Malaysian Communications and Multimedia Commission

Review of Access List

Public Inquiry Report

31 July 2026

This Public Inquiry Report was prepared in fulfilment of sections 55, 61 and 65 of the Communications and Multimedia Act 1998

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ANNEXURE 1 SUMMARIES OF STAKEHOLDER SUBMISSIONS

ABBREVIATIONS AND GLOSSARY

A2P	Application-to-Person
ACCC	Australian Competition and Consumer Commission
AIMS DC	AIMS Data Centre
BTS	Base Transceiver Station
CAS	Common Antenna System
CDN	Content Delivery Network
CMA	Communications and Multimedia Act 1998
CoS	Classes of Service
COPA	Coverage of Populated Areas
DAS	Distributed Antenna System
DIS	Digital Indoor System
EPC	Evolved Packet Core
EPS	Evolved Packet System
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HLR	Home Location Register
HSBB	High Speed Broadband
IBS	In-Building Solutions
IMS	IP Multimedia Subsystem
IMT	International Mobile Telecommunications
IoT	Internet of Things
IP	Internet Protocol
IPTV	Internet Protocol Television
IRU	Indefeasible Right of Use
ISDN	Integrated Services Digital Network
JENDELA	Jalinan Digital Negara or National Digital Infrastructure Plan
LEO	Low Earth Orbit
LTBE	Long-Term Benefit of the End User
LTE	Long-Term Evolution
Mbps	Mega Bit Per Second
MCMC	Malaysian Communications and Multimedia Commission
MEC	Mobile Edge Computing
MNO	Mobile Network Operator
MOCN	Multi-Operator Core Network
MORAN	Multi Operator Radio Access Network
MPEG-TS	Moving Picture Experts Group Transport Stream

MSA	Mandatory Standard on Access
MSAP	Mandatory Standard on Access Pricing
MVNO	Mobile Virtual Network Operator
MyIX	Malaysia Internet Exchange
NEF	Network Exposure Function
NFV	Network Function Virtualisation
NOC	Network Operating Centre
POE	Point of Entry
POI	Point of Interconnection
QoS	Quality of Service
RAN	Radio Access Network
RAO	Reference Access Offer
RedCap	Reduced Capability
SEPP	Security Edge Protection Proxy
SIP	Session Initiation Protocol
SS7	Signalling System Number 7
UDM	Unified Data Management
UDR	Unified Data Repository
VoIP	Voice Over Internet Protocol
VoLTE	Voice-over-LTE
VoNR	Voice over New Radio
WiMAX	Worldwide Interoperability for Microwave Access
WLLC	Wholesale Local Leased Circuit
2G	Second Generation
3G	Third Generation
3GPP	Third Generation Partnership Project
4G	Fourth Generation
5G	Fifth Generation
5GC	Fifth Generation Core

PART 1: BACKGROUND

1 Structure of this PI Report

1.1 This Public Inquiry Report (**PI Report**) relates to MCMC's Public Inquiry on the Review of the Access List. It follows MCMC's Public Inquiry Paper on the Review of the Access List, released on 3 April 2026 (**PI Paper**).

1.2 This PI Report is comprised of three parts and one annexure:

(a) **Part 1 (Background)**: Sections 1 to 4 provide the background to this PI Report, including details about this document, the Public Inquiry process, the stakeholders who have provided submissions, key concepts and a summary of changes to the Access List that MCMC will make arising from this Public Inquiry. This Part also includes a summary of the key themes and the changes MCMC is planning to make to the Access List.

(b) **Part 2 (Priority Issues: New or Significantly Changing Access List Services)**: Sections 5 to 11 focus on facilities and services on the Access List which, in MCMC's view, require significant changes or removal from the Access List. It also focuses on new facilities and services which MCMC proposes adding to the Access List. For each service, the PI Report provides an overview of MCMC's preliminary view on that service (as captured in the PI Paper), an analysis of the stakeholder submissions in respect of that service (including MCMC's response) and MCMC's final view on the changes MCMC proposes to make to the Access List.

(c) **Part 3 (Non-Priority Issues: Current Access List Services with Minor or No Proposed Amendments)**: Sections 12 to 21 focus on facilities and services on the Access List which are proposed to have only minor amendments to the service descriptions or are not changing at all. This Part also considers submissions received from stakeholders on proposed services that are not currently on the Access List and are not proposed to be listed. For each service, the PI Report provides an overview of MCMC's preliminary view on that service (as captured in the PI Paper), an analysis of the stakeholder submissions in respect of that service (including MCMC's response) and MCMC's final view on the changes MCMC proposes to make to the Access List.

(d) **Annexure 1 (Summaries of stakeholder submissions)**: This provides a summary of the submissions made by stakeholders in response to the PI Paper, and which were considered by MCMC in developing the views set out in this PI Report.

2 Introduction

Public Inquiry process

2.1 In the PI Paper, MCMC detailed the approach and methodology it proposed to adopt in this Public Inquiry.

2.2 The purpose of this Public Inquiry has been to solicit views from industry participants, other interested parties and members of the public to assist MCMC to determine whether:

(a) existing Access List facilities and services should be retained or removed;

(b) the descriptions of any Access List items that are to be retained in the Access List remain appropriate or should be revised; and

(c) additional facilities and services should be included in the Access List.

2.3 The PI Paper set out MCMC's preliminary views on these matters and invited comments on MCMC's preliminary views. It specifically sought comment on the questions listed in Annexure 1 of the PI Paper.

2.4 The PI Paper explained:

(a) the legislative context and purpose of conducting the Public Inquiry;

(b) the scope and process of the Public Inquiry;

(c) the proposed outputs of the Public Inquiry; and

(d) MCMC's preliminary views on potential changes to the Access List.

Consultation process

2.5 MCMC has consulted widely and openly with all interested stakeholders during this Public Inquiry, including through:

(a) the circulation of informal questionnaires to industry asking for information and views regarding the proposed Public Inquiry;

(b) meetings with stakeholders before the formal commencement of the Public Inquiry to discuss their responses to the informal questionnaire;

(c) the consideration by MCMC of submissions received from the industry in response to the informal questionnaire;

(d) the publication of the PI Paper on 3 April 2026; and

(e) the consideration of all submissions received by 12 pm (noon) on 3 June 2026 in response to the PI Paper.

Submissions received

2.6 At the close of the Public Inquiry period at 12 pm (noon) on 3 June 2026, MCMC had received written submissions from the following stakeholders.

No.	Submitting party	Short name used in this PI Report
1	BA Networks Sdn. Bhd.	BA Networks

No.	Submitting party	Short name used in this PI Report
2	Bullish Aim Sdn. Bhd.	Bullish Aim
3	CelcomDigi Bhd.	CelcomDigi
4	CTS Horizon Sdn. Bhd.	CTS
5	Digital Nasional Bhd.	DNB
6	EDOTCO Malaysia Sdn. Bhd.	Edotco
7	Maxis Broadband Sdn. Bhd.	Maxis
8	MEASAT Satellite Systems Sdn. Bhd.	MEASAT
9	MSA Resources Sdn. Bhd.	MSA Resources
10	MYTV Broadcasting Sdn. Bhd.	MYTV
11	Neutral Transmission Malaysia Sdn. Bhd.	Neutral Transmission
12	Persatuan Penyedia Infrastruktur Telekomunikasi	PPIT
13	Sarawak Digital Economy Corporation Bhd.	SDEC
14	Starlink Internet Services Malaysia Sdn. Bhd.	Starlink
15	Symbio Networks Malaysia Sdn. Bhd.	Symbio
16	TM Technology Services Sdn. Bhd.	TM
17	TT dotCom Sdn. Bhd.	TIME
18	U Mobile Sdn. Bhd.	U Mobile
19	Wang Kian Tjun	Wang Kian Tjun
20	Xenith IG Malaysia Sdn. Bhd.	Xenith IG
21	XMT Technologies Sdn. Bhd.	XMT

2.7 There were several other submissions after the deadline which were not accepted by MCMC and not considered in developing MCMC's final views or in relation to the drafting of this PI Report.

2.8 Having thoroughly reviewed and assessed the submissions received in response to the PI Paper by the submission deadline against MCMC's own preliminary views, MCMC now presents this PI Report within the timeframe stipulated under section

65 of the Communications and Multimedia Act 1998 (**CMA**), being thirty (30) days after the closing date of submissions, as extended by a further thirty (30) days.

Legislative Context

2.9 MCMC set out the legislative context for the present review of the Access List in the PI Paper in some detail. That background is not repeated here, but interested parties are invited to review Annexure 2 (Legislative Context) of the PI Paper for further details.

Key Concepts and Methodology

2.10 As discussed in section 3 of the PI Paper, MCMC has identified and applied the "long-term benefit of the end-user" (**LTBE**) test and has had reference to the concept of "bottleneck facilities" in determining whether a facility or service should be included in the Access List.

2.11 These concepts are explained further in section 3 of the PI Paper.

3 Key Themes

3.1 In the PI Paper, MCMC nominated five key themes that underpin MCMC's approach to the current review of the Access List:

(a) **the need to improve mobile coverage and speed,** addressed through the proposed listing of 4G Multi-Operator Core Network (**MOCN**) Access and Access to In-Building System for Mobile Service (covering both active and passive in-building mobile infrastructure);

(b) **increasing issues with infrastructure exclusivity in certain areas**, addressed through the proposed listing of Access to Dark Fibre in exclusive zone;

(c) **the growth of data centres**, addressed through the proposed listing of Access to Dark Fibre at points of entry into data centres where there are space or capacity constraints or contractual restrictions on new fibre infrastructure;

(d) **updating the Access List to reflect technological and economic developments**, reflected through the removal of references to SS7-based interconnection within the Interconnect Link Service and the removal of the Internet Protocol (**IP**) Transit Service from the Access List; and

(e) **ensuring that Access List services are intuitively and practically structured**, addressed by moving poles for fixed network equipment from the Infrastructure Sharing service to an expanded Fixed Network Pole, Duct and Manhole Access service, moving access to in-building mobile infrastructure from Infrastructure Sharing to a new service for Access to In-Building System for Mobile Service, and moving broadcasting transmission from the scope of the Transmission Services to a new Broadcasting Transmission Service.

3.2 The PI Paper contains more detail and background on these key themes. Please see section 5 of the PI Paper.

4 Overview of Changes to Access List

Quick guide to amendments

= Retain service on Access List without any modification.

▲ Retain service on Access List with modifications.

✖ Remove service from Access List.

Existing Access List Facilities and Services	Proposed amendments		Section reference
Fixed Network Origination Service	=	Retain service on Access List without any modification.	12
Fixed Network Termination Service	=	Retain service on Access List without any modification.	12
Mobile Network Origination Service	=	Retain service on Access List without any modification.	12
Mobile Network Termination Service	=	Retain service on Access List without any modification.	12
Interconnect Link Service	▲	Retain service on Access List with modifications to remove Signalling System Number Seven (SS7)-based interconnection and to add a new 100 Gbps bandwidth increment.	11
Wholesale Local Leased Circuit Service	▲	Retain service on Access List with minor modifications.	13
Infrastructure Sharing	▲	Retain service on Access List with modifications to remove Common Antenna System (**CAS**) and access to poles for fixed network equipment. CAS will be covered by the new service for Access to In-Building System for Mobile Service, which	9

Existing Access List Facilities and Services	Proposed amendments		Section reference
		will capture both passive and active elements of in-building mobile systems (for 4G and 5G). Access to poles for fixed deployments will be covered as part of the expanded Fixed Network Pole, Duct and Manhole Access service.	
Domestic Connectivity to International Services	=	Retain service on Access List without any modification.	14
Network Co-Location Service	▲	Retain service on Access List with minor amendments to clarify that it applies at premises or facilities owned or operated by the Access Provider (or Access Seeker, as relevant).	16
Digital Terrestrial Broadcasting Multiplexing Service	=	Retain service on Access List without any modification.	17
Layer 2 HSBB Network Service with Quality of Service ("QoS")	▲	Retain service on Access List, renamed as "Layer 2 HSBB Network Service", with modifications to reflect the availability of higher speed tiers for the service and other minor modifications.	18
Trunk Transmission Service	▲	Retain service on Access List with modifications to exclude broadcasting transmission, which will be covered by the proposed new Broadcasting Transmission Service, and other minor modifications.	13
Duct and Manhole Access	▲	Retain service on Access List, renamed as "Fixed Network Pole, Duct and Manhole Access", with modifications to cover access to poles for fixed network equipment, to capture "ducts" and "sub-ducts" generally, and other minor amendments.	15
Layer 3 HSBB Network Service	▲	Retain service on Access List with modifications to reflect the availability of higher speed tiers for the service and other minor modifications.	18
End-to-End Transmission Service	▲	Retain service on Access List with modifications, to exclude broadcasting transmission, which will be covered by the proposed new Broadcasting	13

Existing Access List Facilities and Services	Proposed amendments		Section reference
		Transmission Service, and other minor modifications.	
MVNO Access	▲	Retain service on Access List with minor modifications, including to clarify that it applies to facilities or services owned or operated by the Access Provider and modifications about the functionality included in the service.	19
Domestic Inter-Operator Roaming Service	=	Retain service on Access List without any modification.	20
5G Standalone Access	▲	Retain service on Access List with certain technical modifications (including to clarify the capabilities and functionality included in the service) and amendments to exclude access to 5G in-building mobile systems, which will be covered under the proposed new service for Access to In-Building System for Mobile Service.	7
4G Evolved Packet Core ("EPC") with 5G Radio Access Network ("RAN") Access	▲	Retain service on Access List with technical modifications (including to clarify the capabilities and functionality included in the service) and amendments to exclude access to 5G in-building mobile systems, which will be covered under the proposed new service for Access to In-Building System for Mobile Service.	7
IP Transit Service	✖	Remove service from Access List.	10

Addition of New Access List Facilities and Services

New Access List Facilities and Services	Section reference
Access to Dark Fibre	5
4G Multi-Operator Core Network (MOCN) Access	6
Broadcasting Transmission Service	8
Access to In-Building System for Mobile Service	9

PART 2: PRIORITY ISSUES – NEW OR SIGNIFICANTLY CHANGING ACCESS LIST FACILITIES AND SERVICES

5 Access to Dark Fibre

Overview

5.1 In the PI Paper, MCMC took the preliminary view that a new Access to Dark Fibre service should be listed on the Access List.

5.2 MCMC's preliminary view in the PI Paper was that this service should be limited to dark fibre between two locations, where at least one of these locations is:

(a) within an Exclusive Zone and there are fewer than three independent providers of optical fibre cables providing connectivity between the two locations to which the Access Seeker is requesting access; or

(b) a Restricted Data Centre Point of Entry (**POE**).

MCMC Assessment

General basis for listing dark fibre in Exclusive Zone and for Restricted Data Centre POEs

5.3 Stakeholders had mixed views in relation to the listing of Access to Dark Fibre, although there was more support than opposition in respect of MCMC's proposal. More specifically:

(a) BA Networks, Bullish Aim, MSA Resources, Neutral Transmission, SDEC, TIME and TM opposed listing dark fibre on the Access List; and

(b) CelcomDigi, CTS, DNB, Edotco, Maxis, MEASAT, PPIT, Symbio, U Mobile, XMT and Xenith IG supported listing dark fibre, with:

(i) CelcomDigi, MEASAT and U Mobile favouring further expansion in the scope of the regulated service compared to MCMC's proposal in the PI Paper; and

(ii) Edotco supporting a narrowing of scope.

5.4 There were a number of themes generally raised by the stakeholders opposing the listing of dark fibre, which MCMC will respond to in this section:

(a) dark fibre does not constitute a bottleneck facility;

(b) dark fibre regulation would limit investment incentives and would discourage fibre rollout in Malaysia;

(c) international regulatory practice does not support the listing of dark fibre;

(d) MCMC's proposed listing of dark fibre is not granular enough; and

(e) dark fibre is a "non-commoditised" service that cannot readily be supplied under a regulated instrument such as a RAO.

5.5 MCMC will deal with each of these issues in turn, below.

Dark fibre as a bottleneck facility

5.6 A key point in TM's submission is that dark fibre is not a bottleneck facility, because it forms part of the infrastructure used to deliver "higher-layer" services, such as transmission, which are already available to Access Seekers, while the Access List also regulates "lower-layer" services, in the form of pole, duct and manhole access.

5.7 In MCMC's view, the LTBE is served when operators are able to engage in high-quality, differentiated competition in downstream markets. This requires an ability for operators to engage in both services-based and facilities-based competition. In most areas of Malaysia, this is achieved through pole, duct, manhole and other passive infrastructure access as a driver of facilities-based competition, and access to regulated active/lit services such as transmission services as a driver of services-based competition.

5.8 MCMC reiterates that it is not proposing to list Access to Dark Fibre on a nationwide basis, but only in very specific areas, namely Exclusive Zone and Restricted Data Centre POEs. MCMC agrees that, outside these areas, it is not currently in the LTBE to regulate dark fibre. A key reason for this is that Access Seekers are able to compete in retail markets by using regulated pole, duct and manhole access to deploy their own infrastructure or, alternatively, using active services such as transmission to compete in a services-based manner.

5.9 However, in Exclusive Zone and Restricted Data Centre POEs, the ability for Access Seekers to deploy their own infrastructure is significantly restricted. In these areas, Access Seekers are either unable to roll out their own infrastructure due to legal or contractual exclusivity restrictions or due to space/capacity constraints (in the case of Restricted Data Centre POEs). This means that, in contrast to TM's submission, there is no meaningful ability for Access Seekers to obtain "lower-layer" services in these areas.

5.10 While Access Seekers are generally able to acquire "higher-layer" services in Exclusive Zone and to Restricted Data Centre POEs, this is insufficient to drive high-quality, differentiated competitive outcomes in retail markets. As mentioned in the PI Paper, higher-layer services leave a relatively narrow field for competitive differentiation. In these circumstances, the Access Seeker is competing using the Access Provider's infrastructure and wholesale services as an input, leaving only a relatively small proportion of value that is capable of competitive differentiation.

5.11 Accordingly, in Exclusive Zone and Restricted Data Centre POEs, there is a strong regulatory basis to mandate access at the lowest possible layer, which is dark fibre. In these areas, the inability to legally or practically use duct access (or other civil infrastructure) due to exclusivity or space/capacity restrictions renders dark fibre a bottleneck facility, as it is only through dark fibre that Access Seekers are able to compete in a manner that approaches a degree of facilities-based competition.

Investment incentives

5.12 MCMC is not persuaded by submissions from several stakeholders, primarily BA Networks, Bullish Aim and TM, that regulating dark fibre would diminish investment incentives or discourage fibre rollout.

5.13 As mentioned above, MCMC's proposal is to regulate dark fibre only in those areas where exclusivity restrictions (and, in the case of Restricted Data Centre POEs, space/capacity constraints) prevent new fibre rollout. In these areas, the status quo, without regulation, is already one where it is not possible for new entrants to meaningfully roll out new fibre networks. In other words, there is no "investment incentive" to begin with in Exclusive Zone and Restricted Data Centre POEs that could be curtailed by regulation. Instead, regulated access to existing infrastructure, via Access to Dark Fibre, would allow such infrastructure to be utilised more efficiently and competitively compared to the status quo, which is an outcome that serves the LTBE.

5.14 Accordingly, MCMC does not consider that, in the areas where it is proposing to regulate dark fibre, regulation would diminish investment incentives or discourage fibre rollout.

International regulatory practice

5.15 Bullish Aim and TM both submitted that regulation of dark fibre is not supported by international regulatory benchmarks, including in jurisdictions comparable to Malaysia.

5.16 There are significant differences in context between Malaysia and countries that have refrained from regulating dark fibre, such as Singapore, Australia and Thailand. The presence of Exclusive Zone in Malaysia – where one or a limited number of providers is granted fibre exclusivity and other operators are unable to roll out fibre infrastructure due to legal or contractual restrictions – is a peculiar feature of the Malaysian communications sector.

5.17 As mentioned above, the dynamics of competition in Exclusive Zone are entirely different compared to other areas in Malaysia (and in the comparator jurisdictions cited by Bullish Aim and TM). In Exclusive Zone of Malaysia, new market entry is foreclosed by exclusivity restrictions and there is no "incentive to invest", even without regulation. Accordingly, MCMC does not consider that regulatory practice in other countries, which have refrained from regulating dark fibre nationwide due to concern about investment incentives, is applicable or relevant to the specific circumstances of Exclusive Zone in Malaysia.

5.18 To respond specifically to TM's point about the ACCC declining to regulate dark fibre in Australia in 2018–19 and the corresponding growth of alternative wholesale fibre providers, MCMC notes that this type of alternative wholesale fibre deployment is entirely impossible in Exclusive Zone in Malaysia, due to the presence of exclusivity restrictions.

5.19 MCMC also considers that dark fibre regulation is not unprecedented globally. As TM's own submission mentions, regulation has been applied in certain narrow circumstances in various countries, including a number of European Union countries and the United Kingdom. TM's submission cites the example of Ireland, where dark fibre access is mandated where access to Eircom's ducts and poles is not possible

and dark fibre is reasonably available. TM also refers to Portugal, where dark fibre access is regulated where duct and pole access is not possible.[1]

5.20 This type of narrow regulatory intervention is very similar to what MCMC is proposing. By applying only to Exclusive Zone and Restricted Data Centre POEs, the Access to Dark Fibre service is restricted to those areas where Access Seekers are prohibited (due to exclusivity restrictions or space/capacity constraints) from rolling out their own fibre infrastructure. The situation in Exclusive Zone and at Restricted Data Centre POEs is very similar to a situation where duct access is not possible as, in both cases, the practical effect is an inability to access ducts to roll out new fibre infrastructure. Accordingly, the regulatory practice in countries such as Ireland and Portugal supports rather than contradicts MCMC's approach to regulating dark fibre in Malaysia.

Regulation is not targeted enough

5.21 Bullish Aim submitted that MCMC's bottleneck analysis is insufficiently granular, and that dark fibre listing would "*sweep in well-functioning commercial markets alongside any genuinely problematic zones*".

5.22 MCMC disagrees with this characterisation. In the paragraphs further below, MCMC considers further submissions regarding the definition of "Exclusive Zone" and makes certain amendments to enhance the clarity and focus of this concept.

5.23 With these amendments implemented, MCMC does not consider that the concepts of Exclusive Zone and Restricted Data Centre POEs capture any "*well-functioning commercial markets*". The core features of these areas are that they are subject to legal, contractual or technical restrictions that prevent competition at the infrastructure level. As a result, the service description is tailored towards those specific areas where there is an *absence* of well-functioning competition on a commercial basis.

Dark fibre is a "non-commoditised" service

5.24 BA Networks submitted that dark fibre products involve a range of diverse requirements, which makes it difficult to establish a standardised RAO, while Bullish Aim similarly suggested that dark fibre was not a "*commodity product*" which encompassed a wide variety of configurations.

5.25 MCMC does not agree that this makes dark fibre unsuitable for regulation on the Access List. Compared to other services on the Access List, dark fibre is a relatively simple product from a technical perspective, as it involves the provision of passive (unlit) fibre access to the Access Seeker. While there are various commercial models for supplying dark fibre (e.g. as an IRU or lease, with different pricing structures), the Access List does not mandate Access Providers to implement a specific model and therefore does not lock the market into a "*lowest-common-denominator specification*", as suggested by Bullish Aim.

5.26 MCMC also considers that dark fibre should present significantly fewer challenges in terms of regulatory "productisation" and compliance with administrative

[1] TM submission on Access List, p. 15.

requirements than most existing Access List services and facilities, including more complex services such as MVNO Access or 5G Services, which involve several service components, technical protocols and network integration requirements.

Definition of Exclusive Zone

5.27 Several stakeholders proposed amendments to the definition of "Exclusive Zone" in the PI Paper, to improve clarity and remove ambiguity.

5.28 Given that there were a number of different amendments, with some expanding the definition and others narrowing it, MCMC will not respond to each individual amendment here. However, MCMC has considered each of these proposals and takes the view that it would be appropriate to make certain amendments to the concept of "Exclusive Zone" to enhance certainty and minimise the potential for access disputes. More specifically, MCMC considers that three types of amendments should be made, as explained below.

5.29 **First**, MCMC considers that the types of items that create exclusivity should be specifically limited to concrete and identifiable instruments – namely, a prevailing law, regulation, binding policy, contract, arrangement or understanding. MCMC proposes to remove the reference to "requirement" and "practice" and make it clear that a policy must be "binding" for it to be capable of being an exclusivity restriction. These amendments are intended to focus the Exclusive Zone concept on those areas where there are binding and identifiable exclusivity restrictions, so as to limit disputes about whether a given exclusivity "requirement" or "practice" actually exists, or whether a "policy" actually binds the Access Provider or the Access Seeker.

5.30 **Second**, MCMC proposes to replace the "*prohibits or materially hinders*" language proposed in the PI Paper with a two-factor, effects-based test, where, for an area to be an Exclusive Zone, the relevant prevailing law, regulation, binding policy, contract, arrangement or understanding would need to have the effect of both:

(a) designating or conferring exclusivity on fewer than three licensees in respect of fibre infrastructure in that area; and

(b) prohibiting the deployment of new fibre infrastructure by other licensees in that area.

5.31 This two-factor test has a number of benefits compared to the previous language. It would ensure that the Exclusive Zone concept does not inadvertently cover situations where there may not be any generalised exclusivity restriction but an Access Seeker is prohibited from deploying new fibre infrastructure by factors relating to that Access Seeker specifically (e.g. a failure to obtain necessary permits or a failure to negotiate successfully with a landowner). This is achieved by requiring the relevant instrument to not only have the effect of prohibiting the deployment of new fibre infrastructure, but also of the effect of designating exclusivity on specific licensees. The effect-based nature of this language would also mean that exclusivity restrictions "on paper" that are not actually enforced in practice would <u>not</u> fall within the Exclusive Zone definition.

5.32 The updated test proposed by MCMC would also minimise indeterminacy, which is a concern especially raised by BA Networks, Bullish Aim and TM (among others). By removing the reference to "*materially hinders*" proposed in the PI Paper, the updated definition would require instruments to "*prohibit*" the deployment of new fibre infrastructure. This is appropriate, since "*materially hindering*" deployment of fibre could inadvertently disincentivise new deployments (e.g. by imposing economic barriers) without prohibiting them. As mentioned in paragraphs 5.48 and 5.49 below, the Exclusive Zone concept is intended to capture legal exclusivity, not the presence of economic barriers that hinder new fibre rollout.

5.33 The updated effect-based test would also embed the "*fewer than three licensees*" factor directly within limb (a) of the test (i.e. within the concept of Exclusive Zone), rather than as a separate factor as proposed in paragraph (a)(i) of the service description in the PI Paper. This would simply the service description.

5.34 **Third**, MCMC proposes to amend the Exclusive Zone definition so that an Exclusive Zone must be established by MCMC, in accordance with processes set out in the MSA, before dark fibre in that area becomes subject to access obligations. MCMC's designation of an Exclusive Zone would be based on the test described above – i.e. based on whether a prevailing law, regulation, binding policy, contract, arrangement or understanding has the relevant exclusivity effect described above. Requiring MCMC designation of an Exclusive Zone would provide certainty to both Access Providers and Access Seekers about the specific areas where access obligations apply. This responds to proposals from several stakeholders (e.g. TM and Neutral Transmission) that Exclusive Zone should be defined in a more granular way and by reference to specific areas.

5.35 MCMC considers that requiring Exclusive Zone to be established by MCMC creates an appropriate balance between, on the one hand, keeping the service description flexible and future-proof (i.e. not enumerating any specific Exclusive Zone within the service description) and, on the other hand, ensuring that the geographic scope of dark fibre access obligations is determinate and can be readily ascertained by operators.

Definition of Restricted Data Centre POEs

5.36 Compared to the definition of Exclusive Zone, MCMC received fewer submissions about the definition of Restricted Data Centre POEs.

5.37 In relation to TM's submission that the definition be narrowed to capture only clear, formal and enforceable legal or contractual restrictions and exclude vague concepts such as "understanding" or "practice", MCMC notes that the Restricted Data Centre POE concept is not intended to have the same scope as Exclusive Zone.

5.38 As mentioned in the PI Paper, access to data centres is becoming an increasingly critical input for operators to provide communications services. Data centres are acting as critical points of interconnect, including to international capacity, and also as points where data is being stored (e.g. through cloud services or Content Delivery Network (**CDN**) services), which operators are required to access to provide connectivity between such data and customer locations, such as offices and residential premises. Connectivity into data centres is therefore acting as a particular bottleneck that warrants specific regulatory attention.

5.39 For this reason, MCMC considers that it would be in the LTBE to regulate access to dark fibre at points of entry into data centres not only where there are exclusivity restrictions, but also where there are other objective barriers to Access Seekers deploying their own fibre infrastructure – i.e. practices that prohibit such deployment or space or capacity constraints at the duct or manhole level. The reference to space or capacity constraints is also suited to the specific context of data centres, since access to data centres is only possible via a POE and an operator typically needs access to multiple POEs for redundancy. This means that space and capacity constraints at a POE create clear barriers to operators providing connectivity to a data centre.

5.40 MCMC disagrees with Xenith IG's proposal to expand the Restricted Data Centre POE definition to capture situations where an Access Seeker is "*economically limited*" from deploying its own fibre infrastructure due to the rates being charged by the data centre. This proposal would make the concept unduly broad and would also introduce indeterminacy into this definition, since there are likely to be conflicting views on whether an Access Seeker is sufficiently limited from deploying fibre infrastructure due to economic constraints imposed by the data centre operator. MCMC therefore considers it appropriate to maintain the focus of "Restricted Data Centre POEs" on those POEs where there are space/capacity constraints and actual prohibitions on deploying new fibre infrastructure.

Expansions to service description proposed by stakeholders

5.41 Several stakeholders proposed an expansion in the scope of regulation beyond Exclusive Zone and Restricted Data Centre POEs (as defined under the PI Paper).

5.42 In summary, MCMC does not consider that any expansions in the scope of regulation would be in the LTBE at this stage. MCMC provides its reasoning in response to the specific proposals below.

Utility and transport corridors

5.43 CelcomDigi proposes that the service description be expanded to cover "utility corridors" (as a type of Exclusive Zone), while Neutral Transmission asks a question about whether public infrastructure rights-of-way, including utility and transport corridors, could be considered Exclusive Zone. Xenith IG similarly proposes to expand the Exclusive Zone definition to cover transport and utility corridors (such as highways, train tracks and gas pipelines) and areas with "*special wayleaves or right of way*".

5.44 MCMC considers that, on balance, the Exclusive Zone definition should not be expanded to allow utility corridors and other rights-of-way to be Exclusive Zone. The Exclusive Zone definition proposed in the PI Paper refers to "*any area, including a state, a federal territory, a district, a development area or other location*". This is intended to capture geographic areas rather than specific routes or corridors.

5.45 Utility and transport corridors have different economic characteristics to areas such as states, districts or development areas. Where an operator is designated exclusive in respect of a utility corridor, the exclusivity applies over a relatively narrow area and Access Seekers have the ability to roll out fibre networks using other surrounding infrastructure (e.g. ducts adjacent to the utility corridor). Utility

corridors are also typically a space for rolling out backhaul networks and do not directly include premises or Point of Interconnection (**POI**) where networks terminate or interconnect. This means that an inability to access a utility corridor due to exclusivity restrictions does not typically prevent the Access Seeker from connecting large numbers of premises (or POI) using new fibre infrastructure. This is different to an entire state or local area being subject to an exclusivity restriction, which prohibits new fibre rollout to any premises or locations within that area.

5.46 Accordingly, MCMC is not persuaded that the Exclusive Zone definition should be expanded to specifically refer to utility and transport corridors or other rights-of-way.

Regulation in areas where infrastructure is not economically replicable

5.47 U Mobile proposes that dark fibre be regulated not only in Exclusive Zone and Restricted Data Centre POEs, but also in areas where fibre networks are uneconomic to replicate (e.g. as evidenced by there being fewer than three independent providers or because dark fibre is being rolled out through a government-funded initiative).

5.48 Through the concept of Exclusive Zone, MCMC's proposed scope of regulation is specifically targeted towards areas where there are *legal* or *other structural* (non-economic) barriers to new fibre rollout, rather than economic barriers. In principle, MCMC agrees that, outside Exclusive Zone, there are likely to be areas where economic duplication of fibre networks is inefficient, meaning that Access Seekers will not in practice build new fibre infrastructure even though they have the ability to do so (including via regulated access to poles, ducts and manholes).

5.49 However, MCMC's concern is that, unlike legal restrictions (which can be identified on a relatively objective basis), the presence of economic barriers is subject to a high degree of indeterminacy, with Access Providers and Access Seekers likely to take divergent views on whether alternative fibre rollout is economically efficient. This is likely to create a high number of access disputes and make the service description uncertain in practice.

5.50 MCMC also considers that the two proxies for economic barriers proposed by U Mobile – the presence of government funding and fewer than three independent providers – are not sufficiently close indicators of economic barriers. This would make the scope of regulation overly broad and could potentially capture areas where Access Seekers have a viable option to roll out their own fibre infrastructure. Accordingly, MCMC is not persuaded that the service description should be expanded in the manner proposed by U Mobile.

Regulation on a national basis

5.51 In relation to MEASAT's proposal that dark fibre should be listed nationally (rather than only in Exclusive Zone and Restricted Data Centre POEs) and PPIT's proposal that regulation should extend beyond Exclusive Zone and Restricted Data Centre POEs, MCMC considers that conditions of competition are significantly different outside Exclusive Zone and Restricted Data Centre POEs. In these other areas, Access Seekers have the ability to use Fixed Network Pole, Duct and Manhole Access to roll out their own fibre infrastructure. Accordingly, MCMC is not persuaded

that, at this stage, there is a sufficient regulatory basis for regulating dark fibre nationally.

Other issues

5.52 In relation to Edotco's submission that dark fibre regulation should not extend to fibre deployed for an operator's own operational purposes (and should be restricted to fibre deployed for the purpose of providing access services), MCMC considers that this would be contrary to the purpose and structure of the access regime. The standard access obligations in section 149 require network facilities providers to provide access to "*their network facilities*" listed in the Access List. The Access List is designed to regulate services and facilities that Access Providers may not have an incentive to provide to others commercially. Accordingly, limiting regulated access only to those facilities which an Access Provider already intends to provide to others (or already does so) would undermine a key purpose of the Access List.

5.53 MCMC also notes that the grounds for refusal in section 5.4.11 of the MSA would apply to Access to Dark Fibre, as they already apply to other Access List services. Refusal is permitted where an Access Provider does not currently supply or provide access to a facility, even to itself, except where the Access Seeker compensates the Access Provider for the original supply of access. Refusal is also allowed on the grounds of technical infeasibility or insufficient capacity or space (among other grounds). Accordingly, MCMC does not consider it appropriate to introduce any further limitations to the service description in relation to minimum fibre count thresholds or physical feasibility, as suggested by Edotco.

5.54 Regarding Xenith IG's request that MCMC add a clarification that all operators with dark fibre (within the areas covered by the service description) must offer access to dark fibre, even if dark fibre is not part of their standard product offering, MCMC confirms that:

(a) as set out in paragraph 5.52 above, operators will be required to provide access to their dark fibre in accordance with the standard access obligations, including in circumstances where they are not currently providing wholesale access through a standard product offering; and

(b) the ordinary grounds of refusal under the MSA will apply in relation to Access to Dark Fibre.

MCMC Views

5.55 MCMC confirms its preliminary view that Access to Dark Fibre should be listed on the Access List, capturing dark fibre between two points where at least one of those points is within an Exclusive Zone or is a Restricted Data Centre POE.

5.56 However, compared to the service description proposed in the PI Paper, MCMC will make certain amendments to ensure that the scope of the regulated service in relation to Exclusive Zone is clearer and provides more certainty to both Access Providers and Access Seekers.

5.57 Accordingly, MCMC considers that the service description for Access to Dark Fibre should be as follows:

(20) Access to Dark Fibre

(a) The Access to Dark Fibre is a Facility and/or Service for the provision of access to optical fibre cables between a POI at an Access Provider's premises and another location on the Access Provider's network, where at least one of these locations is:

(i) within an Exclusive Zone; or

(ii) a Restricted Data Centre POE.

*(b) An "**Exclusive Zone**" means any area, including a state, a federal territory, a district, a development area or other location where, as established by the Commission in accordance with the Mandatory Standard on Access, a prevailing law, regulation, binding policy, contract, arrangement or understanding has the effect of:*

(i) designating or conferring exclusivity on fewer than three licensees in respect of fibre infrastructure in that area; and

(ii) prohibiting the deployment of new fibre infrastructure by other licensees in that area.

*(c) A "**Restricted Data Centre POE**" means a point of entry into a data centre to which the Access Seeker is:*

(i) unable to deploy its own fibre infrastructure because of space or capacity constraints in the relevant ducts or manholes at that point of entry; or

(ii) prohibited from deploying its own fibre infrastructure because of contracts, arrangements, understandings or practices between the Access Provider and any person.

(d) Access to optical fibre cables under paragraph (a) includes the Access Seeker's right to install equipment to enable the carriage of communications over the relevant fibre cables and to use the fibre cables for such carriage of communications.

6 4G MOCN Access

Overview

6.1 In the PI Paper, MCMC took the preliminary view that a new 4G MOCN Access service should be listed on the Access List.

MCMC Assessment

Basis for listing 4G MOCN Access

6.2 Among stakeholders who provided views on these issues before the submission deadline:

(a) CelcomDigi and Maxis did not support listing 4G MOCN Access on the Access List;

(b) DNB, PPIT, SDEC and TM, as well as the individual submission of Wang Kian Tjun, supported listing 4G MOCN Access on the Access List; and

(c) U Mobile supporting listing 4G MOCN Access only in areas where the Access Seeker can demonstrate that it cannot economically replicate the Access Provider's 4G RAN and has no alternative means of serving end-users.

6.3 MCMC has considered all of these submissions and continues to take the view that there is a strong basis for listing 4G MOCN Access from an LTBE perspective.

6.4 As mentioned in the PI Paper, the RAN elements of 4G network are a typical "bottleneck" facility, as Access Seekers require access to a RAN to provide mobile telecommunications services in retail markets. Due to the high costs involved in RAN deployment, it is also economically inefficient for RAN infrastructure to be duplicated beyond a certain level – that is, beyond a given number of network operators, with certain geographic areas also supporting fewer operators efficiently deploying their own independent RAN compared to other areas.

6.5 MCMC also considers that MOCN access is an efficient way for Access Seekers to obtain access to RAN elements, as it allows access to be obtained at relatively low overall cost (as compared to each operator rolling out its own independent RAN nationwide) while still retaining a relatively high degree of competitive differentiation and control for each operator (by allowing each Access Seeker to maintain control of its own separate core network).

6.6 As a result, MCMC is persuaded that 4G MOCN Access would allow for a higher quality of competition in retail markets as compared to other Access List services, such as MVNO Access and Domestic Inter-Operator Roaming Service, which provide significantly lower levels of control to Access Seekers. 4G MOCN Access would also promote the economically efficient use of RAN infrastructure, as it would reduce uneconomic duplication of RAN assets and allow existing RAN assets to be used to deliver a greater number of retail services (and a greater differentiation of retail services) as compared to a scenario where such assets are not subject to a MOCN arrangement. For these reasons, MCMC is satisfied that listing 4G MOCN Access on the Access List is in the LTBE.

6.7 MCMC is also not persuaded that 4G MOCN Access would reduce investment incentives into 4G RAN infrastructure. The infrastructure that would be subject to regulated MOCN access has largely already been rolled out, so it is unlikely that regulation would materially change the investment incentives of Access Providers. Moreover, MCMC considers that 4G MOCN Access would largely be used by Access Seekers in circumstances and areas where it would be uneconomical for such Access Seekers to roll out their own RAN infrastructure. Accordingly, MCMC is not persuaded that regulating 4G MOCN Access would diminish incentives by Access Seekers to invest in new 4G RAN infrastructure in an economically efficient manner.

6.8 MCMC notes Maxis' submission that the mobile market in Malaysia is competitive and well-functioning, which Maxis submits is evidenced by an increasing role for MVNOs and improved coverage outcomes. MCMC does not consider the increasing presence or market share of MVNOs to be particularly relevant to determining whether there is a basis for listing 4G MOCN Access on the Access List. Since MVNOs predominantly rely on the host MNO's core network and RAN, they do not deliver the type of competitive differentiation that would be enabled by 4G MOCN Access. Accordingly, the presence of MVNOs in the retail market does not indicate the

presence of robust competition in the retail market (with a sufficiently high level of competitive differentiation) and does not diminish the regulatory basis for listing 4G MOCN Access on the Access List.

6.9 In relation to coverage outcomes, MCMC notes that 4G coverage continues to lag in regional and rural areas, particularly when having regard to coverage on an operator-by-operator basis. While it is true that most states in Malaysia now have 4G coverage approaching 100%, this refers to the aggregate coverage across all operators.

6.10 These coverage levels are not achieved in all states. For example, as set out in Maxis' submission,[2] the "industry minimum" Coverage of Populated Areas (**COPA**) figures for Sarawak and Sabah are 64.2% and 73.5%, respectively. Even in Peninsular Malaysia, there are states with industry minimum COPA below 90% based on Maxis' figures (Pahang at 83.5%, Perlis at 87.4% and Kelantan at 88.2%). Since end-users typically only acquire retail mobile services from a single operator, disparities in coverage on a per-operator basis significantly affect end-user experience and prevent end-users from enjoying true nationwide coverage.

6.11 MOCN access is particularly well suited to dealing with these challenges. Since MOCN access is available on a site-by-site basis (as opposed to the Domestic Inter-Operator Roaming Service), it can be used by operators to address coverage gaps in specific areas, where it may be uneconomical for those operators to roll out an independent RAN in those areas. This allows such operators to increase their coverage in a targeted manner, while still retaining a high degree of control over their network.

6.12 In relation to submissions from CelcomDigi and Maxis that MOCN access is adequately being provided on a commercial basis (and therefore does not need regulation), MCMC received submissions from another operator that it faces barriers in accessing MOCN arrangements, experiencing rejections of up to 51% for site access requests in key areas, and that commercial MOCN pricing is also prohibitive. While listing on the Access List would not itself result in price regulation or address pricing issues (this being a matter for the MSAP), MCMC considers that the existing challenges faced by operators in accessing RAN equipment via a MOCN arrangement demonstrate that there is an existing market failure with regard to MOCN access, which justifies regulating this service via the Access List.

Technical and operational challenges

6.13 CelcomDigi's submitted that 4G MOCN is a highly customised arrangement which cannot be treated as a standardised Access List service, while Maxis submitted that active network sharing arrangements introduce material operational and technical challenges (which would better be dealt with commercially).

6.14 MCMC disagrees with this view. The proposed 4G MOCN Access service is similar to the existing 5G Services from a technical perspective, as these services involve 5G RAN access being provided to Access Seekers using a MOCN model. The service description for 4G MOCN Access is also significantly based on the service descriptions for the 5G Services. The fact that 5G Services have been on the Access

[2] Maxis submission, p. 35.

List since 2021 without significant technical and supply challenges suggests that there are no inherent operational or technical barriers to MOCN arrangements being regulated via the Access List.

6.15 In relation to Maxis' submission that 4G MOCN Access requires customised solutions (which are not suited to access regulation), MCMC notes that listing 4G MOCN Access on the Access List will not prohibit the Access Provider and Access Seeker from agreeing customised solutions depending on the nature of the site to which access is being sought. This is accommodated via the Access Agreement framework and the fact that the MSA only sets terms and conditions for 4G MOCN Access at a relatively general level, therefore not displacing the ability of the Access Provider and Access Seeker to agree terms and conditions that meet their operational, technical and commercial needs.

6.16 Regarding Maxis' view that mandating 4G MOCN Access would prohibit Access Providers from managing access in a manner that protects network quality, MCMC notes that the grounds for refusal in subsection 5.4.11 of the MSA will apply to 4G MOCN Access as they do to other Access List Services. The grounds for refusal include technical infeasibility and insufficient capacity or space, with subsections 5.4.17 and 5.4.18 providing further clarity on when access may be refused on these grounds. In MCMC's view, this will provide a proportionate framework for balancing the ability for Access Seekers to obtain effective access to 4G RAN infrastructure (via 4G MOCN Access) and concerns regarding technical feasibility and capacity constraints.

6.17 Finally, in relation to Maxis' submission about spectrum incompatibility in relation to 4G MOCN Access, MCMC proposes to introduce amendments to the service-specific obligations for 4G MOCN Access in the MSA to clarify that 4G MOCN Access includes models where: (a) the Access Seeker uses its own spectrum entitlements; (b) the Access Seeker uses the Access Provider's spectrum entitlements; or (c) there is pooling of spectrum between the Access Provider and the Access Seeker. The MSA will also require parties to implement reasonable spectrum interference mitigation measures appropriate to the model (e.g. guard bands, radio frequency filtering and antenna isolation). The PI Report on the Review of Mandatory Standard on Access contains further detail on these MSA amendments. In MCMC's view, this will ensure that 4G MOCN Access can be implemented in a manner that deals with spectrum-related challenges and is adapted to the characteristics of each site and the nature of spectrum being held by the Access Provider and the Access Seeker.

Scope of service

6.18 MCMC has considered whether it would be appropriate to narrow the scope of 4G MOCN Access to apply only to certain sites or areas. MCMC's view is that such restrictions are not appropriate, as explained below.

6.19 U Mobile and Maxis both suggest broad, principles-based limitations to the scope of the service:

(a) U Mobile suggests that 4G MOCN Access should only be regulated in areas where the Access Seeker cannot economically replicate the Access Provider's 4G RAN; and

(b) Maxis suggests (as an alternative to its view that 4G MOCN Access not be regulated) that regulation should be restricted to "*sites targeting underserved areas across Malaysia with a focus on rural, remote, difficult terrain and poor-quality coverage sites areas*".

6.20 MCMC does not consider that such principles could practicably be incorporated into the service description. There are likely to be significantly different views between an Access Provider and an Access Seeker about whether it is economically efficient for the Access Seeker to roll out its own RAN in an area. There is also no objective way to determine this without conducting a detailed economic analysis.

6.21 Similarly, whether a site is located in "*difficult terrain*" or in area with "*poor-quality coverage*" (or even whether an area is rural or remote) is likely to be subject to different interpretations among operators and is incapable of having a clearly defined meaning as would be necessary for a service description within the Access List. MCMC considers that adding such criteria into the service description for 4G MOCN Access would create a large number of access disputes and would make this service unworkable from a practical perspective.

6.22 MCMC has also considered the appropriateness of limiting the 4G MOCN Access service to specific, identifiable sites or areas. This approach is suggested by Maxis' submission that regulated access be limited to "JENDELA 2" sites. MCMC's concern with such an approach is that it would not be sufficiently future-proof. Referring to specific sites would not allow the service description to evolve with market conditions over the term of the Access List. This is also not an approach that has been pursued for other services on the Access List, where, even though conditions of competition may differ across geographic areas, regulated services are not restricted to specific, pre-identified geographic areas.

6.23 Even for services where there are clear differences in competition on a geographic basis, the service description is drafted in a future-proof manner. For example, the new Access to Dark Fibre service is confined to Exclusive Zone and Restricted Data Centre POEs (as described in section 5). However, the designation of specific Exclusive Zone is left up to MCMC to establish in the future. This allows the service description to remain adaptable over time in light of changing conditions in the market (and the legal and regulatory context). Consistently with this approach, MCMC does not consider it appropriate to restrict the scope of 4G MOCN Access to specific sites enumerated within the service description, which would prevent the scope of the service from evolving as market conditions change.

Proposed amendments to service description

6.24 TM, U Mobile and CelcomDigi suggested amendments to the service description for 4G MOCN Access, which MCMC will consider in turn.

6.25 In relation to TM's submission about clarifying that the service applies across deployment environments, MCMC considers it would be useful to add clarification to paragraph (d) of the service description that the service must be provided regardless of whether a site is located in an urban, suburban, regional or rural area.

6.26 Regarding TM's submission about bolstering the service description to prevent arbitrary exclusions of eligible sites, MCMC considers that this does not require

further clarification. Paragraph (d) makes it clear that the service must be provided "*at any site where the Access Provider has installed components of its 4G radio network*". Subsection 5.4.11 of the MSA contains a range of refusal grounds (including for technical feasibility), which will apply to the 4G MOCN Access in the same way as they apply to other services in the Access List. Accordingly, MCMC does not consider that any further clarifications need to be made on this point.

6.27 In relation to TM's submission about ensuring indoor coverage, MCMC notes that indoor coverage is to be provided as part of the new service for Access to In-Building System for Mobile Service (which applies regardless of network technology and includes both active and passive in-building elements). To avoid confusion and overlap, MCMC therefore proposes to specifically exclude in-building mobile systems from the scope of 4G MOCN Access, which is consistent with a similar exclusion proposed for 5G Services in the PI Paper.

6.28 Regarding TM's submission about ensuring that 4G MOCN Access does not preclude an Access Seeker from offering downstream wholesale services, MCMC considers that this is already adequately dealt with in the proposed service description. Paragraph (a) of the service description proposed in the PI Paper would not only allow the Access Seeker to use 4G MOCN Access to provide "*public cellular services to the public*" (i.e. retail services), but also to provide "*MVNO Access or another Service and/or Facility on the Access List that uses access to a 4G radio network as an input*". This limb makes it clear that the Access Seeker can use 4G MOCN Access to provide any wholesale Access List service downstream, including MVNO Access.

6.29 However, MCMC agrees with TM's submission that the service description should explicitly state that the service supports a range of use-cases, such as mobile broadband, enterprise-related deployments and machine-to-machine or IoT use-cases. This would be consistent with the 5G Standalone Access service, which (at paragraph (d) of that service description) refers to the service being supplied to enable the Access Seeker to provide mobile broadband services, massive IoT services and mission-critical services.

6.30 MCMC therefore proposes to add two new limbs in paragraph (a) of the service description, to refer to massive Internet of Things (**IoT**) services and mission-critical services. The reference to "*mobile broadband services*" is already included in paragraph (a)(iv) of the proposed service description. In relation to enterprise-related deployments as mentioned by TM, MCMC notes that paragraph (a)(ii) already refers to "*services to enterprise and/or government Customers*".

6.31 In relation to U Mobile's proposed amendments to the service description, MCMC has the following views:

(a) Regarding deletion of the phrase "*whether or not as part of a Mobile Network*", MCMC notes that this phrase also appears in the 5G Standalone Access and 4G EPC with 5G RAN Access service descriptions. MCMC considers that this should be retained for consistency, particularly having regard to the somewhat narrow definition of "Mobile Network" in the Access List.

(b) Regarding the proposed wording "*subject to technical feasibility and the configurations agreed between the parties*" in paragraph (b) of the service

description, as well as "*subject to capacity and technical feasibility constraints*" in paragraph (d), MCMC reiterates that the supply of 4G MOCN Access will be subject to the grounds for refusal in subsection 5.4.11 of the MSA, which include grounds relating to technical feasibility and insufficient capacity. Accordingly, it is not necessary to add caveats for technical feasibility or capacity constraints within the service description.

(c) Regarding the proposed reference to "*including new releases*" alongside the reference to Third Generation Partnership Project (**3GPP**) Release 15, MCMC agrees. This change would also align with amendments to be made to the 5G Services, as set out in paragraph 7.52 below.

(d) Regarding the addition of an anti-overlap provision for Access to In-Building System for Mobile Service, MCMC also agrees. This change is also described above at paragraph 6.27.

6.32 In relation to CelcomDigi's proposed amendments to the service description, MCMC considers these changes to have the effect of diluting the scope of the service and effectively transforming it into a commercially supplied rather than regulated service.

6.33 For example, restricting 4G MOCN Access only to "*mutually agreed sites*", "*subject to … commercial agreement between the parties*" would mean there is no regulatory obligation for the Access Provider to supply 4G MOCN Access at every site (subject to the permitted grounds of refusal in the MSA and other limitations under the Access List). This drafting change would effectively maintain the status quo of 4G MOCN Access as an unregulated, commercially provided arrangement.

6.34 Similarly, CelcomDigi's proposed amendments regarding "*technical feasibility*" and "*capacity availability*" are already dealt with under the existing framework, including through the grounds of refusal under subsection 5.4.11 of the MSA, which include grounds relating to technical infeasibility and insufficient capacity.

MCMC Views

6.35 MCMC confirms its preliminary view that 4G MOCN Access should be added to the Access List.

6.36 Furthermore, MCMC considers that the service description proposed in the PI Paper should be amended to:

(a) clarify in paragraph (a) that 4G MOCN Access includes services provided for the purpose of the Access Seeker providing massive IoT services and mission-critical services;

(b) clarify in paragraph (c)(ii) that the reference to "3GPP Release 15 and any updates to that standard from time to time" includes new releases;

(c) clarify in paragraph (d) that the service must be provided regardless of whether a site is located in an urban, suburban, regional or rural area; and

(d) add a new paragraph (e) to clarify that 4G MOCN Access does not include any services or facilities within the scope of Access to In-Building System for Mobile Service.

6.37 MCMC therefore considers that the service description for 4G MOCN Access should be as follows:

(21) 4G Multi-Operator Core Network ("MOCN") Access

(a) 4G MOCN Access is a Service for access to a 4G radio network, whether or not as part of a Mobile Network, for the purpose of the Access Seeker providing:

(i) MVNO Access or another Service and/or Facility on the Access List that uses access to a 4G radio network as an input;

(ii) services to enterprise and/or government Customers;

(iii) public cellular services to the public;

(iv) wireless or mobile broadband services to the public;

(v) massive IoT services; and/or

(vi) mission-critical services.

(b) 4G MOCN Access may include access to Facilities and/or Services used by the Access Seeker to provide one or more of voice, data and application services, as selected by the Access Seeker, provided that the Access Seeker has integrated its 4G core with the Access Provider's eNodeB.

(c) The functionalities of 4G MOCN Access include:

(i) integration between the Access Provider's eNodeB and the Access Seeker's 4G core network; and

(ii) support for 3GPP Release 15 and any updates to that standard (including new releases) from time to time.

(d) 4G MOCN Access must be made available by the Access Provider on a site-by-site basis at any site where the Access Provider has installed components of its 4G radio network, regardless of whether such a site is located in an urban, suburban, regional or rural area.

(e) Despite anything to the contrary in paragraphs (a) to (d), 4G MOCN Access does not include any Facilities or Services within the scope of Access to In-Building System for Mobile Service.

7 5G Services

Overview

7.1 In the PI Paper, MCMC took the preliminary view that the 5G Standalone Access and 4G EPC with 5G RAN Access services (together, the **5G Services**) should remain on the Access List, with:

(a) amendments to the 5G Standalone Access service description to include specific reference to Security Edge Protection Proxy (**SEPP**) and N32 interfaces;

(b) clarifications that the references to 3GPP Release 15 in the service descriptions includes new releases; and

(c) clarifications to exclude Facilities or Services within the scope of the proposed new service for Access to In-Building System for Mobile Service from the scope of the 5G Services.

MCMC Assessment

7.2 In the PI Paper, MCMC consulted on a large number of issues in relation to the 5G Services. These issues are dealt with sequentially here and comprise:

(a) responsibility for voice service capability;

(b) Non-Public Network functionality;

(c) Reduced Capability (**RedCap**) and High-Performance Machine Type Communication (**HMTC**) capabilities;

(d) SEPP and N32 capabilities;

(e) VoNR and EPS fallback;

(f) interactions between 5G Services and Access to In-Building System for Mobile Service;

(g) the application of 5G Services to 5G MOCN arrangements between 5G wholesale network providers; and

(h) interactions between 5G Services and MVNO Access.

Responsibility for voice service capability

7.3 The current service descriptions for the 5G Services provide that the Access Seeker is solely responsible for any voice service capability delivered over the Access Provider's radio network.

7.4 The stakeholder submissions broadly suggested departing from this and instead referring to voice service capability as a shared responsibility of the Access Provider and the Access Seeker:

(a) CelcomDigi, Maxis, TM and U Mobile suggested that voice service capability should be a shared responsibility; and

(b) DNB submitted that voice service capability should remain the sole responsibility of the Access Seeker.

7.5 A common theme among stakeholders who supported shared responsibility is that the Access Provider should remain responsible for capabilities and performance at the RAN level, since the Access Provider controls the RAN under the 5G Services, whereas the Access Seeker should remain responsible for capabilities at the core

network level, such as IP Multimedia Subsystem (**IMS**) and Voice-over-LTE (**VoLTE**), since this is outside the technical scope of the 5G Services.

7.6 MCMC agrees with this characterisation and considers that the allocation of voice service responsibility should align with the broader technical scope of the 5G Services, which are fundamentally services for access to the Access Provider's RAN. As set out in TM's submission, MCMC also considers that it would be preferable to determine specifically which party has responsibility for which capabilities, rather than referring generally to "shared responsibility" between the Access Seeker and the Access Provider, as this is likely to create confusion and regulatory uncertainty.

7.7 To this end, MCMC finds TM's proposal particularly useful, as it would clearly delineate the voice capability responsibilities between the Access Seeker and the Access Provider. Adapting this proposal, MCMC proposes that the service descriptions be amended to specify that:

(a) the Access Provider is responsible for voice service capability functions within its RAN;

(b) the Access Seeker is responsible for voice service capability functions outside the Access Provider's RAN (e.g. within the Access Seeker's core network); and

(c) the parties will coordinate activities relating to voice service capability and the inter-network interfaces required to support end-to-end voice continuity.

7.8 MCMC considers that this approach is also consistent with the submissions of CelcomDigi and U Mobile, as they also distinguish between responsibility for the RAN and responsibilities for the core network in relation to voice services.

Non-Public Network functionality

7.9 There are mixed views among stakeholders about whether Non-Public Network functionality should be referred to in the service descriptions for the 5G Services.

7.10 CelcomDigi, DNB and U Mobile do not support inclusion, whereas Maxis and TM consider that such functionality should be explicitly captured.

7.11 Non-Public Network functionality is a concept introduced under 3GPP Release 16. The service descriptions already require Access Providers to provide the 5G Services in compliance with 3GPP Release 15 and any updates from time to time (which would include 3GPP Release 16).

7.12 MCMC does not agree with submissions from CelcomDigi and DNB that Non-Public Network functionality should not be included because it is not a bottleneck facility. Once it is established that the 5G Services are bottleneck services (which is not disputed by any stakeholder), it follows that such services should be supplied in accordance with the industry-standard technical specifications and the functionalities contemplated under such specifications. This would include Non-Public Network functionality in compliance with 3GPP Release 16.

7.13 The stakeholders opposing inclusion have also not established that there would be any technical barriers associated with the provision of Non-Public Network functionality.

7.14 Accordingly, MCMC considers that paragraph (d) of the descriptions of both 5G Services should be amended to specifically refer to Non-Public Network functionality.

Reduced Capability and High-Performance Machine Type Communication capabilities

7.15 Among the stakeholders who provided a submission on this issue before the submission deadline, CelcomDigi, Maxis and TM considered that RedCap and HMTC capabilities should be captured, while DNB and U Mobile did not support specific reference to these capabilities.

7.16 MCMC is persuaded by CelcomDigi's and TM's submissions that these capabilities support a range of critical use-cases, including enterprise, industrial and IoT use-cases.

7.17 MCMC does not agree with the submissions of DNB and U Mobile that RedCap and HMTC capabilities are evolving or remain constrained by the maturity of the device ecosystem or market demand. These capabilities were introduced in 3GPP Release 17, released in June 2022, and have therefore been industry standards for several years. The fact that all Access Seekers who have made a submission on this issue (CelcomDigi, Maxis and TM) support inclusion of these capabilities also indicates there is likely to be market demand for these capabilities.

7.18 Accordingly, MCMC considers that paragraph (d) of the descriptions of both 5G Services should be amended to require the Access Provider to provide the Access Seeker with access to all technical capabilities required by the Access Seeker to supply mobile communication services that require the use of RedCap and HMTC capabilities (and similar capabilities supporting IoT-type communications and other machine-type use-cases).

SEPP and N32 capabilities

7.19 Of the stakeholders providing a submission on this issue, only CelcomDigi supported specifically referring to SEPP and N32 capabilities in the service description. DNB, Maxis and U Mobile were opposed to specific inclusion. TM did not have in-principle objections to including SEPP and the N32 interface, but preferred that this be done in a non-exhaustive way, in a manner that was technology-neutral and adaptable to future developments.

7.20 MCMC agrees with Maxis' point that SEPP should not be included because it is a core network functionality (i.e. not a RAN functionality) and that N32 is an interface inherently associated with SEPP (and therefore also associated with core network functionality).

7.21 On this basis, MCMC has revised its preliminary view in the PI Paper and considers that it would not be appropriate to refer to SEPP and N32 in the service descriptions. Both of the 5G Services are services for access to a 5G RAN and do not include core network access. The Access Provider must bring its own core network, whether in

the form of a 5G core network under 5G Standalone Access or a 4G EPC network under 4G EPC with 5G RAN Access.

7.22 Accordingly, adding specific references to SEPP and N32 is likely to create confusion and regulatory uncertainty about the boundaries of the 5G Services.

7.23 However, MCMC considers that paragraph (d) of the service descriptions should be expanded to require the Access Provider to provide not just all "*technical capabilities*" to allow the Access Seeker to provide the downstream services listed in paragraph (d), but also all "*interfaces*" for the same purpose. In line with the views put forward by TM, this ensures that interfaces are captured in a technology-neutral, future-proof manner, without reference to specific interfaces.

VoNR and EPS fallback

7.24 Of the stakeholders that provided a view on this issue:

(a) CelcomDigi, Maxis and TM supported explicitly referring to VoNR and EPS fallback in the service descriptions; and

(b) DNB and U Mobile disagreed with referring to VoNR and EPS fallback.

7.25 MCMC is particularly persuaded by the submissions of Maxis and TM, who point out that VoNR and EPS fallback are an essential aspect of ensuring voice continuity over 5G networks. TM regards voice continuity as a "*core component of 5G services*".

7.26 MCMC agrees that ensuring voice continuity is critical to ensuring that downstream 5G services meet the needs and expectations of end-users. They are also an inherent feature of 5G services rather than an optional or ancillary capability.

7.27 The two stakeholders in opposition, DNB and U Mobile, have also not identified any technical or implementation challenges that would arise from specifically referring to VoNR and EPS fallback.

7.28 Accordingly, MCMC considers that VoNR and EPS fallback should be included within the service description.

Interactions between 5G Services and Access to In-Building System for Mobile Service

7.29 All stakeholders who provided a view on this issue agreed that 5G in-building mobile systems should be covered as a separate service under the proposed new Access to In-Building System for Mobile Service, and not under the 5G Services.

7.30 Accordingly, MCMC confirms its preliminary view that the descriptions of the 5G Services should exclude access to 5G in-building mobile systems. This is achieved through an anti-overlap provision in paragraph (e) of the service descriptions, which makes it clear that the 5G Services do not include any Services or Facilities that fall within the scope of Access to In-Building System for Mobile Service.

7.31 Certain stakeholders, such as CelcomDigi and U Mobile, expressed views about the specific types of in-building mobile elements that should be captured under the Access List. MCMC has responded to these submissions in the context of Access to In-Building System for Mobile Service, in section 9 below.

Application of 5G Services to 5G MOCN arrangements between 5G wholesale network providers

7.32 Stakeholders had mixed views on whether the 5G Services should be capable of being acquired by a 5G network provider (i.e. DNB or U Mobile) to obtain MOCN access to the other 5G network provider's network.

7.33 CelcomDigi supported the 5G Standalone Access service covering MOCN arrangements between DNB and U Mobile, while U Mobile supported this but only when the two network providers do not have overlapping footprints and the Access Seeker cannot reasonably replicate RAN infrastructure.

7.34 DNB, Maxis and TM were opposed to the 5G Services being used in this manner.

7.35 MCMC considers that this is a complex issue and appreciates the submissions of all stakeholders on this matter.

7.36 On balance, MCMC does not consider it appropriate to make any amendments to the service description to either explicitly allow or prohibit 5G MOCN arrangements between the two 5G wholesale network providers (DNB and U Mobile).

7.37 MCMC is concerned that explicitly *excluding* a 5G wholesale network provider from using the 5G Services to enter into a MOCN arrangement with the other 5G wholesale network provider may diminish competition by 5G network owners in the retail market.

7.38 Allowing a 5G wholesale network provider to acquire 5G Services (even though it has its own network infrastructure in other areas) is likely to have a pro-competitive impact compared to prohibiting it from doing so and requiring it to build its own competing network infrastructure in that area. This is for two reasons.

7.39 **First**, the cost of a 5G wholesale network provider rolling out its own network infrastructure in a given area is significantly greater than obtaining 5G RAN access via the 5G Services. There are therefore likely to be several areas where, if a 5G wholesale network provider is unable to obtain 5G Services under the Access List, they would not roll out a competing RAN in that area, and would instead pursue a network coverage solution (such as domestic roaming) which provides a lesser degree of competitive differentiation than access via the 5G Services.

7.40 Accordingly, MCMC is not persuaded that prohibiting a 5G wholesale network provider from obtaining regulated MOCN access via the 5G Services is likely to *enhance* competitive differentiation. Instead, it is more likely to *diminish* competitive differentiation, by prohibiting the relevant 5G wholesale network provider from competing as vigorously in the retail market.

7.41 **Second**, for those areas or sites where it is economically efficient for both 5G wholesale network providers to roll out independent RANs (or where such providers have existing 5G rollout commitments), the presence of regulated MOCN access via the 5G Services is unlikely to materially affect investment incentives, as rolling out a separate 5G network in those areas would either be mandated under 5G rollout commitments or would be economically advantageous to the relevant network operator.

7.42 Accordingly, while MCMC acknowledges TM's submission that 5G MOCN between the two 5G network providers would undermine the objectives of the dual network model, MCMC is not persuaded that maintaining access to 5G Services for wholesale network providers would necessarily diminish incentives for wholesale network providers to invest in their own RAN networks where economically efficient or where they are mandated to do so under a rollout commitment.

7.43 On balance, MCMC therefore considers that it would be harmful for retail competition to exclude 5G wholesale network providers from being Access Seekers of 5G Services and using these services to obtain MOCN access to the network of the other 5G wholesale network provider.

7.44 On this basis, MCMC does not propose to add any exclusions on this point within the service descriptions.

Interactions between 5G Services and MVNO Access

7.45 In question 45 of the PI Paper (within the section on MVNO Access), stakeholders were asked whether any further amendments should be made to the descriptions of the 5G Services to clarify that they do not include core network access. This question was asked in the MVNO Access section as it related to delineating the boundary between the 5G Services (which does not include core network access) and MVNO Access (which includes core network access). However, MCMC will consider this question here, since it ultimately relates to the drafting of the descriptions of the 5G Services, rather than MVNO Access.

7.46 All stakeholders who provided a view on this issue – CelcomDigi, Maxis, TM and U Mobile – agreed that the 5G Services does not include core network access.

7.47 MCMC also considers this approach to be sound, as the 5G Services involve the provision of access to RAN network elements, under a MOCN arrangement, with the Access Seeker being required to interconnect its own 4G (EPC) or 5G core network. Access Seekers that wish to obtain core network access in addition to RAN access have the ability to use MVNO Access, which can be used for 5G networks alongside other network generations.

7.48 To this end, both Maxis and TM proposed removing references to specific EPC/5G core network elements from the descriptions of the 5G Services. U Mobile proposed more general amendments that the 5G Services do not include access to the Access Provider's core network (and that such access requires acquisition of MVNO Access).

7.49 Having considered all of these submissions, MCMC's view it that:

(a) for 5G Standalone Access, in line with Maxis' submission, references to Unified Data Management (**UDM**), Unified Data Repository (**UDR**), Network Exposure Function (**NEF**), security-related functions, value-added service platforms, customer billing and customer relationship management in paragraph (c) of the service description should be removed, as these refer to core network functionality. Moreover, since paragraph (c) is inclusive – referring to "Examples of Facilities and Services to which the Access Seeker may request access" – removal of these functionalities has very little risk,

since Access Providers will still need to provide all functionalities required to comply with paragraphs (a), (b) and (d) of the service description;

(b) for 5G Standalone Access, MCMC proposes to retain reference to Mobile Edge Computing (**MEC**) and Network Function Virtualisation (**NFV**). These are elements that can be deployed within the RAN or integrated with the RAN, and therefore may have continuing functionality as part of the 5G Services;

(c) for 4G EPC with 5G RAN Access, there are currently no specific references to core network elements. Accordingly, MCMC does not propose removing any aspects of the service description for this purpose; and

(d) for both 5G Services, MCMC does not consider it necessary to add wording explicitly excluding access to the Access Provider's core network (as suggested by U Mobile). Paragraph (a) of the descriptions of both services make it clear that these are services for "*access to a 5G New Radio radio network*" or "*access to a 5G New Radio network*". 5G New Radio specifically refers to RAN technology, rather than core networks. Adding an exclusion relating to core networks is therefore likely to create duplication and confusion about the scope of these services. However, for consistency, MCMC considers it useful to amend the 4G EPC with 5G RAN Access description to align with that of 5G Standalone Access by referring to "*access to a 5G New Radio radio network*". This also makes it clearer that this is a service for RAN (radio network) access.

MCMC Views

7.50 MCMC confirms its preliminary view to retain 5G Standalone Access and 4G EPC with 5G RAN Access on the Access List.

7.51 MCMC also considers that the service descriptions for both 5G Services should be amended to align with the analysis and views expressed above, which would ensure that the service descriptions are consistent with the intended scope of the 5G Services and adapted to technological evolutions.

7.52 MCMC therefore considers that the service descriptions of the 5G Services should be amended as follows:

(18) 5G Standalone Access

(a) 5G Standalone Access is a Facility and/or Service for access to a 5G New Radio radio network, whether or not as part of a Mobile Network, for the purpose of the Access Seeker providing:

(i) MVNO Access;

(ii) services to enterprise or government Customers;

(iii) public cellular services to the public; and/or

(iv) wireless or mobile broadband services to the public.

(b) 5G Standalone Access may include access to the Facilities and Services used by the Access Seeker to provide one or more of voice, data and application services, as

selected by the Access Seeker, provided that where the Access Seeker has integrated its 5G core with the Access Provider's gNodeB:

(i) the Access Provider is responsible for voice service capability functions within its radio network; and

(ii) the Access Seeker is ~~solely~~ responsible for ~~any~~ voice service capability functions outside the Access Provider's radio network (e.g. within the Access Seeker's core network),

and the Access Seeker and Access Provider will coordinate activities relating to voice service capability and the inter-network interfaces required to support end-to-end voice continuity.

~~(and for the avoidance of doubt any such voice services may be delivered using the Access Provider's radio network).~~

(c) Examples of Facilities and Services to which the Access Seeker may request access includes but is not limited to:

(i) radio network, including gNodeB;

(ii) integration between the Access Provider's gNodeB and the Access Seeker's 5G core (5GC);

(iii) Network Slice Selection Function (NSSF and 5G Network Slices as selected by the Access Seeker);

~~(iv) Unified Data Management (UDM);~~

~~(v) Unified Data Repository (UDR);~~

~~(vi) Network Exposure Function or (NEF);~~

(iv~~vii~~) Mobile Edge Computing (MEC);

(v~~viii~~) Network Function Virtualisation (NFV); and

~~(ix) security related functions, such as Security Anchor Function (SEAF), and Authentication Server Function (AUSF);~~

~~(x) value added service platforms (such as its IP Multimedia Subsystem, Short Message Service Centre, Multimedia Service Centre and Voicemail Server);~~

~~(xi) customer billing; and~~

~~(xii) customer relationship management;~~

(vi) Voice over New Radio (VoNR) and Evolved Packet System (EPS) Fallback.

(d) ~~The~~ 5G Standalone ~~Service~~ Access shall be supplied to the Access Seeker in compliance with 3rd Generation Partnership Project ("3GPP") Release 15 and any updates to that standard (including new releases) from time to time, and with all technical capabilities and interfaces, as may be required to enable the Access Seeker to provide the following types of services (or similar services), as selected by the Access Seeker:

(i) mobile broadband services;

(ii) *massive IoT services;* ~~*and*~~

(iii) *mission-critical services; and*

(iv) to the extent technically supported by the Access Provider's radio network:

(A) Non-Public Network services (as defined under 3GPP Release 16 and any updates to that standard, including new releases); and

(B) mobile communication services that require the use of Reduced Capability and High-Performance Machine Type Communication (as defined under 3GPP Release 17 and any updates to that standard, including new releases) or any similar capabilities supporting IoT-type communications and other machine-type use-cases.

(e) Despite anything to the contrary in paragraphs (a) to (d), 5G Standalone Access does not include any Facilities or Services within the scope of Access to In-Building System for Mobile Service.

(19) 4G EPC with 5G RAN Access

(a) 4G EPC with 5G RAN Access is a Facility and/or Service for access to a 5G New Radio radio network, for the purpose of the Access Seeker providing:

(i) *MVNO Access;*

(ii) *services to enterprise or government Customers;*

(iii) *public cellular services to the public; and/or*

(iv) *wireless or mobile broadband services to the public.*

(b) 4G EPC with 5G RAN Access may include access to the Facilities and Services used by the Access Seeker to provide one or more of voice, data and application services, as selected by the Access Seeker, provided that:

(i) the Access Provider is responsible for voice service capability functions within its radio network; and

(ii) the Access Seeker is ~~*solely*~~ *responsible for* ~~*any*~~ *voice service capability functions outside the Access Provider's radio network (e.g. within the Access Seeker's core network),*

and the Access Seeker and Access Provider will coordinate activities relating to voice service capability and the inter-network interfaces required to support end-to-end voice continuity.

~~*(and for the avoidance of doubt any such voice services may be delivered using the Access Provider's radio network).*~~

(c) The functionalities of 4G EPC with 5G RAN Access include:

(i) *integration between the Access Provider's gNodeB and the Access Seeker's EPC, whether using anchor technology or otherwise; and*

(ii) *support for 3GPP Release 15 Options 3, 3a and 3x, including E-UTRA New Radio Dual Connectivity (EN-DC) and any updates to that standard from time to time; and*

(iii) VoNR and EPS Fallback.

(d) 4G EPC with 5G RAN Access shall be supplied to the Access Seeker in compliance with 3GPP Release 15 and any updates to that standard (including new releases) from time to time, and with all technical capabilities and interfaces as may be required to enable the Access Seeker to provide mobile broadband and similar services and, to the extent technically supported by the Access Provider's radio network:

(i) Non-Public Network services (as defined under 3GPP Release 16 and any updates to that standard, including new releases); and

(ii) mobile communication services that require the use of Reduced Capability and High-Performance Machine Type Communication (as defined under 3GPP Release 17 and any updates to that standard, including new releases) or any similar capabilities supporting IoT-type communications and other machine-type use-cases.

(e) Despite anything to the contrary in paragraphs (a) to (d), 4G EPC with 5G RAN Access does not include any Facilities or Services within the scope of Access to In-Building System for Mobile Service.

8 Broadcasting Transmission Service

Overview

8.1 In the PI Paper, MCMC's preliminary view was that a new Broadcasting Transmission Service should be listed on the Access List. This would comprise:

(a) the provision of transmission services for broadcasting purposes, which are currently included within the scope of the Trunk Transmission Service and the End-to-End Transmission Service; and

(b) certain ancillary services that are supplied together with broadcasting transmission services.

MCMC Assessment

8.2 Of the two stakeholders that provided a submission on the Broadcasting Transmission Service before the submission deadline, MYTV (who would be the main Access Seeker) supported listing this service on the Access List, while TM (who would be the main Access Provider) was opposed.

8.3 There are three main issues to consider in relation to this service:

(a) whether it remains in the LTBE to regulate broadcasting transmission services;

(b) whether the Broadcasting Transmission Service should be listed separately, rather than being included within the scope of the Trunk Transmission Service and End-to-End Transmission Service; and

(c) whether any changes are required to the service description for the Broadcasting Transmission Service, including the treatment of ancillary services.

Basis for continued regulation of broadcasting transmission services

8.4 MCMC considers that it remains in the LTBE to include broadcasting transmission services on the Access List.

8.5 TM submits that broadcasting transmission should not be regulated as it is not a bottleneck input. MCMC strongly disagrees with this characterisation.

8.6 As stated in MYTV's submission, there is a single provider of broadcasting transmission services, TM. This is not refuted by TM or any other stakeholder. There is also a lack of substitutability from other services, as Access Seekers cannot readily switch from broadcasting transmission services to "standard" transmission services, HSBB or satellite backhaul, due to the specific synchronisation and Moving Picture Experts Group Transport Stream (**MPEG-TS**) requirements associated with terrestrial broadcasting. The often remote locations of television and radio broadcast towers also limit the availability of alternative transmission options. This means that TM does not face competitive constraints from other operators in relation to the supply of broadcasting transmission services.

8.7 Broadcasting transmission services also exhibit clear bottleneck characteristics. Since they provide transmission between broadcasters' play-out facilities and broadcasting towers, they are an essential input in the supply chain for the provision of free-to-air television and radio broadcasting services.

8.8 In relation to TM's submission about the bespoke nature of these services (using site-specific infrastructure with limited alternative use), MCMC considers that this supports rather than detracts from the basis for regulation. The fact that broadcasting transmission links are often dedicated and purpose-built means that they are not as readily amenable to duplication or to competition from alternative providers. This suggests that broadcasting transmission links more strongly act as bottleneck facilities, compared to more standardised transmission services.

8.9 TM also argues that access regulation is primarily aimed at controlling foreclosure risks by a vertically integrated operator, whereas TM has strong commercial incentives to continue supplying broadcasting transmission services as it does not compete in the retail market. MCMC broadly agrees that TM relies on Access Seekers for the entirety of its revenue from broadcasting transmission services, as TM does not self-consume these services to supply television or radio broadcasting in retail markets.

8.10 However, MCMC considers that Access Seekers do not have sufficient countervailing buyer power to ensure that TM supplies access to broadcasting transmission on efficient and competitive terms. Since TM is the sole provider of these services, and these services are a critical, non-substitutable input into retail broadcasting, TM is likely to have a significantly greater degree of bargaining power compared to Access Seekers. This is supported by MYTV's submission that it is required to enter into a commercial agreement for broadcasting transmission, there is an imbalance of bargaining power between it and the Access Provider and that pricing and terms are controlled by a single provider.

8.11 Accordingly, MCMC is not persuaded that TM would have sufficient commercial incentives to supply broadcasting transmission services on efficient terms in the absence of regulation.

8.12 Finally, in relation to TM's argument that broadcasting transmission services are not necessary to support any-to-any connectivity, MCMC notes that any-to-any connectivity is only one element of the LTBE criteria. This element is mostly relevant to telecommunications services, particularly interconnection, origination and termination services. It is not readily applicable to broadcasting, which involves one-way communication of content from a television or radio broadcaster to an end-user. Accordingly, any-to-any connectivity is not a relevant LTBE factor for broadcasting transmission services, and the fact that such services are not needed to promote any-to-any connectivity does not diminish the basis for regulating them.

8.13 The other elements of the LTBE – the objective of promoting competition in relevant markets and the objective of encouraging the economically efficient use of and investment in communications infrastructure – are strongly satisfied in relation to broadcasting transmission services, for the reasons mentioned above.

8.14 Accordingly, MCMC considers that it remains strongly in the LTBE for access to broadcasting transmission services to be regulated via the Access List.

Listing the Broadcasting Transmission Service as a separate service

8.15 MYTV submitted that listing broadcasting transmission services separately from other transmission services would ensure clearer regulation, fairer terms and recognition of the unique technical and operational requirements of the national digital terrestrial television platform.

8.16 TM's submission does not specifically focus on this issue, instead arguing more broadly that broadcasting transmission services should be removed from the Access List.

8.17 In MCMC's view, once it is established that it is in the LTBE to regulate broadcasting transmission services (as discussed above), it would be preferable to list such services under a separate "Broadcasting Transmission Service" rather than under the more general Trunk Transmission Service and the End-to-End Transmission Service. This is for two reasons.

8.18 First, broadcasting transmission services have substantially different technical specifications and conditions of competition compared to other transmission services, both on the supply side (i.e. the number and nature of the Access Providers) and the demand side (i.e. the number and nature of the Access Seekers). Treating broadcasting transmission as a separate Access List service is likely to avoid confusion and make administration of the Access List simpler, including in relation to RAOs and Access Agreements.

8.19 Second, broadcasting transmission services include a range of ancillary services (discussed further below) which are not present or are less relevant for other transmission services. A separate service listing would allow these ancillary services to be captured within the Access List, without needing to make complex

amendments to the service descriptions for the Trunk Transmission Service and the End-to-End Transmission Service.

Service description and ancillary services

8.20 Based on the stakeholder submissions, MCMC does not consider that any changes are required to the service description proposed in the PI Paper, including to the description of ancillary services in paragraph (e) of the proposed service description.

8.21 MYTV's submission states that broadcasting transmission involves "*additional elements such as service level availability, monitoring, equipment maintenance, and Network Operating Centre (**NOC**) support*".[3] TM's submission also refers to "*broadcasting network operations centre services and operation and maintenance services (including repair and replacement)*" (in line with the PI Paper proposal) and does not propose additional ancillary services or amendments to these services.

8.22 On this basis, MCMC considers that no further changes are required to paragraph (e) of the proposed service description. Monitoring, equipment maintenance and NOC support are caught under the references to "*broadcasting network operations centre services*" and "*operation and maintenance services … in respect of Access Seeker equipment*". Service level availability is not an ancillary service, but rather a feature of the broadcasting transmission link itself, and therefore does not need to be itemised as an ancillary service element.

8.23 In relation to TM's comments on the proposed service description, MCMC has the following responses:

(a) **Inclusion of ancillary services**: MCMC considers it important to include the ancillary services as part of the service description. As MCMC understands it, TM generally supplies broadcasting transmission services together with ancillary services. MCMC is concerned that removing the ancillary services from the service description would create confusion about whether a broadcasting transmission service supplied *with* ancillary services falls within the regulated service description or, alternatively, must be acquired commercially. MCMC is also concerned that, if the ancillary services are excluded, they will fall outside the scope of Access List regulation and therefore the Access Provider will be able to indirectly impose inefficient terms of access (e.g. excessive pricing) on broadcasting transmission services as a whole, via its terms of supply for the ancillary services.

(b) **Imposition of latency, jitter and other technical parameters**: The references to latency, jitter and other technical parameters in paragraph (d) of the service description are inclusive rather than prescriptive. They do not prescribe any mandatory latency, jitter or other parameters but instead clarify that services with a range of parameters fall within the scope of the Broadcasting Transmission Service. This to ensure that the scope of the regulated service is broad and to avoid services with specific parameters falling outside the scope of the regulated service (such that they would have

[3] MYTV submission on Access List, p. 2.

to be acquired commercially on inefficient terms). Accordingly, MCMC disagrees that these parameters should be removed.

(c) **Equivalence of inputs**: TM submits that equivalence of inputs obligation is not relevant to broadcasting transmission services. However, there are no references within the service description to equivalence of inputs. Accordingly, MCMC does not consider any changes are warranted in response to this point. MCMC has also considered this issue as part of the review of the MSA and has responded to TM's submission in the PI Report on the Review of the MSA, issued concurrently with this PI Report.

8.24 In relation to MYTV's submission about the service diagram that MCMC included at Figure 5 of the PI Paper being incorrect, MCMC agrees that the multiplexer does not form part of the Broadcasting Transmission Service. The diagram provided in the PI Paper was not intended to suggest otherwise.

8.25 In any event, MYTV has not suggested that the service description also requires amendment on this basis. The service description does not refer to a multiplexer or to the provision of multiplexing services as falling within the scope of the Broadcasting Transmission Service. MCMC agrees that multiplexing for digital terrestrial television broadcasting is provided as part of the Digital Terrestrial Broadcasting Multiplexing Service.

MCMC Views

8.26 MCMC confirms its preliminary view that a new Broadcasting Transmission Service should be listed on the Access List. MCMC confirms the following service description:

(22) Broadcasting Transmission Service

(a) The Broadcasting Transmission Service is a Facility and/or Service for the carriage of communications, which comprise a content applications service, between any two (2) technically feasible network transmission points via such network interfaces at such transmission rates as may be agreed between the Access Provider and the Access Seeker on a permanent or virtual basis.

(b) Network interfaces may use any technology as may be agreed between the Access Provider and the Access Seeker, including, for example, synchronous digital hierarchy, or any other applicable technology which is currently available, or which may be developed in the future.

(c) The functionalities of the Broadcasting Transmission Service include:

(i) transmission and any type of routing or switching, whether packet, circuit, multi-layer or otherwise;

(ii) the signalling and synchronisation required to support the technology or to provide a service;

(iii) termination at either end by a port, router, network termination unit, switch or earth station; and/or

(iv) a digital protocol including Internet Protocols and Moving Picture Experts Group Transport Stream ("MPEG-TS").

(d) The Broadcasting Transmission Service includes any Broadcasting Transmission Service supplied to the Access Seeker with:

(i) any network availability between 99.90% and 99.992%, whether per month or otherwise;

(ii) any latency of <20ms;

(iii) any jitter of <10ms;

(iv) zero or more routes of redundancy; and

(v) any other technical parameters specified or utilised by the Access Provider from time to time, including parameters of a type referred to in subparagraphs (i) to (iv) above.

(e) An Access Seeker requesting access to the Broadcasting Transmission Service may, at its discretion, also request the Access Provider to provide any one or all of the following ancillary services, which the Access Provider shall provide:

(i) broadcasting network operations centre services;

(ii) operation and maintenance services (including repair and replacement) in respect of Access Seeker equipment used in connection with the service described in paragraph (a); and

(iii) any other service ancillary to the service described in paragraph (a), as may be agreed between the Access Provider and the Access Seeker.

9 Infrastructure Sharing and Access to In-Building System for Mobile Service

Overview

9.1 In the PI Paper, MCMC took the preliminary view that it was in the LTBE to retain Infrastructure Sharing on the Access List, with amendments to:

(a) remove references to CAS and related language and move it to a new "Access to In-Building System for Mobile Service" service;

(b) exclude poles, ducts and manholes which are covered under the proposed amended service of Fixed Network Pole, Duct and Manhole Access; and

(c) include a reference to "street furniture" for clarity.

9.2 In the PI Paper, MCMC also proposed adding a new Access to In-Building System for Mobile Service, which would capture access to both passive and active elements of in-building mobile systems on a technology-neutral basis.

MCMC Assessment

Listing and service description of Infrastructure Sharing

9.3 MCMC considers that there remains a very strong basis for maintaining Infrastructure Sharing on the Access List, from the LTBE perspective.

9.4 MCMC did not receive any objections to the continued listing of Infrastructure Sharing on the Access List or the minor amendment that it proposed in relation to "street furniture".

9.5 Accordingly, MCMC confirms its preliminary view to keep Infrastructure Sharing on the Access List with this amendment.

9.6 In relation to the addition of drafting to exclude, from the scope of Infrastructure Sharing, poles, ducts and manholes that fall within the scope of Fixed Network Pole, Duct and Manhole Access, MCMC notes that:

(a) this is consequential to the inclusion of poles for fixed network equipment within the expanded Fixed Network Pole, Duct and Manhole Access service, which MCMC expresses its views in paragraphs 15.5 to 15.9 below; and

(b) the proposed new paragraph (f) of the Infrastructure Sharing service description is intended to act as an anti-overlap provision, to promote regulatory certainty and a clear delineation between Infrastructure Sharing and Fixed Network Pole, Duct and Manhole Access.

Access to In-Building System for Mobile Service as a separate service

9.7 There was very strong support among stakeholders for listing "Access to In-Building System for Mobile Service" as a separate service from Infrastructure Sharing. All stakeholders who provided a view on this issue supported this proposal.

9.8 Accordingly, MCMC does not propose to depart from its preliminary view that Access to In-Building System for Mobile Service should be a separate service from Infrastructure Sharing.

9.9 However, in contrast to MCMC's position in the PI Paper, MCMC considers that this service should be named "Access to In-Building System for Mobile Service". This provides greater clarity about the scope of service, which relates to access to in-building systems (often referred to as "IBS") that allow Access Seekers to provide mobile telecommunications services in downstream markets.

9.10 MCMC also confirms its proposed addition of paragraph (e) of the Infrastructure Sharing service description, which is intended to prevent overlap with the new service for Access to In-Building System for Mobile Service and promote regulatory certainty.

Service description of Access to In-Building System for Mobile Service

9.11 There were a range of perspectives on the proposed service description of Access to In-Building System for Mobile Service and the scope and structure of the service.

9.12 DNB and PPIT agreed with the proposed service description and/or did not propose changes.

9.13 CelcomDigi submitted that active elements, such as Base Transceiver Station (**BTS**) and active multiband Distributed Antenna System (**DAS**), be excluded from the scope of the service. This position was not widely supported by other stakeholders,

with both Maxis and TM explicitly supporting the inclusion of active elements and other stakeholders not expressing opposition to such inclusion.

9.14 MCMC considers that it would be in the LTBE to include active elements within the scope of Access to In-Building System for Mobile Service. Active in-building elements such as the BTS and DAS form part of the RAN for mobile services. Providing regulated access to such elements would promote the economically efficient use of infrastructure, by minimising inefficient duplication on in-building networks. It would also promote competition in retail markets, by minimising the barriers involved for operators to provide high-quality in-building coverage as part of their retail services.

9.15 Moreover, access to active in-building elements would promote technological neutrality and regulatory parity. Access to outdoor RAN elements is already possible under the scope of the 5G Services and will be possible under the 4G MOCN Access service proposed as part of this Public Inquiry. Listing access to active in-building elements would ensure that the same regulatory treatment also applies to indoor elements of the RAN, ensuring that in-building mobile coverage is subject to the same regulatory protections as outdoor coverage.

9.16 Several stakeholders proposed structural or technical amendments to the service description. More specifically:

(a) CelcomDigi suggested expanding the service to cover "*other passive in-building infrastructure, including cabling and antenna distribution systems, which are intended to host or support network elements without becoming active elements of the network*";

(b) Maxis suggested renaming the concept of "Active In-Building Elements" to "Digital Indoor Systems (**DIS**)", and changing its scope to comprise active DAS and indoor small cell architecture or components;

(c) TM suggested explicitly including passive in-building radio frequency components and passive DAS in the service description; and

(d) U Mobile suggested splitting the service into two, with one service covering the Common Antenna System (including DAS/DIS and associated amplifiers and cabling, physical space in the central equipment room and ancillary civil works) and another service covering the BTS layer (radio equipment).

9.17 MCMC notes that the passive elements of the service are currently captured via the concepts/definitions of "*CAS*" and "*physical access to the central equipment room of a building*" (which also comprises power, environmental services, security, etc). The active elements of the service are captured via the "*Active In-Building Elements*" definition.

9.18 The "CAS" definition currently includes "*antennas and cabling to the antennas inside a building*". Accordingly:

(a) for clarity and to avoid confusion, MCMC proposes to rename the "CAS" concept to "Passive In-Building Elements" and exclude Active In-Building Elements from this concept;

(b) in response to CelcomDigi's submission, MCMC considers that the service description already captures cabling and antenna distribution systems;

(c) in response to TM's submission, MCMC considers it would be helpful to specify in the Passive In-Building Elements definition that the reference to "antennas" includes "*passive distributed antenna systems*", and to include reference to passive radio frequency components; and

(d) in response to Maxis' submission, MCMC proposes to add references to "*other passive structures inside a building, such as ducts, trays or risers*" within the Passive In-Building Elements definition.

9.19 In relation to the definition of "Active In-Building Elements", and in response to Maxis' submission, MCMC does not consider it necessary to rename "Active In-Building Elements" to "DIS". In particular, while MCMC recognises that DIS are a major way of delivering in-building coverage for 5G networks, Access to In-Building System for Mobile Service is technology-neutral and includes in-building coverage for 4G and other network generations. Accordingly, MCMC prefers to retain the broader nomenclature.

9.20 However, MCMC proposes to make certain amendments to this definition in line with Maxis' submission, as these would add clarity to the definition. These include adding references to "baseband unit" and removing references to the "CAS" within the "Active In-Building Elements" definition.

9.21 In relation to U Mobile's submission, MCMC does not consider it necessary to split the service into two. The realignment proposed by MCMC above will ensure there is a clearer delineation between passive and active in-building elements. Moreover, MCMC proposes to make amendments to the service description to clarify that an Access Seeker can obtain access to "*any or all*" of the components of this service. This will ensure that, where an Access Provider only owns or operates certain facilities (e.g. the BTS layer), an Access Seeker will still be able to use Access to In-Building System for Mobile Service to acquire access to those facilities.

Elements of physical access

9.22 Paragraph (b) of the service description for Access to In-Building System for Mobile Service proposed in the PI Paper specifies that the concept of "*physical access to the central equipment room of a building*" includes power (including right-of-way for power installation), environmental services, security, site maintenance and personnel access.

9.23 Most stakeholder submissions on this limb of the service description supported the proposed drafting and did not propose amendments.

9.24 Maxis suggested expanding this provision to cover "*right-of-way for fibre installation*" (as opposed to only right-of-way for power installation).

9.25 MCMC considers that this proposal would be beneficial for two reasons:

(a) first, it would better reflect the nature of 5G in-building coverage infrastructure, which relies on in-building fibre to a relatively high degree; and

(b) second, allowing Access Seekers to roll out their own in-building fibre (via rights-of-way) would create greater competitive differentiation and flexibility compared to requiring Access Seekers to use the Access Provider's in-building cabling. MCMC notes that this flexibility is supported by the fact that the "Passive In-Building Elements" definition captures other passive structures, such as ducts, trays and risers, which could be used by Access Seekers wishing to deploy their own in-building cabling. Alternatively, for those Access Seekers who wish to use the Access Provider's in-building cabling, this is also covered under the "Passive In-Building Elements" definition, which refers to in-building cabling to antennas and other components.

MCMC Views

Infrastructure Sharing

9.26 MCMC confirms its preliminary view that Infrastructure Sharing should be retained on the Access List, with modifications to:

(a) remove references to CAS and related language and move it to the new "Access to In-Building System for Mobile Service" service (renamed from "Access to In-Building Mobile Systems" as referred to in the PI Paper);

(b) exclude any Facilities and/or Services that are within the scope of the new service for Access to In-Building System for Mobile Service;

(c) exclude poles, ducts and manholes which are covered under the proposed amended service of Fixed Network Pole, Duct and Manhole Access; and

(d) include a reference to "street furniture" for clarity.

9.27 MCMC therefore confirms that the service description should be amended as follows:

(9~~7~~) Infrastructure Sharing

(a) An Infrastructure Sharing is a Facility and/or Service which comprises the ~~following:~~

~~(i)~~ provision of physical access, which refers to the provision of space (including rooftop space) at specified network facilities to enable an Access Seeker to install and maintain its own equipment~~; or~~

~~(ii) provision of access to in-building Common Antenna Systems and physical access to central equipment room.~~

(b) Specified network facilities include:

(i) towers and Associated Tower Sites; and

(ii) any other facility that supports, or has the capability to support, the installation of mobile or fixed network equipment in, along, or in close proximity to:

(A) a street;

(B) a road;

(C) a path;

(D) a railway corridor;

(E) a park; or

(F) such other outdoor area that may be accessed by members of the public,

including but not limited to street furniture (such as billboards, public transit shelters, poles, and traffic light poles), bridges, and road gantries.

(c) Physical access includes power (including right-of-way for power installation by the Access Seeker), environmental services (such as heat, light, ventilation and air-conditioning), security, site maintenance and access for the personnel of the Access Seeker.

(d) Provision of space at Associated Tower Sites includes space where the Access Seeker may place its cabin or outdoor equipment and space required for cable gantry connecting to the tower and generator set.

(e) The Facilities and/or Services that fall within the scope of Access to In-Building System for Mobile Service are excluded from the scope of Infrastructure Sharing.

(f) Poles, ducts and manholes that fall within the scope of Fixed Network Pole, Duct and Manhole Access are excluded from the scope of Infrastructure Sharing.

Access to In-Building System for Mobile Service

9.28 MCMC also confirms that a new service, Access to In-Building System for Mobile Service, should be added to the Access List, with the following service description:

(23) Access to In-Building System for Mobile Service

(a) Access to In-Building System for Mobile Service is a Facility and/or Service which comprises:

(i) the provision of access to any or all components of Passive In-Building Elements and/or Active In-Building Elements within a building; and

(ii) the provision of physical access to the central equipment room of a building.

(b) Physical access in subparagraph (a)(ii) includes power (including right-of-way for power installation by the Access Seeker), access to rights-of-way for in-building fibre installation, environmental services (such as heat, light, ventilation and air-conditioning), security, site maintenance and access for the personnel of the Access Seeker.

9.29 Compared to the position put forward in the PI Paper, the above service description includes modifications to:

(a) clarify that the service includes "*any or all*" components of Passive In-Building Elements and/or Active In-Building Elements (to make it clear that modular access is allowed); and

(b) include the new terminology of "Passive In-Building Elements" (compared to the current "CAS").

9.30 Relatedly, MCMC considers that the "CAS" concept in the Access List should be renamed "Passive In-Building Elements" and amended as follows:

"~~Common Antenna System~~Passive In-Building Elements" means a system of Facilities comprising any or all of:

(a) antennas (including passive distributed antenna systems);

(b) passive radio frequency components (including splitters), ~~and~~

(c) cabling to ~~the~~ such antennas and components inside a building; and

(d) other passive structures inside a building, such as ducts, trays or risers,

which ~~is~~ are owned or operated by an Operator, including one or more mobile network operators, in association with in-building coverage, but excluding any Active In-Building Elements;"

9.31 MCMC also confirms that a new "Active In-Building Elements" definition will be added as follows:

"Active In-Building Elements" means powered hardware and associated software inside a building, including but not limited to a base transceiver station, baseband unit, active multi-band distributed antenna system, master units, remote units, bi-directional amplifiers and small cells, which amplify, filter and convert radio frequency signals for distribution within a building, and which are owned and/or operated by an Operator, including one or more mobile network operators, in association with in-building coverage;

9.32 Compared to the position put forward in the PI Paper, this definition includes modifications to:

(a) refer to "baseband unit"; and

(b) remove references to "*distribution through the Common Antenna System*" and instead focus on distribution "*within a building … in association with in-building coverage*".

10 IP Transit Service

Overview

10.1 In the PI Paper, MCMC took the preliminary view that the IP Transit Service should be removed from the Access List.

MCMC Assessment

10.2 Stakeholder views were quite evenly divided on the removal of the IP Transit Service, with:

(a) CelcomDigi, Symbio, TM and U Mobile agreeing with the removal; and

(b) CTS, Maxis, MEASAT and PPIT considering that the service should be retained on the Access List.

10.3 Stakeholders in support of retaining the service have argued that the IP Transit Service ensures fair pricing and healthy competition, especially in areas with limited

provider and peering options, and that it is a critical input for operators without international gateway facilities. They have submitted that continued regulation of the service could ensure the continued availability of competitive, efficient and reasonable terms of supply.

10.4 Conversely, stakeholders in favour of removing the service have pointed to the availability of commercial alternatives, IP peering, internet exchanges such as MyIX and regional connectivity options. U Mobile in particular argued that the IP transit market in Malaysia is competitive and it has not experienced challenges in acquiring IP transit on commercial terms.

10.5 MCMC acknowledges that the arguments in favour and against continued regulation are relatively finely balanced. However, taking into account all of the submissions, MCMC is persuaded that continued listing of the IP Transit Service is no longer in the LTBE.

10.6 As set out in the PI Paper,[4] the primary basis for MCMC listing the IP Transit Service in the 2021 was the presence of regional bottlenecks in certain states, such as Sabah, where there was a lack of competitive peering options and there was evidence of prohibitive prices for IP transit (indicating a lack of competition). The market has significantly changed since then, due to the availability of IP transit on competitive terms by a broader range of Access Providers, the ability for Access Seekers to source IP transit or peering via other countries (such as Singapore), the expansion of MyIX and the introduction of peering points in East Malaysia.

10.7 While stakeholders supporting the continued listing of the service have provided general arguments that it would promote competition and fair pricing, MCMC has not received sufficient and specific evidence of any lack of competition or difficulties in accessing IP transit services, whether nationally or in specific areas.

10.8 An exception is PPIT's submission whereby PPIT commented that removal of the IP Transit Service would have adverse impacts on competition, cost efficiency and regional digital development in the Northern Regional Zone, where Access Seekers depend on a single provider of IP transit. PPIT submitted that Access Seekers in the Northern Regional Zone are required to route traffic via the Klang Valley or Singapore if they wish to obtain redundancy or an alternative to the single IP transit provider, which gives rise to higher latency and undermines service quality.

10.9 MCMC is not persuaded that this provides a sufficient basis for continued regulation of the IP Transit Service. In particular:

(a) the fact that Access Seekers are able to route traffic via the Klang Valley or Singapore suggests the existence of alternatives to obtaining connectivity from the local backbone provider in the Northern Regional Zone, which is likely to competitively constrain the terms on which that provider supplies IP transit services; and

(b) the Northern Regional Zone includes the four states of Penang, Kedah, Perlis and Perak, which form the Northern Corridor Economic Region. Penang has an internet exchange in the form of PenangIX (operated by DE-CIX) since

[4] Review of Access List – Public Inquiry Paper, 3 April 2026, paragraph 12.13.

late 2023. Kedah also hosts the Open DC D8-1 Data Centre in Bukit Kayu Hitam since early 2026, which will contain a DE-CIX internet exchange and also provide connectivity to Thailand. These facilities create additional IP connectivity options in the northern states without needing to rely on the Klang Valley or other locations. They also demonstrate that, since the listing of IP transit on the Access List in 2021, there has been a continued growth in IP peering and transit options across Malaysia, which suggests increasing competition.

10.10 Accordingly, MCMC considers that it is no longer in the LTBE to list the IP Transit Service on the Access List.

MCMC Views

10.11 MCMC confirms its preliminary view that the IP Transit Service should be removed from the Access List.

11 Interconnect Link Service

Overview

11.1 In the PI Paper, MCMC took the preliminary view that it would be in the LTBE to retain the Interconnect Link Service on the Access List, with amendments to:

(a) remove references to SS7-based interconnect links; and

(b) add additional bandwidth increments of 100 Mbps and 100 Gbps.

MCMC Assessment

Removal of SS7-based interconnect links

11.2 All stakeholders who provided a submission before the submission deadline agreed that SS7-based interconnect links should be removed from the scope of the Interconnect Link Service.

11.3 Accordingly, MCMC confirms its preliminary view from the PI Paper that there is no longer a regulatory basis for retaining SS7-based interconnect links under this service, given that SS7 is a legacy protocol from which the industry has largely moved away and which has been superseded by IP-based interconnection.

11.4 MCMC therefore confirms that it will remove paragraph (a)(ii) of the service description, which deals with interconnection of SS7 networks, from the scope of the Interconnect Link Service.

Additional bandwidth increments

11.5 In relation to adding a new 100 Gbps bandwidth increment, there was widespread support among stakeholders.

11.6 The only stakeholder to oppose this was TM, who argued that the Interconnect Link Service is primarily used to support voice and short messaging services traffic,

which have modest bandwidth requirements and can be efficiently accommodated using 1 Gbps and 10 Gbps interfaces.

11.7 MCMC acknowledges this submission but notes that several other stakeholders took a contrary view. For example, CTS mentioned that 100 Gbps interfaces would support modern network deployments and future high-capacity requirements, such as hyperscale interconnects, while Symbio mentioned that certain licensees may require 100 Gbps interfaces for CDN and video-related applications. U Mobile suggested that 100 Gbps would be a beneficial baseline to meet current demand and even suggested adding larger increments up to 400 Gbps. This suggests that there would be demand from operators for a 100 Gbps bandwidth increment, rather than there being no operational or technical requirement for such increment, as suggested by TM.

11.8 To ensure that Access Seekers have access to high-capacity interconnection interfaces for their various requirements (which in turn enable such Access Seekers to provide competitive services in downstream markets), MCMC considers that it would be in the LTBE to add a new 100 Gbps bandwidth increment within the service description.

11.9 There was lower support among stakeholders for adding a 100 Mbps increment. The addition of a 100 Mbps increment was supported by Maxis, Symbio, U Mobile and XMT, but was opposed by CelcomDigi, CTS, TM and TIME.

11.10 Among the supporting stakeholders, only Symbio provided a substantive reason in favour, arguing that this smaller increment would be useful for services that require smaller bandwidth, such as Voice SIP Trunking services.

11.11 Among the opposing stakeholders, several stakeholders suggested that it would not be practical for Access Providers to supply increments below 1 Gbps. TM suggested that 1 Gbps was the smallest physical interface that would be economical for Access Providers to deploy in practice. CelcomDigi similarly submitted that 100 Mbps increments are not in line with prevailing technologies and network design practices, and would require artificial capacity partitioning.

11.12 MCMC is persuaded that the provision of 100 Mbps bandwidth increments is likely to create implementation challenges for Access Providers and there is no sufficient demand from Access Seekers to justify the imposition of these challenges. MCMC also does not have sufficient evidence that there are any services that would necessarily depend on interconnection in 100 Mbps increments, such that the unavailability of such increments would have negative downstream impacts on competition.

11.13 MCMC therefore revises its preliminary view and considers that a 100 Mbps bandwidth increment should not be added to the service description.

11.14 MCMC also notes that the service description would still allow 100 Mbps increments to be provisioned by agreement between the Access Provider and the Access Seeker, as per current paragraph (b)(iii) of the service description (renumbered to paragraph (b)(iv) in the amended service description).

Bandwidth on Demand

11.15 MCMC's preliminary view in the PI Paper was that Bandwidth on Demand functionality was likely to impose an undue burden on Access Providers and was best handled through commercial agreement, rather than regulation under the Access List.

11.16 A large majority of stakeholders opposed the inclusion of Bandwidth on Demand as an interconnection feature within the service description. Stakeholders referred to issues such as Bandwidth on Demand requiring additional investment or costs for both parties, a lack of demand for this functionality and the fact that this was a value-added capability that went beyond what was necessary for Access Seekers to achieve effective interconnection.

11.17 Among the stakeholders providing submissions before the submission deadline, the only substantive argument in favour of including Bandwidth on Demand was from Symbio, who argued that this feature would allow new licensees to grow based on business demand.

11.18 MCMC acknowledges the view that Bandwidth on Demand allows for a more targeted and proportionate supply of interconnection, as the amount of bandwidth (and therefore the cost of such bandwidth) is dynamically adjusted to Access Seeker needs, rather than being acquired in predetermined bandwidth increments.

11.19 However, based on the stakeholder submissions as a whole, there is a weak support for including Bandwidth on Demand, suggesting that there is likely to be a lack of demand for this functionality at present. Accordingly, MCMC considers that the burdens associated with the implementation of such functionality (including additional cost) are not outweighed by the demand or benefits that would be created by such functionality.

11.20 Accordingly, MCMC is not persuaded that there is a sufficient basis for including Bandwidth on Demand within the service description.

MCMC Views

11.21 MCMC confirms its preliminary view that the Interconnect Link Service should be retained on the Access List, with the following modifications:

(a) removal of references to SS7-based interconnect links; and

(b) addition of a new bandwidth increment of 100 Gbps.

11.22 In a departure from its preliminary view, MCMC considers that a new bandwidth increment of 100 Mbps should not be added within paragraph (b) of the service description.

11.23 MCMC therefore confirms that the service description for the Interconnect Link Service should be amended as follows:

(5) Interconnect Link Service

(a) An Interconnect Link Service is a Facility and/or Service which enables the connection between the network of an Access Provider and the network of an Access

Seeker for the purpose of providing an Interconnection Service, including ~~but not limited to:~~

~~(i)~~ the interconnection of the IP-based network of an Access Provider to the IP-based network of an Access Seeker~~.; and~~

~~(ii) the interconnection of the Signalling System Number Seven ("SS7") network of an Access Provider to the SS7 network of an Access Seeker at the signal transfer points.~~

(b) Interconnection of an IP-based network ~~the kind described in subparagraph (5)(a)(i) above~~ includes the provision of bandwidth at the following increments:

(i) 1 Gbps;

(ii) 10 Gbps; ~~and~~

(iii) 100 Gbps; and

~~(iii)~~(iv) any other amount or increment of bandwidth agreed between the Access Provider and the Access Seeker.

PART 3: NON-PRIORITY ISSUES – CURRENT ACCESS LIST FACILITIES AND SERVICES WITH MINOR OR NO PROPOSED AMENDMENTS

12 Origination and Termination Services

Overview

12.1 In the PI Paper, MCMC took the preliminary view that it would be in the LTBE for Fixed Network Origination Service, Fixed Network Termination Service, Mobile Network Origination Service and Mobile Network Termination Service (together, the **O&T Services**) to remain on the Access List without modification.

MCMC Assessment

12.2 MCMC considers that it remains in the LTBE to list the O&T Services in the Access List.

12.3 Every stakeholder who provided a view on the O&T Services by the submission deadline supported retaining these services and did not propose any amendments to the service descriptions.

12.4 While supporting the principle that the O&T Services should be listed on the Access List without modification, TM proposed that international inbound call termination should be recognised as distinct from domestic call termination for the purposes of access regulation and pricing. TM's submission on this point appears to be entirely focused on the different cost drivers and operational requirements for international inbound calls.

12.5 This issue does not in itself justify the separation of international inbound call termination into a different Access List Service. MCMC has already provided its views on this issue at paragraph 14.37 of the PI Paper. Accordingly, MCMC does not consider it appropriate for international inbound call termination to constitute a separate Access List service.

12.6 In relation to Symbio's submission that MCMC should add a new "Number Hosting Service" to the Access List, MCMC notes that this was not raised by Symbio in its previous questionnaire response (before preparation of the PI Paper) and has also not been raised by other stakeholders.

12.7 MCMC also reiterates that, under section 145 of the CMA, the Access List is only able to regulate network facilities, network services and other facilities or services which facilitate the supply of network services or application services, including content application services. It is not clear to MCMC that the Number Hosting Service proposed by Symbio would be capable of regulation under the Access List within the constraints of section 145 of the CMA.

MCMC Views

12.8 MCMC confirms its preliminary view that the Fixed Network Origination Service, Fixed Network Termination Service, Mobile Network Origination Service and Mobile Network Termination Service should be maintained on the Access List without any modification.

13 Transmission Services

Overview

13.1 In the PI Paper, MCMC took the preliminary view that it would be in the LTBE to retain the Trunk Transmission Service, End-to-End Transmission Service and Wholesale Local Leased Circuit (**WLLC**) Service (together, **Transmission Services**) in the Access List, with the following modifications:

(a) amendments to remove provisions relating to broadcasting transmission, which MCMC proposed would be dealt with under the new Broadcasting Transmission Service;

(b) minor amendments to clarify that the WLLC Service and End-to-End Transmission Service capture services with any latency below 40 ms (rather than the current reference to *"between <1 ms and <40 ms"*); and

(c) minor amendments within the End-to-End Transmission Service description to clarify interactions between the Trunk Transmission Service, End-to-End Transmission Service and WLLC Service.

13.2 In the PI Paper, MCMC also asked questions about:

(a) whether the Trunk Transmission Service should be defined with the same technical parameters as those existing for the WLLC Service and End-to-End Transmission Service; and

(b) whether there are specific routes that should be removed from the scope of the Transmission Services.

MCMC Assessment

Amendments proposed in PI Paper

13.3 In relation to the minor amendments proposed to the service descriptions for the Transmission Services in the PI Paper (regarding latency range and interactions between Transmission Services), MCMC did not receive any submissions in opposition to these changes by the submission deadline.

13.4 MCMC considers that these amendments would enhance the clarity of the service descriptions without materially amending the scope of these services. Accordingly, MCMC considers that these amendments should continue to be made.

13.5 In relation to the removal of references relating to broadcasting transmission, MCMC addresses the basis for listing a separate Broadcasting Transmission Service in section 8 above.

13.6 The remainder of this "MCMC Assessment" section will focus on issues that MCMC asked questions about in the PI Paper but did not propose amendments for in the PI Paper.

Technical parameters for Trunk Transmission Services

13.7 In the PI Paper, MCMC asked a question on whether the same technical parameters should be included in the service description for the Trunk Transmission Service as in the current service descriptions for the WLLC Service and End-to-End Transmission Service.

13.8 These technical parameters refer to network availability, latency, redundancy and any other technical parameters specified or utilised by the Access Provider from time to time. They are set out in paragraph (d) of the current WLLC Service description and paragraph (i) of the current End-to-End Transmission Service description.

13.9 The majority of stakeholders supported the view that the technical parameters should be harmonised across the three Transmission Services.

13.10 CelcomDigi, SDEC and TIME took a different view. More specifically:

(a) CelcomDigi argued that Trunk Transmission Service are provided across a shared (aggregated) transport layer that supports multiple services simultaneously, whereas WLLC Service and End-to-End Transmission Service are point-to-point services.

(b) SDEC argued that the technical parameters for Trunk Transmission Service should not be the same as the other Transmission Services, but did not provide reasons, instead focusing on the point that technical parameters are more appropriately addressed in the MSA.

(c) TIME argued that network availability is different across the three types of Transmission Services, subject to fibre route and redundancy design.

13.11 MCMC is not persuaded that the submissions above justify different technical parameters for Trunk Transmission Service. End-to-End Transmission Service may use the same network infrastructure as Trunk Transmission Service (with End-to-End Transmission Service also using other network segments). Accordingly, if the current technical parameters are appropriate for End-to-End Transmission Service, it is not clear why these would not be appropriate or practicable for Trunk Transmission Service.

13.12 Moreover, CelcomDigi's submission states that network availability targets are *higher* at the core and aggregation segments of the network, as compared to the access segment. This suggests that the network availability targets for WLLC Service and End-to-End Transmission Service (which include access segments) could readily be met by services provided only over core and aggregation segments, such as Trunk Transmission Service.

13.13 In relation to SDEC's submission that technical parameters are more appropriately dealt with in the MSA, MCMC notes that a key objective of including these parameters in the Access List is to ensure that services which fall within the specified parameters are within the scope of the (regulated) Transmission Services. This is to avoid the Access Provider claiming that a Transmission Service with specific parameters (e.g. high network availability or redundancy) is outside the

scope of the Access List and not subject to the applicable requirements of the MSA or MSAP. Since they affect the scope of the regulated service (not just its terms of supply), MCMC prefers to keep these technical parameters in the Access List rather than the MSA.

13.14 In relation to TIME's submission that network availability is subject to fibre route and redundancy design, this issue would apply to all Transmission Services and does not justify the application of different parameters for Trunk Transmission Service, as distinct from WLLC Service or End-to-End Transmission Service. The Access List seeks to set a range of baseline parameters for all Transmission Services which create a very high level of flexibility, including to cater for different routes and network/service designs. For example, the current parameters for the WLLC Service and End-to-End Transmission Service capture services with "zero or more routes of redundancy", which allows for the provision of services with or without redundancy.

13.15 Accordingly, MCMC considers that the references to technical parameters in paragraph (d) of the current WLLC Service description and paragraph (i) of the current End-to-End Transmission Service description should also be added to the Trunk Transmission Service description.

Exclusion of specific routes

13.16 There were mixed views among stakeholders regarding whether certain routes or areas should be excluded from the scope of the Transmission Services.

13.17 CelcomDigi, Maxis and U Mobile submitted that no routes should be excluded.

13.18 Among the other stakeholders:

(a) CTS submitted that routes involving submarine infrastructure should be excluded;

(b) MSA Resources submitted that there should be exclusions for routes where there are at least three independent fibre owners serving both end-points, alternative routes are available without civil works or the Access Seeker can reasonably self-deploy;

(c) SDEC submitted that the Trans Borneo Trunk network should be excluded; and

(d) TM submitted that routes in commercially dense and competitive areas, as well as transmission links that require local submarine connectivity or are in remote areas which are difficult to access, should be excluded.

13.19 Each of the stakeholders proposing exclusions has proposed different routes or different criteria for such exclusions. There are no specific routes that a large number of stakeholders agree should be excluded. In turn, this suggests that any exclusion of routes is likely to be contentious and carry a high risk of regulatory error.

13.20 To deal with the proposals by CTS and TM, MCMC does not consider that **submarine cable routes or routes in remote areas** should be excluded. Indeed,

there is likely to be a *greater* regulatory basis for regulating these routes, as the high capital costs involved with submarine cable deployments (or difficulties accessing remote areas) are likely to result in less competition at the infrastructure level, thereby suggesting that such routes are more likely to have bottleneck characteristics and the LTBE would be served by regulating access to them.

13.21 To the extent that routes requiring submarine cable connectivity or those in remote areas require different terms of access, including pricing, these are matters for the MSA and MSAP, rather than justifying complete exclusion (deregulation) of these routes from the scope of the Access List.

13.22 In response to MSA Resources' submission, MCMC accepts that, in principle, the presence of **three independent fibre owners** on a given route is a relevant factor in assessing whether a route is competitive. However, MCMC has two main concerns with implementing a blanket exclusion on this basis within the service descriptions for Transmission Services. First, the presence of three independent fibre owners on a route is not necessarily determinative that a route is competitive and therefore ought to be entirely excluded from the scope of regulation. The network topology, route characteristics and technical characteristics of the three or more transmission links could still be sufficiently different to not make them substitutable and therefore sufficiently competitive with each other. Second, this criterion is also likely to give rise to disputes about how the presence of competition at an endpoint is defined (e.g. whether the three or more endpoints need to be in the same building or POI, or whether locations in close proximity can be taken into account).

13.23 Accordingly, while this test may appear straightforward on its face, MCMC considers it likely to increase the amount of access disputes and make the Transmission Services less workable as a wholesale access remedy in practice.

13.24 MCMC notes that, where it has incorporated reference to the number of operators in a particular area or route within a service description (e.g. in the context of the new Access to Dark Fibre service), this is as part of a broader test to be applied by MCMC in a future designation, rather than being an automatic exclusion from regulation.

13.25 For example, under the Access to Dark Fibre service description, MCMC has the power to designate Exclusive Zone. A factor that MCMC will have regard to as part of such designation is whether a law, regulation, contract (or other thing listed in the service description) has the effect of designating or conferring exclusivity "*on one licensee, or two licensees*" (as distinct from three or more). This allows the matter to be objectively established by MCMC, with licensees obtaining regulatory certainty once a designation is made. In contrast, an automatic exclusion of all routes that have three of more independent fibre owners from the scope of the Transmission Services will not provide such regulatory certainty to stakeholders.

13.26 The other two criteria proposed by MSA Resources – the availability of alternative routes without civil works and the ability for Access Seeker to reasonably self-deploy – are also likely to lead to a high level of indeterminacy as to the scope of the exclusion, since Access Providers and Access Seekers are likely to have different views about whether an alternative route is available or whether self-deployment by an Access Seeker is reasonable or economically efficient.

13.27 Finally, in relation to TM's proposed exclusion of **dense and competitive areas**, MCMC agrees in principle that conditions of competition for Transmission Services differ across areas in Malaysia and that the basis for regulation in some areas is weaker than others. However, MCMC considers that exclusion of specific areas from the scope of Transmission Services cannot take place without a detailed market analysis to objectively determine the conditions of competition in these areas.

13.28 While TM has proposed a range of specific areas for exclusion (such as Cyberjaya and AIMS DC Kuala Lumpur), these areas have not been proposed or affirmed by other stakeholders. This suggests that there are likely to be divergent perceptions among stakeholders about the state of competition in these areas.

13.29 Moreover, the proposed areas are very small in size and are likely to only act as a single endpoint for a Transmission Service. The presence of competitive options in these specific areas therefore does not establish that all endpoints of a transmission route – and therefore the route as a whole – is competitive.

13.30 Accordingly, MCMC is not satisfied that there is a sufficient regulatory basis for excluding from the scope of the Transmission Services any specific routes or areas that have been identified by certain stakeholders.

MCMC Views

13.31 MCMC confirms its preliminary view that the WLLC Service, Trunk Transmission Service and End-to-End Transmission Service be maintained on the Access List, with the following modifications:

(a) amendments to remove provisions relating to broadcasting transmission, which MCMC proposed would be dealt with under a new "Broadcasting Transmission Service";

(b) minor amendments to clarify that the WLLC Service and End-to-End Transmission Service capture services with any latency below 40 ms (rather than the current reference to "*between <1 ms and <40 ms"*); and

(c) minor amendments within the End-to-End Transmission Service description to clarify interactions between the Trunk Transmission Service, End-to-End Transmission Service and WLLC Service.

13.32 MCMC also confirms that the technical parameter provisions within the descriptions of the WLLC Service and the End-to-End Transmission Service should also be added to the Trunk Transmission Service.

13.33 MCMC therefore confirms that the service descriptions for the Transmission Services should be amended as follows:

(6) Wholesale Local Leased Circuit Service

(a) A Wholesale Local Leased Circuit Service is a Facility and/or Service for the carriage of communications by way of a private circuit between a POI at an Access Provider's premises and an End User location or an Access Seeker's premises, available only at one end of a private circuit, at such transmission rates as may be agreed between the Access Provider and the Access Seeker on a permanent or virtual basis.

(b) The functionalities of the Wholesale Local Leased Circuit Service include:

(i) transmission and any type of routing or switching, whether packet, circuit, multi-layer or otherwise;

(ii) the signalling required to support the Interconnect Link Service or onward transmission via a Trunk Transmission Service provided by the same Access Provider; and

(iii) a digital protocol including Internet Protocols.

Examples of technologies used in the Wholesale Local Leased Circuit Service would be ISDN, Metro Ethernet ("Metro-E"), IP based networks and Ethernet interfaces.

(c) Without limiting subparagraph 6(a) above, the Wholesale Local Leased Circuit Service includes the provision of any Trunk Transmission Service by the same Access Provider to the extent required to enable connectivity between the relevant End User location or Access Seeker's premises and a POI at the Access Provider's premises.

(d) The Wholesale Local Leased Circuit Service includes any Wholesale Local Leased Circuit Service supplied to the Access Seeker with:

(i) any network availability between 99.90% and 99.992%, whether per month or otherwise;

(ii) any latency ~~of between <1 ms and~~ <40 ms;

(iii) zero or more routes of redundancy; and

(iv) any other technical parameters specified or utilised by the Access Provider from time to time, including parameters of a type referred to in subparagraphs (i) to (iii) above.

(Z~~12~~) Trunk Transmission Service

(a) The Trunk Transmission Service is a Facility and/or Service for the carriage of communications between any two technically feasible network transmission points, not being End User locations or Access Seeker's premises, on the Access Provider's network, via such network interfaces at such transmission rates as may be agreed between the Access Provider and the Access Seeker on a permanent or virtual basis.

(b) Network interfaces may use any technology as may be agreed between the Access Provider and the Access Seeker including, for example, Ethernet interfaces and Metro-E.

(c) The functionalities of the Trunk Transmission Service include:

(i) transmission and any type of routing or switching, whether packet, circuit, multi-layer or otherwise;

(ii) the signalling required to support the technology or to provide a service;

(iii) termination at either end by a port, router, network termination unit, switch, submarine cable landing centre or earth station; and

(iv) a digital protocol including Internet Protocols.

(d) *A technically feasible network transmission point in subparagraph (a) may include a submarine cable or satellite link between Sabah and Sarawak and Peninsular Malaysia, submarine cable landing centre or an earth station.*

~~*(e) The Trunk Transmission Service may be for the carriage of communications which comprise of content applications service.*~~

~~*(f)*~~*(e)* *An Access Seeker for the Trunk Transmission Service* ~~*which*~~ *includes but is not limited to a network facilities provider or network service provider which is only authorised to provide limited network facilities or network services such as in the last mile, but wishes to acquire the Trunk Transmission Service in order to connect its limited network facilities or network services.*

(f) The Trunk Transmission Service includes any Trunk Transmission Service supplied to the Access Seeker with:

(i) any network availability between 99.90% and 99.992%, whether per month or otherwise;

(ii) any latency <40 ms;

(iii) zero or more routes of redundancy; and

(iv) any other technical parameters specified or utilised by the Access Provider from time to time, including parameters of a type referred to in subparagraphs (i) to (iii) above.

(8~~15~~) End-to-End Transmission Service

(a) *The End-to-End Transmission Service is a Facility and/or Service for the carriage of communications between:*

(i) *two End User locations;*

(ii) *between two Access Seekers' premises; or*

(iii) *between one End User location and one Access Seeker's premises,*

via such network interfaces at such transmission rates as may be agreed between the Access Provider and the Access Seeker on a permanent or virtual basis.

(b) *Network interfaces may use any technology as may be agreed between the Access Provider and the Access Seeker including, for example, Ethernet interfaces.*

(c) *The functionalities of the End-to-End Transmission Service include:*

(i) *transmission and any type of routing or switching, whether packet, circuit, multi-layer or otherwise;*

(ii) *the signalling required to support the technology or to provide a service;*

(iii) *termination at either end by a port, router, network termination unit, switch, submarine cable landing centre or earth station; and*

(iv) *a digital protocol including Internet Protocols.*

(d) *An End User location or Access Seeker's premises in subparagraph (a) may include submarine cable or satellite link between Sabah and Sarawak and Peninsular Malaysia, submarine cable landing centre or an earth station.*

~~*(e) The End-to-End Transmission Service may be for the carriage of communications which comprise a content applications service.*~~

~~*(f)*~~*(e) Technologies used to supply End-to-End Transmission Service, such as Metro-E, or any other applicable technology which is currently available or which may be developed in future, may be requested by Access Seekers and the Access Provider must supply End-to-End Transmission Service using these technologies on request.*

~~*(g)*~~*(f) An Access Seeker for the End-to-End Transmission Service ~~which~~ includes but is not limited to a network facilities provider or network service provider which is only authorised to provide limited network facilities or network services such as in the last mile, but wishes to acquire the End-to-End Transmission Service in order to connect its limited network facilities or network services.*

~~*(h) For the avoidance of doubt, the End-to-End Transmission Service comprises but is not limited to the Facilities and/or Services specified in the Trunk Transmission Service and the Wholesale Local Leased Circuit Service.*~~

~~*(i)*~~*(g) The End-to-End Transmission Service includes any End-to-End Transmission Service supplied to the Access Seeker with:*

(i) any network availability between 99.90% and 99.992%, whether per month or otherwise;

(ii) any latency ~~of between <1 ms and~~ <40 ms;

(iii) zero or more routes of redundancy; and

(iv) any other technical parameters specified or utilised by the Access Provider from time to time, including parameters of a type referred to in subparagraphs (i) to (iii) above.

14 Domestic Connectivity to International Services

Overview

14.1 In the PI Paper, MCMC took the preliminary view that it would be in the LTBE for Domestic Connectivity to International Services to remain on the Access List without modification.

MCMC Assessment

14.2 MCMC considers that it remains in the LTBE to list this service on the Access List, as there are no effective competitive constraints on the provision of domestic connectivity to each international submarine cable system. Such domestic connectivity therefore remains a bottleneck. Further analysis on this point is provided in section 16 of the PI Paper.

14.3 All stakeholders who provided a view in relation to Domestic Connectivity to International Services by the submission deadline supported retaining this service on the Access List and did not propose any amendments to the service description.

14.4 Accordingly, MCMC does not propose to make any amendments to the service description for Domestic Connectivity to International Services.

MCMC Views

14.5 MCMC confirms its preliminary view that Domestic Connectivity to International Services should be maintained on the Access List without any modification.

15 Fixed Network Pole, Duct and Manhole Access

Overview

15.1 In the PI Paper, MCMC took the preliminary view that it remains in the LTBE for duct and manhole access to continue to be included in the Access List.

15.2 MCMC also proposed:

(a) amendments to bring poles used for the installation of fixed network equipment within the scope of Duct and Manhole Access, so as to create an expanded service referred to as "Pole, Duct and Manhole Access";

(b) amendments to clarify that the service description includes "ducts" generally, rather than being restricted to Lead-in Ducts, Mainline Ducts and Inter-exchange Ducts;

(c) amendments include sub-ducts within the service description generally, rather than only where there is no room for the Access Seeker to install its own sub-ducts; and

(d) additional minor amendments for clarity.

MCMC Assessment

Name of service

15.3 In the PI Paper, MCMC proposed that the expanded service be renamed from "Duct and Manhole Access" to "Pole, Duct and Manhole Access", to reflect the addition of poles for fixed network equipment.

15.4 MCMC considers that this service should be further renamed to "Fixed Network Pole, Duct and Manhole Access". This is to make it clear that the poles included within this service are limited to poles for fixed network deployments, with poles for mobile network equipment remaining within the scope of Infrastructure Sharing.

Inclusion of poles for fixed network equipment

15.5 Based on the stakeholder submissions, there was broad support for including poles used for fixed network infrastructure with the scope of an expanded Fixed Network Pole, Duct and Manhole Access service, with a large number of stakeholders supporting this proposal.

15.6 In relation to the submission by CTS that poles should not be included in the service because they involve distinct technical, operational, safety and maintenance considerations compared to ducts and manholes, MCMC considers that this view is generally not supported by the industry.

15.7 MCMC's preliminary view in the PI Paper was driven by requests from several operators to include poles for fixed deployments within the same service as ducts and manholes. This was on the basis that poles for fixed deployments were often acquired together with duct access or were substitutable with duct access. Including such poles within the same service as ducts and manholes would allow an Access Provider to prepare a single RAO for all of these facilities and would allow Access Seekers to acquire access to these facilities under a single Access Agreement.

15.8 This view continues to be widely supported by operators, based on the stakeholder submissions. Accordingly, MCMC does not consider that the different technical, operational, safety or maintenance considerations associated with poles provides a sufficient basis for not integrating poles for fixed deployments within the same service as ducts and manholes.

15.9 In relation to Edotco's submission about a phased implementation for the inclusion of poles, MCMC strongly disagrees. Poles are already captured as part of the service description for Infrastructure Sharing, including poles used for fixed deployments. By moving poles used for fixed deployments from Infrastructure Sharing to the expanded Fixed Network Pole, Duct and Manhole Access service, MCMC would not be expanding the scope of regulation to any new facilities, but instead simply changing the service under which such facilities are supplied. Accordingly, MCMC does not consider that there is any basis for introducing transitional provisions or a phased implementation for the regulation of poles for fixed deployments.

Definition of "Fixed Network Pole" in service description

15.10 Most stakeholder submissions agree with the proposed definition of "Fixed Network Pole" under the expanded Fixed Network Pole, Duct and Manhole Access service.

15.11 In relation to TM's submission about removing references to "traffic poles", MCMC agrees that, on balance, it would be preferable to remove this reference from the "Pole" definition. Traffic light poles are more commonly used for mobile network infrastructure, not fixed network infrastructure, and removing them from the scope of this definition would make it clearer that this concept is limited to poles used for fixed network equipment. Removal of this reference would also not substantively narrow the concept of "Pole", as "traffic pole" is referred to as a non-exhaustive example and the definition captures "any pole".

15.12 In relation to TM's submission about removing the reference to "capability to support":

(a) MCMC emphasises that the "Fixed Network Pole" definition does not expand the scope of poles subject to regulation compared to the current Access List, but simply moves poles for fixed network deployments from Infrastructure Sharing to Fixed Network Pole, Duct and Manhole Access.

(b) The current Infrastructure Sharing description in the Access List (before amendment) captures any facility that "*supports, or has the capability to support, the installation of mobile or fixed network equipment*".

(c) It is therefore appropriate to retain the reference to "*has the capability to support*" in the "Fixed Network Pole" definition, to ensure parity of scope between poles for mobile network deployments and poles for fixed network deployments, as well as between the current Infrastructure Sharing and the expanded Fixed Network Pole, Duct and Manhole Access.

15.13 MCMC does not agree with PPIT's submission about excluding "poles" supplied under Infrastructure Sharing from the definition of "Poles" under Fixed Network Pole, Duct and Manhole Access. MCMC's proposed amendments to the Infrastructure Sharing description would already exclude poles that fall within the scope of Fixed Network Pole, Duct and Manhole Access from the scope of Infrastructure Sharing. This "one-way" anti-overlap provision is sufficient to prevent overlap between the two services. Adding a further exclusion or anti-overlap provision within the definition of "Fixed Network Poles" would create circularity and is not necessary.

15.14 For consistency with the service being renamed to "Fixed Network Pole, Duct and Manhole Access" (as described in paragraph 15.4 above) and for clarity, MCMC also considers that the defined term "Pole" as used in the service description should be renamed to "Fixed Network Pole".

Treatment of sub-ducts

15.15 There is broad support from stakeholders for MCMC's proposed amendments to include "*sub-ducts*" generally within the service description, rather than only "*sub-ducts where there is no room for the Access Seeker to install its own sub-ducts*".

15.16 MCMC considers that this amendment would promote the LTBE by ensuring efficient use of existing sub-ducts and would minimise access disputes. Accordingly, MCMC proposes to retain this amendment.

Manholes

15.17 MCMC considers reasonable TM's submission about manholes needing to be associated with a duct. Both the current service description and the proposed amendments in the PI Paper refer broadly to "*manholes, including any manholes associated with*" a duct. MCMC agrees that access to manholes necessarily only occurs as an ancillary service to accessing a duct, since manholes are a point of entry into a duct and do not have an independent function or use for Access Seeker. An Access Seeker cannot use manhole access (in isolation) as an input into the supply of any downstream network facilities or services.

15.18 Accordingly, MCMC agrees that paragraph (a)(iii) of the service description should be amended to refer to "*manholes associated with a duct*", rather than "*manholes, including manholes associated with a duct*".

Other amendments

15.19 MCMC did not receive any material objections to the other amendments it proposed to the service description in the PI Paper – namely, amendments to clarify that the service description includes "*ducts*" generally, rather than being restricted to Lead-in Ducts, Mainline Ducts and Inter-exchange Ducts and minor amendments for clarity.

15.20 In relation to Maxis' submission about removing paragraph (c) of the service description, MCMC acknowledges that this provision is merely a reference to the MSA, which will anyway apply to Fixed Network Pole, Duct and Manhole Access even without being referred to in the service description. However, MCMC considers it helpful to retain this provision to flag to operators that the provision of physical access will be subject to the security measures in the MSA. Moreover, since this drafting is already in the Access List and has not created any issues for Access Providers or Access Seekers, MCMC proposes to retain it.

15.21 In relation to TM's submission that the modular and unbundled nature of the service should not require every physical component to be supplied independently where it has no standalone technical or commercial function, MCMC has dealt with this by amending the reference to "*manholes*" in the service description, as mentioned in paragraphs 15.16 to 15.17 above. MCMC does not consider that any further changes are warranted on this point, since the other elements of the service – namely, Fixed Network Poles, ducts and sub-ducts – should be able to be acquired on a modular and unbundled basis, as each of these facilities has a standalone and independent function in relation to the deployment of telecommunications network infrastructure.

15.22 In relation to Xenith IG's submission that duct and manhole access should only be regulated in circumstances where the Access Provider is unable to provide dark fibre access at commercially reasonable rates, MCMC disagrees. Duct access is necessary to allowing an Access Seeker to deploy its own fixed network infrastructure. Deploying such infrastructure creates a greater degree of competitive differentiation compared to dark fibre access. This ultimately enables a higher level and quality of competition, which is in the LTBE. Accordingly, even where dark fibre access is available at reasonable prices, duct and manhole access would promote the LTBE by enabling facilities-based competition.

MCMC Views

15.23 MCMC confirms its preliminary view that:

(a) the Duct and Manhole Access service should be expanded to include poles used for the installation of fixed network equipment;

(b) the service description should include "*ducts*" generally, rather than being restricted to Lead-in Ducts, Mainline Ducts and Inter-exchange Ducts; and

(c) the service description should include "*sub-ducts*" generally, rather than only where there is no room for the Access Seeker to install its own sub-ducts.

15.24 MCMC also considers that:

(a) the Duct and Manhole Access service should be renamed to "Fixed Network Pole, Duct and Manhole Access" to reflect the expanded scope of the service;

(b) the concept of "*Pole*" proposed in the PI Paper should be renamed to "*Fixed Network Pole*" for consistency and clarity;

(c) the reference to "*manholes*" in the service description should be confined to "*manholes associated with a duct*"; and

(d) the reference to "*traffic pole*" in the proposed definition of "Fixed Network Pole" should be removed.

15.25 MCMC therefore confirms that the service description should be amended as follows:

(15~~3~~) Fixed Network Pole, Duct and Manhole Access

(a) Fixed Network Pole, Duct and Manhole Access is a Facility and/or Service which comprises provision of physical access to, at the Access Seeker's discretion, one or more of the following elements:

(i) poles for Fixed Network;

(ii) ducts, including any or all of the following;

~~(i)~~(A) Lead-in Ducts;

~~(ii)~~(B) Mainline Ducts; and

~~(iii)~~(C) Inter-exchange Ducts;

~~(iv)~~(iii) ~~manholes, including any~~ manholes associated with a duct~~Lead-in Ducts, Mainline Ducts or Inter-exchange Ducts~~; and

~~(v)~~(iv) sub-ducts ~~where there is no room for the Access Seeker to install its own sub-ducts~~.

(b) Provision of physical access includes the provision of, or procurement of the provision of:

(i) space at specified network facilities to enable an Access Seeker to install and maintain its own lines, equipment and sub-ducts; and

(ii) access for the personnel of the Access Seeker, including to the land upon which any Lead-in Ducts, Mainline Ducts, Inter-exchange Ducts, sub-ducts and manholes are situated.~~; and~~

~~(iii)~~(c) ~~p~~Provision of physical access in subparagraphs (b)(i) ~~to~~and (b)(ii) above will be subject to the security measures to be included in the Mandatory Standard on Access to mitigate security risk of Access Provider.

15.26 MCMC also confirms that the definition of "Fixed Network Pole" should be as follows:

*"**Fixed Network Pole**" means any pole, including a utility pole, that supports, or has the capability to support, the installation of fixed network equipment.*

16 Network Co-Location Service

Overview

16.1 In the PI Paper, MCMC took the preliminary view that the Network Co-Location Service should be retained on the Access List, with amendments to clarify that "*Access Provider's premises*" and "*Access Provider's network facilities*" refer to premises or network facilities "*owned and/or operated*" by the Access Provider.

16.2 MCMC also asked questions in the PI Paper about whether:

(a) stakeholders have acquired or offered virtual co-location services in the last twenty-four (24) to thirty-six (36) months and, if not, what the primary deterrents were; and

(b) removal of virtual co-location from the service description would create a barrier to entry for smaller licensees who lack the capital to invest in their own physical hardware.

MCMC Assessment

Virtual co-location

16.3 The majority of stakeholder submissions supported retaining virtual co-location as part of the Network Co-Location Service (set out in paragraph (a)(ii) of the service description).

16.4 MCMC acknowledges submissions by TIME and TM that virtual co-location be removed due to lack of take-up. The fact that a service does not have take-up is a relevant factor in assessing whether it is a bottleneck facility and whether it is in LTBE to regulate access to that service. However, even where a service does not have significant take-up at present, it may still be in the LTBE to retain on the Access List where it has the potential to facilitate access in the future and enable Access Seekers to supply downstream services (ultimately enhancing competition in downstream markets).

16.5 To this end, MCMC is persuaded by submissions from a diverse range of stakeholders, such as Maxis, MYTV and Symbio, that removing virtual co-location would create barriers to entry for smaller licensees and retaining this option is important for maintaining equitable access.

16.6 Accordingly, MCMC considers that virtual co-location should be maintained as part of the Network Co-Location Service.

Inclusion of data centres

16.7 In the PI Paper, MCMC considered whether "data centres" should specifically be referred to within the service description. MCMC's preliminary view was that this was not necessary, since paragraph (b) of the service description already captures "*such other network facilities locations associated with the provision of a Facility or Service in the Access List*". This would capture data centres that are owned or

operated by a licensee and associated with the provision of an Access List Service or Facility.

16.8 MCMC received two submissions on this issue, one from Maxis arguing that the service description should explicitly include data centres and one from TM arguing that data centres should be explicitly excluded if they are not owned or operated by a licensee (or where access is not associated with the provision of an Access List Service or Facility).

16.9 MCMC does not consider that further amendments are necessary to the service description on this point, for the following reasons:

(a) Maxis's proposed amendment would result in "data centres" being included generally, even where a data centre is not "*associated with the provision of a Facility or Service on the Access List*". MCMC does not consider it appropriate to regulate access to such data centres. Where a data centre is not necessary to access a regulated (Access List) service or facility, it does not act as a bottleneck facility and it would therefore not be justifiable from an LTBE perspective to list access to such data centres on the Access List.

(b) For those data centres that are associated with the provision of an Access List facility or service (e.g. because a listed service originates or terminates there), such data centres are already captured under the concept of "*such other network facilities locations associated with the provision of a Facility or Service in the Access List*".

(c) In relation to TM's submission, MCMC considers that it is already clear which types of data centres are included under the Network Co-Location Service. Since the service description specifically refers to "*other network facilities locations associated with the provision of a Facility or Service in the Access List"*, it would be duplicative and unnecessary to exclude data centres that are not associated with the provision of an Access List Facility or Service.

(d) The exclusion of data centres not owned or operated by a licensee is inherent under section 149 of the CMA, which limits the obligation to supply Facilities and Services on the Access List to (licensed) network facilities providers and network service providers. Since the Access List is applicable only to licensees, MCMC does not consider it appropriate to specifically add an exclusion to this effect for data centres.

References to premises and network facilities "operated" by Access Provider

16.10 In relation to TM's submission about removing the words "*owned and/or operated by an Access Provider*" in relation to in-span interconnection, MCMC is not persuaded that these words would create unnecessary restriction or ambiguity in scope compared to the existing Access List drafting. Indeed, these words are intended to remove the ambiguity inherent in the current phrase "*Access Provider's network facilities*" in paragraph (a)(iii) of the service description. They make it clear that the relevant nexus between the Access Provider and the network facility is ownership and/or operation of that network facility by the Access Provider.

16.11 However, as pointed out by TM, MCMC acknowledges that there is an inconsistency in wording between "*the network facilities owned and/or operated by an Access Provider*" and "*an Access Seeker's network facilities*". Accordingly, MCMC considers that "*an Access Seeker's network facilities*" should be amended to "*the network facilities owned and/or operated by an Access Seeker*", for consistency and clarity.

16.12 MCMC acknowledges U Mobile's submission that, for premises or network facilities "*operated*" by the Access Provider, access should be subject to the consent of the property owner, which the Access Provider must use reasonable endeavours to obtain.

16.13 At present, the grounds for refusal of an Access Request in the MSA (at subsection 5.4.11) do not specifically allow refusals in circumstances where the Access Provider operates (but does not own) a facility and is unable to provide access to a third-party Access Seeker (e.g. because it cannot sub-lease the facility or has been designated as an exclusive provider).

16.14 MCMC has considered whether there is a basis for expanding the grounds of refusal in the MSA to deal with this issue (or clarifying that this is a basis for refusal within the service description in the Access List). On balance, MCMC does not consider this to be appropriate. MCMC is concerned that, if the Access List or MSA allowed refusal on this basis, Access Providers could be incentivised to agree restrictive or exclusive conditions in their agreements with landowners or facility owners, which they could then point to as a ground for refusing access to Access List Facilities and/or Services. This has the potential to undermine the basis of the access regime in the Access List.

16.15 Such a restriction is also not supported by international precedent. For example, in Australia, carriers are required to provide another carrier with access to any eligible underground facility (including ducts) "*owned or operated*" by them.[5] Similarly, in the EU, the Gigabit Infrastructure Act requires network operators to provide access to physical infrastructure that they "*own or control*".[6]

16.16 Accordingly, MCMC is not persuaded that any amendments need to be made to the "Grounds for Refusal" provision in the MSA in relation to premises or network facilities "operated" by the Access Provider.

MCMC Views

16.17 MCMC confirms its preliminary view that the Network Co-Location Service should be retained on the Access List.

16.18 MCMC also:

(a) confirms its preliminary view that the service description should be amended to clarify that that "*Access Provider's premises*" and "*Access Provider's network facilities*" refer to premises or network facilities "*owned and/or operated*" by the Access Provider; and

[5] Telecommunications Act 1997 (Cth), Schedule 1, clause 35.
[6] Regulation (EU) 2024/1309 of the European Parliament and of the Council of 29 April 2024 on measures to reduce the cost of deploying gigabit electronic communications networks, amending Regulation (EU) 2015/2120 and repealing Directive 2014/61/EU (**Gigabit Infrastructure Act**) (EU), Article 3(1).

(b) considers that the reference to "*Access Seeker's network facilities*" should also be amended to "*network facilities owned and/or operated by the Access Seeker*", for consistency and clarity.

16.19 MCMC therefore confirms that the service description should be amended as follows:

(11~~9~~) Network Co-Location Service

(a) The Network Co-Location Service is a Facility and/or Service which comprises:

(i) physical co-location, which refers to the provision of space at ~~an~~ premises owned and/or operated by the Access Provider~~'s premises~~ to enable the Access Seeker to install and maintain equipment necessary for the provision of the Access Seeker's services through the Facilities and/or Services of any Operator. Physical co-location includes physical space, power, environmental services (such as heat, light, ventilation and air-conditioning), security, site maintenance and access for the personnel of the Access Seeker;

(ii) virtual co-location, which refers to the provision of Facilities or Services at ~~an~~ premises owned and/or operated by the Access Provider~~'s premises~~ to enable the acquisition by the Access Seeker of Facilities and Services in the Access List, where equipment is owned and maintained by the Access Provider; or

(iii) in-span interconnection, which is the provision of a POI at an agreed point on a physical cable linking ~~an Access Provider's~~ the network facilities owned and/or operated by an Access Provider to ~~an Access Seeker's~~ the network facilities owned and/or operated by an Access Seeker.

(b) Network premises at which co-location is to be provided includes switching sites, submarine cable landing centres, earth stations, exchange buildings, other Customer Access Modules including roadside cabinets, any location where a main distribution frame is housed and such other network facilities locations associated with the provision of a Facility or Service in the Access List.

17 Digital Terrestrial Broadcasting Multiplexing Service

Overview

17.1 In the PI Paper, MCMC took the preliminary view that it would be in the LTBE for the Digital Terrestrial Broadcasting Multiplexing Service to remain on the Access List without any modification.

MCMC Assessment

17.2 MCMC did not receive any submissions arguing for modifications to the Digital Terrestrial Broadcasting Multiplexing Service or for removal of this service from the Access List.

17.3 There remains a very strong basis for retaining this service on the Access List from an LTBE perspective, given that it is an essential input for operators who wish to engage in terrestrial television broadcasting, especially free-to-air broadcasting.

The sole Access Provider of this service, MYTV, agrees that the service should be kept on the Access List without modification.

MCMC Views

17.4 MCMC confirms its preliminary view that the Digital Terrestrial Broadcasting Multiplexing Service should be maintained on the Access List without any modification.

18 High-Speed Broadband (HSBB) Network Services

Overview

18.1 In the PI Paper, MCMC's preliminary view was that the Layer 2 HSBB Network Service with Quality of Service ("QoS") and Layer 3 HSBB Network Service (together, the "**HSBB Network Services**") should be retained on the Access List, with the following modifications:

(a) the Layer 2 HSBB Network Service with QoS should be renamed to the "Layer 2 HSBB Network Service"; and

(b) for both the Layer 2 HSBB Network Service and the Layer 3 HSBB Network Service:

(i) a new bandwidth profile of 2,000 Mbps downstream and 500 Mbps upstream should be added to the pre-defined bit rates table;

(ii) bandwidth profiles below 100 Mbps downstream should be deleted from the pre-defined bit rates table;

(iii) the service description should clarify that it captures all "*network availability parameters*" specified, utilised or agreed by the Access Provider from time to time; and

(iv) clarification should be added that the service does not include transmission from an Access Seeker's POI (and that such transmission will need to be separately acquired by the Access Seeker).

MCMC Assessment

Addition of new 2,000/500 Mbps bandwidth profile

18.2 A significant majority of stakeholder submissions support the addition of a new 2,000/500 Mbps bandwidth profile as part of the HSBB Network Services.

18.3 MCMC considers that the additional of a new higher-speed tier reflects technological evolutions since the previous review of the Access List and is also consistent with international practice. As stated in TM's submission, this bandwidth profile is already available in the market and is permitted under HSBB network architectures and therefore should not present a challenge for Access Providers. MCMC is

therefore not persuaded that there are any grounds for continuing to treat this bandwidth profile as being subject to commercial negotiation, as distinct from other (lower-speed) bandwidth profiles.

18.4 The listing of a 2,000/500 Mbps bandwidth profile as part of the regulated HSBB Network Services is likely to enhance competition in retail markets in relation to higher-speed broadband services. Promoting greater access to higher-speed tiers would also encourage the economically efficient use of communications infrastructure. For these reasons, MCMC considers that the addition of a new 2,000/500 Mbps bandwidth profile for HSBB Network Services is in the LTBE.

18.5 MCMC acknowledges submissions by CelcomDigi and Maxis that even higher bandwidth profiles (up to 10 Gbps downstream) be added to the bit rates table in the service descriptions. As set out in Maxis's submission, there is some support for this based on international practice, with speeds above 2 Gbps at the wholesale level being provided in a range of jurisdictions, such as New Zealand, Canada, Italy and Singapore.

18.6 However, the majority of the international precedents cited by Maxis either do not extend as far as 10 Gbps downstream or extend to 10 Gbps services only at the commercial retail level (not as a mandatory wholesale speed tier). This suggests that, if MCMC were to mandate speeds of up to 10 Gbps downstream under the HSBB Network Services, MCMC would be acting significantly ahead of international regulatory practice rather than in line with it.

18.7 MCMC has done this on other occasions where there are specific features of the Malaysian communications sector that support taking a different approach to international practice (e.g. the structure of the sector, competition conditions or geographic factors are different in Malaysia compared to comparable jurisdictions).

18.8 Nevertheless, in the current circumstances, MCMC does not consider that the Malaysian market is at the stage where there should be mandated wholesale access to bandwidth profiles above 2,000/500 Mbps. The highest speed tier available on TM's Unifi Home Broadband services (at the retail level) is 2 Gbps as of June 2026.[7] Mandating the wholesale provision of speeds above 2 Gbps would therefore result in the Access List mandating speeds that are not currently offered in the market even on a commercial basis.

18.9 Accordingly, MCMC is therefore not satisfied that, having regard to current market dynamics, there is a sufficient regulatory basis to mandate access to HSBB speed tiers above 2 Gbps downstream.

18.10 MCMC also notes that the services descriptions for both HSBB Network Services extend to "*Any other higher, lower or different bit rates specified or utilised by the Access Provider from time to time*". This means that, if Access Providers provide HSBB-based retail broadband services at bit rates above 2,000 Mbps in the future, they would be required to also provide access to such services at the wholesale level, via the Access List. This creates a sufficient degree of future-proofing for the service descriptions of the HSBB Network Services.

[7] Unifi, Unifi Home Broadband Plans, https://unifi.com.my/fibre-broadband.

Removal of bandwidth profiles below 100 Mbps downstream

18.11 In the PI Paper, MCMC proposed deletion of the 30 Mbps and 50 Mbps speed tiers on the basis that they were no longer being widely acquired by Access Seekers or supplied in retail markets.

18.12 The stakeholder views on this point are quite evenly balanced.

18.13 However, MCMC welcomes further information from stakeholders indicating that there remains a significant customer base for the 30 Mbps and 50 Mbps speed tiers. In particular, Maxis mentions that these bandwidth profiles are still "*widely used*" and has provided confidential data to support this.

18.14 In light of this new information, MCMC is concerned that removal of these speed tiers from the bit rate table would result in these speed tiers no longer being offered by Access Providers, which would require Access Seekers (and therefore end-users) to migrate to speed tiers of 100 Mbps downstream and above. This could result in a significant number of end-users being forced to acquire services beyond their current broadband needs, at prices higher than they are willing to pay for. This would result in an outcome that does not promote the efficient use of communications infrastructure and limits the choice of services available to end-users, which would ultimately affect the quality of competition in downstream markets. For these reasons, MCMC considers that it would be in the LTBE to retain the various speed tiers with bit rates of 30 Mbps and 50 Mbps under both HSBB Network Services.

References to "network availability parameters"

18.15 There is wide support from stakeholders for adding references to "*network availability parameters*" within paragraph (d)(iii) of each of the Layer 2 HSBB Network Service description and the Layer 3 HSBB Network Service description.

18.16 The effect of this amendment is that an Access Provider would be required to make available to Access Seekers any network availability parameters for HSBB Network Services that it specifies, utilises or agrees with the Access Seeker from time to time.

18.17 CTS disagrees with this proposal, arguing that network availability parameters should be subject to mutual agreement. TM also considers that references to network availability parameters should not be included, as premium or enterprise-grade services go beyond what should be captured by a regulated service.

18.18 MCMC considers that, if an Access Provider specifies or uses a network availability parameter, including in its own retail services, it should be required to provide HSBB Network Services with such parameters to Access Seekers. This would promote competition in downstream markets, which would be in the LTBE, and would also be consistent with the requirement for Access Providers to provide regulated services on an equitable and non-discriminatory basis under subsection 149(2) of the CMA. MCMC would be concerned with a scenario where Access Providers only offer services with certain (lower-end) network availability commitments at the wholesale level, while restricting higher-end network availability commitments to its own retail services, as this would leave Access

Seekers at a disadvantage in competing with the Access Provider's own retail operations in downstream markets.

18.19 Accordingly, MCMC considers that it would be in the LTBE for Access Providers to be required to supply HSBB Network Services with any "*network availability parameters … specified, utilised or agreed by the Access Provider from time to time*".

Exclusion of transmission from an Access Seeker's POI

18.20 MCMC has not received submissions opposing the additions proposed at paragraph (a) of each HSBB Network Service description in this PI Paper. This language would specify that the HSBB Network Services do not cover transmission from the Access Seeker's POI to the Access Provider's POI, and that the Access Seeker would need to separately acquire a transmission service between these two points.

18.21 However, Maxis has proposed certain amendments to this text, which would:

(a) specify that the acquisition of a separate transmission service between the Access Seeker's POI and the Access Provider's POI is at the Access Seeker's "*own discretion*";

(b) allow the Access Seeker to use their own fibre for this segment; and

(c) specify that the transmission service may be "*any other feasible methodology*" (not just a Trunk Transmission Service, Wholesale Local Leased Circuit Service or End-to-End Transmission Service, as mentioned in MCMC's proposed language in the PI Paper).

18.22 Maxis submitted that these amendments would avoid the risk of forced bundling between HSBB Network Services and transmission services.

18.23 MCMC considers that amendments of this nature would clarify the intended application of the language proposed in the PI Paper. MCMC also notes that the language it proposed in the PI Paper was not intended to mandate an Access Seeker to acquire any transmission service alongside a HSBB Network Service (to permit connections from an Access Seeker POI) and that this would benefit from further clarification.

18.24 MCMC therefore proposes to add the following language to the service descriptions of each of the HSBB Network Services (with changes shown below in red relative to the version of the text proposed in the PI Paper):

> *"Where the Access Seeker is acquiring the Layer [2/3] HSBB Network Service from a POI at the Access Seeker's premises, ~~the Layer [2/3] HSBB Network Service will not cover transmission from the Access Seeker's POI and will only cover the other elements of this service from that location~~ the Access Provider may require the Access Seeker to separately acquire or self-provision transmission from the POI at the Access Seeker's premises to the nearest POI at the Access Provider's premises. In these circumstances, ~~T~~the Access Seeker ~~will need to~~ may, at its discretion, separately acquire a transmission service from the Access Provider or a third party (which could be a Trunk Transmission Service, Wholesale Local Leased Circuit Service, ~~or~~ End-to-End Transmission Service or another type of transmission service)*

or use its own network infrastructure from the ~~Access Seeker's~~ POI at the Access Seeker's premises to ~~a~~ the POI at the Access Provider's premises."

TR069 and TR369 references

18.25 MCMC received a range of different views on whether references to the TR069 protocol (and evolutions to it, such as TR369) should be reflected in the service descriptions for the HSBB Network Services. These are protocols for remotely managing customer premises equipment such as modems or routers.

18.26 Some stakeholders submitted that no further changes should be made, while others (in particularly CelcomDigi) stated that these protocols should be explicitly referenced.

18.27 U Mobile submitted that specific protocols such as TR069 or TR369 should not be hard-coded into the service description, as this risks making the Access List obsolete over the determination cycle. Instead, U Mobile supporting adding a generic reference to "*industry-standard device management protocols*", with TR069 and TR369 being cited only as examples.

18.28 Maxis submitted that references to "*TR069 and subsequent evolutions*" should be included for both the Layer 2 and Layer 3 HSBB Network Services.

18.29 In light of these submissions, MCMC considers that the preferable approach is to refer generally to "*customer premises equipment management protocols … specified, utilised or agreed by the Access Provider from time to time*" in paragraphs (d)(iii) of the service description.

18.30 This would ensure that Access Seekers would have access to protocols for managing customer premises equipment, including TR069 and TR369, where these are used by the Access Provider itself or otherwise agreed between the Access Provider and the Access Seeker. However, given concerns from several stakeholders about ensuring the Access List is future-proof and not too rigid, this approach would not codify any particular standard or protocol as needing to be provided by an Access Provider.

MCMC Views

18.31 MCMC confirms its preliminary view that the HSBB Network Services should be retained on the Access List, with the following modifications:

(a) the Layer 2 HSBB Network Service with QoS should be renamed to the "Layer 2 HSBB Network Service"; and

(b) for both the Layer 2 HSBB Network Service and the Layer 3 HSBB Network Service:

(i) a new bandwidth profile of 2,000 Mbps downstream and 500 Mbps upstream should be added to the pre-defined bit rates table; and

(ii) the service description should clarify that it captures all "*network availability parameters*" specified, utilised or agreed by the Access Provider from time to time.

18.32 MCMC has reconsidered its preliminary view to delete bandwidth profiles below 100 Mbps downstream from the pre-defined bit rates table. MCMC considers that these bandwidth profiles should remain within the bit rates table for both HSBB Network Services, without modification.

18.33 MCMC also considers that the service descriptions for both HSBB Network Services should:

(a) capture all "*customer premises equipment management protocols*" specified, utilised or agreed by the Access Provider from time to time; and

(b) specify that the service does not include transmission from an Access Seeker's POI (as proposed in the PI Paper), but with further clarifications to create greater flexibility for Access Seekers for the segment between the Access Seeker POI and the Access Provider POI.

18.34 MCMC therefore confirms that the service description for the Layer 2 HSBB Network Service with QoS should be amended as follows:

(13~~1~~) Layer 2 HSBB Network Service ~~with Quality of Service ("QoS")~~

(a) The Layer 2 HSBB Network Service ~~with QoS~~ is an access and transmission Facility and/or Service for the provision of Layer 2 connectivity for the carriage of certain communications, being data in digital form and conforming to Internet Protocols, between customer equipment at an End User's premises and a POI at the Access Seeker's premises or the Access Provider's premises, as selected by the Access Seeker, where in respect of the service:

(i) the customer equipment is directly connected to an Access Provider's High-Speed Broadband Network;

(ii) the Access Seeker selects the bit rate;

(iii) the Access Seeker selects the QoS Class; and

(iii) the Access Seeker assigns the Customer with an IP address.

Where the Access Seeker is acquiring the Layer 2 HSBB Network Service from a POI at the Access Seeker's premises, the Access Provider may require the Access Seeker to separately acquire or self-provision transmission from the POI at the Access Seeker's premises to the nearest POI at the Access Provider's premises. In these circumstances, the Access Seeker may, at its discretion, separately acquire a transmission service from the Access Provider or a third party (which could be a Trunk Transmission Service, Wholesale Local Leased Circuit Service, End-to-End Transmission Service or another type of transmission service) or use its own network infrastructure from the POI at the Access Seeker's premises to the POI at the Access Provider's premises.

(b) The Layer 2 HSBB Network Service ~~with QoS~~ includes shared splitting services, interfaces to operational support systems and network information.

(c) Nothing in this service description is intended to limit:

(i) the number of concurrent Layer 2 HSBB Network Services ~~with QoS~~ acquired by an Access Seeker from an Access Provider associated with a single Customer;

(ii) *concurrent acquisition of Layer 2 HSBB Network Services ~~with QoS~~ and other HSBB Network Services by an Access Seeker from an Access Provider associated with a single Customer; or*

(iii) *the number of HSBB Network Services that may be acquired by a single Access Seeker, either in a single location or at multiple locations (or permit an Access Provider to require an Access Seeker to acquire any minimum or maximum number of HSBB Network Services, either in a single location or at multiple locations), as a condition of an Access Provider supplying the Layer 2 HSBB Network Service ~~with QoS~~.*

(d) *The Layer 2 HSBB Network Service ~~with QoS~~ shall be supplied to the Access Seeker as follows:*

(i) *at pre-defined speeds which are capable of providing the bit rates specified below, as selected by the Access Seeker:*

Bit rate		***Note and example applications***
Downstream	***Upstream***	
Unconstrained	*Unconstrained*	*Access Provider does not constrain the speed of the service itself but would provide an unconstrained network service which the Access Seeker rate shapes, i.e. determines the speed. This option is only available with QoS Class 5.*
30 Mbps	*5 Mbps*	*Low-speed broadband services*
30 Mbps	*10 Mbps*	
30 Mbps	*30 Mbps*	
50 Mbps	*10 Mbps*	*High-speed residential, business broadband services, or enterprise grade business broadband services*
50 Mbps	*20 Mbps*	
50 Mbps	*50 Mbps*	
100 Mbps	*40 Mbps*	
100 Mbps	*50 Mbps*	
100 Mbps	*100 Mbps*	
250 Mbps	*100 Mbps*	
500 Mbps	*100 Mbps*	
600 Mbps	*100 Mbps*	
700 Mbps	*100 Mbps*	
800 Mbps	*200 Mbps*	
1000 Mbps	*500 Mbps*	

Bit rate		Note and example applications
Downstream	**Upstream**	
2000 Mbps	500 Mbps	
Any other higher, lower or different bit rates specified or utilised by the Access Provider from time to time		

(ii) in accordance with the following QoS Class, as selected by the Access Seeker:

QoS Class	Latency	Jitter	Packet Loss	Notes and example applications
0	*≤ 100 ms*	*≤ 50 ms*	*≤ 10^{-3}*	*Real-time, jitter sensitive, high interaction – Voice over IP ("VoIP")*
1	*≤ 200 ms*	*≤ 50 ms*	*≤ 10^{-3}*	*Real-time, jitter sensitive, interactive – IP television ("IPTV")*
2	*≤ 100 ms*	-	*≤ 10^{-3}*	*Transaction data, highly interactive – signalling*
3	*≤ 400 ms*	-	*≤ 10^{-3}*	*Transaction data, interactive – business data*
4	*≤ 1 s*	-	*≤ 10^{-3}*	*Low loss only (short transactions, bulk data) – video streaming*
5	-	-	-	*Best efforts – traditional applications of default IP networks*

(iii) any other technical parameters or standards (including network availability parameters and customer premises equipment management protocols) specified, utilised or agreed by the Access Provider from time to time.

18.35 MCMC also confirms that the service description for the Layer 3 HSBB Network Service should be amended as follows:

(14) Layer 3 HSBB Network Service

(a) The Layer 3 HSBB Network Service is an access and transmission Facility and/or Service for the provision of Layer 3 connectivity for the carriage of certain communications, being data in digital form and conforming to Internet Protocols, between customer equipment at an End User's premises and a POI at the Access Provider's premises or the Access Seeker's premises, as selected by the Access Seeker, where in respect of the service:

(i) the customer equipment is directly connected to an Access Provider's High-Speed Broadband Network;

(ii) the Access Seeker selects the bit rate; and

(iii) the Access Seeker selects the Classes of Service ("CoS").

Where the Access Seeker is acquiring the Layer 3 HSBB Network Service from a POI at the Access Seeker's premises, the Access Provider may require the Access Seeker to separately acquire or self-provision transmission from the POI at the Access Seeker's premises to the nearest POI at the Access Provider's premises. In these circumstances, the Access Seeker may, at its discretion, separately acquire a transmission service from the Access Provider or a third party (which could be a Trunk Transmission Service, Wholesale Local Leased Circuit Service, End-to-End Transmission Service or another type of transmission service) or use its own network infrastructure from the POI at the Access Seeker's premises to the POI at the Access Provider's premises.

(b) The Layer 3 HSBB Network Service includes:

(i) any hybrid Layer 2 and/or Layer 3 functionality required for the provision of the service;

(ii) shared splitting services;

(iii) interfaces to operational support systems; and

(iv) network information.

(c) Nothing in this service description is intended to limit:

(i) the number of concurrent Layer 3 HSBB Network Services acquired by an Access Seeker from an Access Provider associated with a single Customer;

(ii) concurrent acquisition of the Layer 3 HSBB Network Services and other HSBB Network Services by an Access Seeker from an Access Provider associated with a single Customer; or

(iii) the number of HSBB Network Services that may be acquired by a single Access Seeker, either in a single location or at multiple locations (or permit an Access Provider to require an Access Seeker to acquire any minimum or maximum number of HSBB Network Services, either in a single location or at multiple locations), as a condition of an Access Provider supplying the Layer 3 HSBB Network Service.

(d) The Layer 3 HSBB Network Service shall be supplied to the Access Seeker as follows:

(i) at pre-defined speeds which are capable of providing the bit rates specified below, as selected by the Access Seeker, subject to the maximum bit rate supported by the access technology used at particular End User premises:

Symmetric base bit rates
4 to 30 (inclusive) in 1 Mbps increments
32
50
60
100

Additional Bit Rates the Access Seeker may request	
Downstream	***Upstream***
30 Mbps	*5 Mbps*
30 Mbps	*10 Mbps*
50 Mbps	*10 Mbps*
50 Mbps	*20 Mbps*
100 Mbps	*40 Mbps*
100 Mbps	*50 Mbps*
250 Mbps	*100 Mbps*
500 Mbps	*100 Mbps*
600 Mbps	*100 Mbps*
700 Mbps	*100 Mbps*
800 Mbps	*200 Mbps*
1000 Mbps	*500 Mbps*
2000 Mbps	*500 Mbps*
Any other higher, lower or different bit rates specified or utilised by the Access Provider from time to time	

(ii) *in accordance with the following CoS, as selected by the Access Seeker, with traffic in each CoS prioritised as set out below in the case of congestion:*

Class of Service	***Traffic Priority***
VoIP	*1*
IPTV, Video-on-Demand	*2*
Management, Business Internet	*3*
Residential Internet, Best Efforts Connection	*4*

(iii) *any other technical parameters or standards (including network availability parameters and customer premises equipment management protocols) specified, utilised or agreed by the Access Provider from time to time.*

19 MVNO Access

Overview

19.1 In the PI Paper, MCMC's preliminary view was that MVNO Access should be retained on the Access List, with minor modifications to clarify that the Facilities and Services to which the Access Seeker can request access include those that are "*owned and/or operated*" by the Access Provider.

MCMC Assessment

Retention of MVNO Access on Access List

19.2 There was general support from stakeholders regarding the retention of MVNO Access on the Access List.

19.3 Among the major Access Providers, CelcomDigi and U Mobile did not express opposition to, or hold a strong view on, the retention of MVNO Access. TM also agreed with retaining MVNO Access on the Access List.

19.4 Maxis submitted that MVNO Access should be removed from the Access List. Similarly to the questionnaire responses before the PI Paper, Maxis was the only stakeholder to argue in favour of the removal of MVNO Access from the Access List.

19.5 MCMC acknowledges Maxis' detailed submissions on this point. One of the key arguments made by Maxis is that MCMC should not rely on the number of hosts (Access Providers) and their relative scale as being indicative of the level of competition in the market. Maxis submits that MCMC should look more broadly at non-structural factors and market outcomes, such as pricing, coverage, innovation and service differentiation, and the degree of MVNO entry and participation in the market. Maxis also submits that market evolutions in the past decade should not be attributed to the presence of regulated access.

19.6 The key challenge with such an analysis is that MVNO Access has been regulated in Malaysia for a long time (since 2015). Accordingly, it is difficult to determine with certainty whether the current dynamics and outcomes in the market are the result of (or have been assisted by) access regulation, or whether they would have occurred in the absence of access regulation (such that access regulation is no longer necessary).

19.7 In MCMC's view, there is a strong basis for finding that regulation has been a key factor in the growth of MVNOs in the retail market, whose market presence enhances competition in retail markets and the efficient use of communications infrastructure (and is therefore in the LTBE). As stated by MCMC in the PI Paper and repeated by Maxis in its submission, the period from 2019 to 2024 has seen an increase in the number of active MVNOs from 8 to 20. Maxis also submits that the MVNO subscriber share in the retail market has grown from 8.7% in 2015 to 16.1% in 2024.[8] These increases have occurred despite greater consolidation in the wholesale market, primarily by virtue of the Celcom-Digi merger.

19.8 A persuasive explanation for these somewhat contradictory phenomena – increased consolidation at the MNO level and increased MVNO presence – is that access regulation has continued to support the growth of MVNOs in the retail market, notwithstanding structural consolidation in the wholesale market.

19.9 MCMC also disagrees with Maxis' submissions regarding the long-run costs of retaining regulation. Maxis submits that mandated wholesale access diminishes incentives to invest in network upgrades by Access Providers, while also weakening MVNO incentives to invest in differentiation or in core network functionality.

19.10 MCMC considers that there is an inconsistency between the view that the dynamic growth in MVNO hosting and subscriber share is the result of commercial incentives for Access Providers (not regulation) and the view that regulated MVNO access would decrease investment incentives for Access Providers. If it is true that regulated MVNO Access decreases investment incentives, this suggests that there

[8] Maxis submission, pp. 90, 94.

is no commercial incentive to provide MVNO Access to a sufficient degree in the absence of regulation.

19.11 MCMC also disagrees that regulated MVNO Access dissuades MVNOs from investing in network functionality or differentiation. Given the high barriers to entry to become an MNO (which have become even greater due to higher levels of consolidation following the Celcom-Digi merger), MCMC is not persuaded that, in the absence of regulated MVNO Access, MVNOs would "move up the value chain" and invest in core network functionality, thereby becoming MNOs. In this context, MVNO Access creates a pathway for introducing a greater level of competition in the retail market, by allowing retail mobile services to be provided by MVNOs who would not otherwise meaningfully compete in the retail market.

19.12 For these reasons, MCMC considers that it remains in the LTBE to retain MVNO Access on the Access List.

Facilities and services "owned and/or operated" by the Access Provider

19.13 Most stakeholders who provided a view on this issue before the submission deadline agreed with MCMC's proposed amendment to paragraph (c) of the service description. In line with changes proposed to other services on the Access List, this would clarify that the Facilities and Services to which an Access Seeker may request access include a range of Facilities and Services "*that are owned and/or operated by the Access Provider*" (replacing the current reference to "*the Access Provider's*" Facilities and Services).

19.14 MCMC considers that the reference to "*owned and/or operated*" makes clearer the nexus between the Access Provider and the relevant Facility or Service.

19.15 MCMC acknowledges Maxis' submission that the reference to Facilities or Services "*operated*" by the Access Provider should be removed, because such Facilities or Services could be subject to limitations set by the owner of the Facility or Service.

19.16 MCMC has responded to this issue at paragraphs 16.12 to 16.16 above in the context of the Network Co-Location Service. The same views are relevant to this point raised by Maxis in the context of MVNO Access.

Other submissions

19.17 Several stakeholders provided submissions on amending the service descriptions of the 5G Services to clarify that these do not include core network access, which would more clearly delineate the 5G Services from MVNO Access. MCMC has responded to these submissions in section 7 (see paragraphs 7.45 to 7.49).

19.18 In relation to TM's submission that the service description should specifically refer to "thin" and "thick" MVNO Access models, MCMC considers that the service description is already sufficiently flexible to cater for these different models. Paragraph (c) of the service description states that the Access Seeker may request access to a range of radio and core network elements, including customer billing. This allows the Access Seeker to choose which of these elements it wishes to acquire, depending on whether it is a "thin" or "thick" MVNO.

19.19 However, MCMC considers that some of the core network elements currently listed in paragraph (c) refer to legacy 2G and 3G networks and are not suited for 4G and 5G network generations. Accordingly, MCMC proposes to:

(a) supplement the reference to "Home Location Register (HLR)" with "*and successor or equivalent subscriber management functions for 4G and 5G network generations*" – this would capture the 4G and 5G equivalents to the HLR, such as Home Subscriber Server (HSS) for 4G and Unified Data Management (UDM) for 5G; and

(b) add a general reference to "*one or more core network elements of 4G or 5G network generations that enable the Access Seeker to provide public cellular services to the public*" – this would both update the service description to specifically capture 4G and 5G core network elements and also clarify that the Access Seeker has flexibility to request "one or more" core network elements, depending on the specific MVNO model it wishes to pursue.

MCMC Views

19.20 MCMC confirms its preliminary view that MVNO Access should be retained on the Access List, with minor modifications to clarify that the Facilities and Services to which the Access Seeker can request access include those that are "*owned and/or operated*" by the Access Provider.

19.21 MCMC also considers that the service description should be further amended to clarify that it includes access to 4G and 5G core network elements.

19.22 MCMC therefore confirms that the service description should be amended as follows:

(16) MVNO Access

(a) MVNO Access is a Facility and/or Service for access to the Mobile Network used by the Access Provider to provide public cellular services to the public, for the purpose of the Access Seeker providing public cellular services to the public.

(b) MVNO Access may include access to the Facilities and Services used by the Access Seeker to provide:

(i) one or more of voice, data and application services, as selected by the Access Seeker; and

(ii) services over networks including GSM, WiMAX, LTE, IMT-Advanced or LTE-Advanced, 5G and any other mobile networks which are currently available or which may be developed in future.

(c) Examples of Facilities and Services to which the Access Seeker may request access includes, but is not limited to, the following that are owned and/or operated by the Access Provider~~'s~~:

(i) radio network;

(ii) serving general packet radio service (GPRS) support node and gateway GPRS support node;

(iii) *home location register and successor or equivalent subscriber management functions for 4G and 5G network generations;*

(iv) one or more core network elements of 4G or 5G network generations that enable the Access Seeker to provide public cellular services to the public;

(~~iv~~v) value-added service platforms (such as its short message service centre, multimedia service centre and voicemail server);

(~~v~~vi) subscriber identity module provisioning and configuration;

(~~vi~~vii) customer billing; and

(~~vii~~viii) customer relationship management.

20 Domestic Inter-Operator Roaming Service

Overview

20.1 In the PI Paper, MCMC expressed the preliminary view that it would be in the LTBE to retain the Domestic Inter-Operator Roaming Service on the Access List without modification.

MCMC Assessment

20.2 All stakeholders who provided submissions before the submission deadline agreed with retaining the Domestic Inter-Operator Roaming Service on the Access List. MCMC also did not receive any submissions before the submission deadline arguing for modifications to the service description.

20.3 MCMC considers that it remains in the LTBE to retain the Domestic Inter-Operator Roaming Service on the Access List.

20.4 As set out in the PI Paper, Domestic Inter-Operator Roaming Service is complementary to, rather than substitutable with, other mobile services on the Access List, such as 4G MOCN Access and MVNO Access.

20.5 In particular, domestic roaming plays a critical role in ensuring the Access Seekers can obtain national coverage in an accessible manner, without having to undertake the high investments necessary to roll out their own network infrastructure or to participate in MOCN or MORAN arrangements.

20.6 The availability of domestic roaming therefore ensures that small MNOs and MVNOs are able to achieve national network coverage and participate meaningfully as competitors in retail markets. In turn, this enhances competition in retail mobile markets, which is in the LTBE.

MCMC Views

20.7 MCMC confirms its preliminary view that the Domestic Inter-Operator Roaming Service should be maintained on the Access List without any modification.

21 Other Services and Facilities

Overview

21.1 In the PI Paper, MCMC considered whether there was a basis for listing three other Services and Facilities on the Access List:

(a) low earth orbit (**LEO**) satellite services;

(b) access to data centres; and

(c) application-to-person (**A2P**) messaging services.

21.2 MCMC's preliminary view was that LEO satellite services, access to data centres and A2P messaging services should not be listed on the Access List.

MCMC Assessment

LEO satellite services

21.3 Most stakeholders who provided a view on this issue before the submission deadline – Celcom, DNB, MEASAT, Starlink, TIME and TM – agreed that LEO satellite services should not be listed on the Access List.

21.4 The only stakeholders arguing in favour of regulation were:

(a) CTS, who considered that LEO satellite services should be included on the Access List to support connectivity in remote and underserved areas;

(b) Maxis, who submitted that it was necessary to add LEO satellite services to the Access List, to ensure fair competition, spectrum integrity, national security and consumer protection; and

(c) U Mobile, who suggested that LEO satellite backhaul services should be listed, subject to a proportionate, light-touch regulatory framework.

21.5 MCMC acknowledges these submissions but remains concerned that regulation at this stage carries a high risk of regulatory error. As mentioned in the PI Paper, this is because the market remains in its infancy and the market structure has not stabilised to an extent that allows MCMC to determine the conditions of competition and whether regulation would be in the LTBE.

21.6 At this stage, MCMC is concerned that regulation may discourage further entry into the market, particularly as wholesale regulation of LEO satellite networks is virtually absent globally, which means that LEO satellite operators are not familiar with the requirements of operating at the wholesale level under regulated terms.

21.7 Discouraging further entry into the LEO satellite market would likely have negative consequences for other services in Malaysia, as LEO satellite services provide a degree of competition at the margins in relation to other services, such as HSBB Network Services and Transmission Services.

21.8 Accordingly, MCMC confirms its preliminary view to not list LEO satellite services on the Access List at this juncture.

Access to data centres

21.9 MCMC did not ask a specific question about the listing of access to data centres and did not receive specific views on this from stakeholders.

21.10 There were certain submissions about the inclusion of data centres within the scope of the Network Co-Location Services. MCMC has analysed these submissions and expressed its view at paragraphs 16.7 to 16.9 above.

A2P messaging services

21.11 Among the stakeholders who provided a view on A2P messaging services before the submission deadline:

(a) CelcomDigi, CTS, Maxis, TIME and U Mobile agreed with MCMC's preliminary view that these services should not be listed on the Access List;

(b) TM submitted that these services should be listed.

21.12 Given the significant number of stakeholders who agreed with MCMC's preliminary view, MCMC does not consider that there is a sufficient basis for it to depart from its preliminary view in the PI Paper.

21.13 MCMC is not persuaded that there is a market failure in relation to these services that would justify regulation. CelcomDigi and U Mobile have both supported this view, stating that there are no barriers or market failures that would necessitate regulatory intervention via the Access List.

21.14 Maxis also identifies that there would be an increased risk of spam or fraud for end-users if A2P messaging services were listed and considers that these risks do not outweigh the benefits of regulation.

21.15 Having regard to all of these submissions, MCMC confirms its preliminary view that A2P messaging services should not be listed on the Access List at this juncture.

MCMC Views

21.16 MCMC confirms its preliminary view that:

(a) LEO satellite services should not be listed on the Access List; however, the MCMC is of the view that the regulation of LEO satellite services at this stage carries a high risk of regulatory error as the market structure is still evolving and yet to stabilise. As such, the MCMC will review the need for regulating LEO satellite services after one year from the publication of Access List;

(b) access to data centres should not separately be listed on the Access List (although access to certain data centres is already covered under the Network Co-Location Service, as mentioned at paragraphs 16.7 to 16.9 above); and

(c) A2P messaging services should not be listed on the Access List; however, the MCMC is not persuaded that there is a market failure for A2P messaging service at this juncture. The MCMC will review the need for regulating A2P Messaging Service after one year from the publication of Access List.

Disclaimer

This Public Inquiry Report is issued for the purpose of summarising and reporting the submissions received and matters considered throughout the public inquiry process.

The Commission shall make final determination and decisions on the issues raised in the submissions and all matters relating to the proposed Commission Determination on Access List and shall publish the same through the relevant Commission Determination.

Annexure 1 Summaries of Stakeholder Submissions

1. Access to Dark Fibre

Submissions Received

Question 1:	Do you agree that Access to Dark Fibre should be listed on the Access List, within the scope set out in the proposed service description?
Question 2:	Do you agree with MCMC's proposed approach to limiting the scope of the Access to Dark Fibre service to Exclusive Zones and Restricted Data Centre POEs?
Question 3:	Do you suggest any amendments to the proposed service description, including the definitions of Exclusive Zones and Restricted Data Centre POEs?

1.1. BA Networks Sdn. Bhd. (BA Networks), Bullish Aim Sdn. Bhd. (Bullish Aim), MSA Resources, Neutral Transmission, SDEC, TM, TIME oppose the inclusion of Access to Dark Fibre on the Access List.

1.2. CelcomDigi, CTS, DNB, Edotco, Maxis, PPIT, Symbio, U Mobile, Xenith IG, XMT support the inclusion of Access to Dark Fibre on the Access List.

1.3. BA Networks submitted that dark fibre deployment requires significant investment and commercial flexibility due to its customised nature and long investment recovery periods. BA Networks also considers that a market-driven approach would better support continued investment and network expansion.

1.4. BA Networks further explained that the proposed definitions of "Exclusive Zone" and "Restricted Data Centre POE" are overly broad and insufficiently precise, creating uncertainty regarding the scope and application of access obligations. While maintaining concerns regarding the potential impact of mandated access of investment incentives and future fibre deployment, BA Networks is of the view that the proposed service description and definitions should be refined through clear and objective criteria should the service be included on the Access List.

1.5. Bullish Aim submitted that the case for regulation has not been sufficiently established, the proposed service description is impractical and the potential impact on investment incentives is significant. Bullish Aim is of the view that alternative measures including targeted competition law enforcement, enhanced regulation of Duct and Manhole Access, transparency obligations, industry-led standards development and monitoring initiatives would be more proportionate approaches at this stage.

1.6. Bullish Aim also considered that the proposed definitions of "Exclusive Zone" and "Restricted Data Centre POE" are overly broad and may capture most commercially significant routes, thereby undermining investment incentives for dark fibre providers. Bullish Aim also believes that any regulatory intervention should focus on underlying duct infrastructure rather than dark fibre services. Should Access to Dark Fibre be

included on the Access List, Bullish Aim recommended several amendments, including excluding IRU arrangements and submarine cable fibre leasing from the regulated service, narrowing the scope of "Exclusive Zone", introducing a de minimis threshold for low-investment routes, conducting a formal review of the listing within 36 months and developing separate SLA schedules for different categories of dark fibre products.

1.7. CelcomDigi submitted that access to existing dark fibre infrastructure can help to address the significant costs and practical challenges associated with new fibre deployment, including trenching works, permits and rights of way. CelcomDigi considered that the service would promote more efficient utilisation of existing infrastructure and reduce unnecessary duplication of network facilities.

1.8. CelcomDigi agrees with the proposed approach of limiting the service scope to Exclusive Zones and Restricted Data Centre POEs, as this targeted framework addresses areas with greater deployment constraints and infrastructure bottlenecks while preserving investment incentives and supporting facilities-based competition. CelcomDigi further proposes that designated utility corridors be expressly included within the definition of Exclusive Zones, citing similarities in access control and governance arrangements, and highlighting potential concerns relating to monopoly risks and infrastructure accessibility. In addition, CelcomDigi recommends that the framework for Restricted Data Centre POEs reflect the different deployment zones within the data centre ecosystem and align with prevailing deployment practices and technical standards.

1.9. CelcomDigi proposed amendments to the definitions of Exclusive Zones and Restricted Data Centre POEs as follows:

"Access to Dark Fibre
[…]
(b) An "Exclusive Zone" means any area, including a state, a federal territory, a district, a development area, Utility Corridor or other location where, at the time of the access request, a prevailing law, regulation, policy, requirement, contract, arrangement, understanding or practice prohibits or materially hinders the deployment of new fibre infrastructure by a licensee in that area.

"Utility Corridors" shall include State-appointed, centralised utility frameworks, commonly implemented via a One Stop Agency (OSA) model, and operated or overseen by State Utility Corridor Companies ("Syarikat Koridor Utiliti Negeri"). These frameworks govern permitting processes, infrastructure coordination and access arrangements for telecommunications deployment within designated areas.

(c) A "Restricted Data Centre POE" means a point of entry into a data centre to which the Access Seeker is:

(i) unable to deploy its own fibre infrastructure because of space or capacity constraints in the relevant ducts or manholes at that point of entry; or

(ii) prohibited from deploying its own fibre infrastructure because of contracts, arrangements, understandings or practices between the Access Provider and any person.

For the avoidance of doubt, a Restricted Data Centre POE includes connectivity across the broader data centre ecosystem, which may be characterised by multiple deployment zones, including:

Zone 1: Data centre premises, including in-building infrastructure and immediate campus connectivity (typically within ~1 km);

Zone 2: Adjacent data centre or industrial park developments forming part of an integrated data centre cluster (typically up to ~2 km); and

Zone 3: External connectivity linking data centre clusters to the wider network, metropolitan aggregation points, or intercity routes (typically ~2–5 km or beyond).

1.10. CTS is of the view that the inclusion of Access to Dark Fibre on the Access List is subject to the establishment of a clearly defined scope to facilitate consistent implementation and compliance by all parties.

1.11. CTS agrees with the proposed scope limitation to Exclusive Zones and Restricted Data Centre POEs and does not propose any further amendments. However, CTS submitted that any future amendments to the proposed framework may give rise to compliance challenges, particularly in relation to meeting the timelines under the MSA and pricing requirements under the MSAP.

1.12. DNB submitted that inclusion of Access to Dark Fibre on the Access List would provide an alternative access solution in areas where transmission services are unavailable, particularly within exclusive or otherwise constrained locations.

1.13. DNB further considers that the regulatory framework should address challenges arising from non-licensed entities, such as property developers and utility providers, that exercise control over access to fibre infrastructure.

1.14. Edotco expressed concerns regarding the scope of the proposed access obligations and recommends that such obligations be limited to specific route segments where fibre has been deployed for the provision of access services, rather than fibre used for its own operational purposes.

1.15. Edotco proposed that mandated access be subject to minimum fibre count thresholds to ensure sufficient capacity is retained for operational requirements. In addition, it considers that access obligations should be subject to physical feasibility considerations, including available duct capacity, existing occupancy levels and other structural constraints.

1.16. Maxis supports limiting the regulation of Access to Dark Fibre to exceptional circumstances, specifically within Exclusive Zones and Restricted Data Centre POEs. Maxis contended that barriers to network deployment in such areas arise from non-economic constraints rather than ordinary commercial risks, and that targeted access remedies are a more proportionate response where infrastructure competition is unable to develop.

1.17. Maxis also supports the proposed threshold of fewer than three independent fibre operators and considers that targeted dark fibre access obligations may be appropriate in areas where infrastructure competition is constrained. However, Maxis

maintains that regulation of dark fibre should remain a limited measure of last resort, as broader regulation could adversely affect investment incentives and network expansion.

1.18. Maxis further proposed minor amendments to the proposed service description as follows:

> *"(b) An "Exclusive Zone" means any area, including a state, a federal territory, a district, a development area or other location where, at the time of the access or order request, a prevailing law, regulation, policy, requirement, contract, arrangement, understanding or practice prohibits or materially hinders the deployment of new fibre infrastructure by a licensee in that area.*
>
> *(c) A "Restricted Data Centre POE" means a point of entry into a data centre and/or its surrounding areas to which the Access Seeker is:*
>
> *(i) unable to deploy its own fibre infrastructure because of space or capacity constraints in the relevant ducts or manholes at that point of entry; or*
>
> *(ii) prohibited from deploying its own fibre infrastructure because of contracts, arrangements, understandings or practices between the Access Provider and any person.*
>
> *(d) Access to optical fibre cables under paragraph (a) includes the Access Seeker's right to install equipment to enable the carriage of communications over the relevant fibre cables (which includes the ability to provide power to this equipment and install other active elements) and to use the fibre cables for such carriage of communications."*

1.19. MEASAT supports the inclusion of Access to Dark Fibre on the Access List but does not support limiting the service scope solely to Exclusive Zones and Restricted Data Centre POEs.

1.20. MEASAT contended that access constraints are not confined to these areas, noting that dark fibre services can be costly, supplied by a limited number of providers and may require route diversity and redundancy to meet service availability requirements. While acknowledging the potential for market entry and self-deployment outside the proposed zones, MEASAT considered that these options may not always be practical or timely, particularly for Access Seekers without existing fibre infrastructure. MEASAT further noted that limited route diversity and the small number of viable providers in certain locations may constrain access to dark fibre regardless of whether an area falls within the proposed scope. Accordingly, MEASAT recommended for a more flexible framework that can address situations where access to dark fibre is constrained in practice.

1.21. Neutral Transmission expressed concerns that the proposed service description lacks sufficient clarity and may be difficult to implement. Neutral Transmission also suggested that access to dark fibre could be facilitated through alternative means without mandating the service on the Access List and questioned the effectiveness of a mandatory access framework in situations where only a single provider operates within an Exclusive Zone.

1.22. Neutral Transmission further suggested for clearer definitions and practical examples of "Exclusive Zones" to reduce ambiguity and the potential for differing interpretations. Neutral Transmission also recommended the publication of a list of designated Exclusive Zones and seeks clarification on whether public infrastructure rights of way, utility corridors and transport corridors would fall within the scope of the proposed framework, noting that deployment costs may vary across different regions.

1.23. PPIT noted that the inclusion of Access to Dark Fibre on the Access List is a logical extension of the existing regulation of Duct and Manhole Access. However, PPIT does not support the regulation of Access to Dark Fibre pricing, contending that commercial arrangements should be determined on a willing seller–willing buyer basis. PPIT also questions the rationale for regulating Access to Dark Fibre, given the limited extent of such regulation in other jurisdictions.

1.24. PPIT expressed the view that barriers to entry may exist beyond Exclusive Zones and Restricted Data Centre POEs and therefore considers that any regulatory framework for Access to Dark Fibre should not be limited solely to those areas.

1.25. PDC and MICTH proposes the service description as follows:

"(20) Access to Dark Fibre

(a) Access to Dark Fibre is a Facility and/or Service for the provision of access to optical fibre cables between a POI at an Access Provider's premises and another location on the Access Provider's network, ~~where at least one of these locations is~~ at all places including the following:-

(i) within an Exclusive Zone ~~and there are fewer than three independent providers of optical fibre cables providing connectivity between the two locations to which the Access Seeker is requesting access;~~ or

(ii) within a Restricted Data Centre POE.

(b) An "Exclusive Zone" means any area, including a state, a federal territory, a district, a development area or other location where, at the time of access request, a prevailing law, regulation, policy, requirement, contract, arrangement, understanding or practice prohibits or materially hinders the deployment of new fibre infrastructure by licensee and there are fewer than three independent providers of optical fibre cables providing connectivity between the two locations to which the Access Seeker is requesting access."

1.26. SDEC is of the view that existing contractual arrangements between Access Providers and Access Seekers are sufficient to facilitate commercial access to the service. SDEC also does not support the proposed regulatory framework, noting that its effectiveness would depend on the availability of adequate resources to support enforcement and ensure compliance.

1.27. Symbio agrees as the inclusion will open more connectivity options and allow new licensees to explore possibilities to expand their business.

1.28. TM is of the view that the proposed intervention is disproportionate and does not meet the Long-Term Benefit of End Users (LTBE) objectives. TM considered that dark fibre does not constitute a bottleneck wholesale service, noting that Access Seekers already have access to regulated transmission services as well as Pole, Duct and Manhole Access (PDMA), which TM views as sufficient to support downstream competition and infrastructure deployment. TM further contended that the proposal represents an unbundling of upstream infrastructure rather than a response to a demonstrated market failure, and that no clear demand for dark fibre access has been established.

1.29. TM also submitted that the inclusion of dark fibre would risk undermining investment incentives and efficient fibre roll-out, as it may reduce returns on infrastructure investment, discourage capacity expansion and lead to inefficient duplication of future network build. TM considered that existing regulatory mechanisms already enable effective competition and differentiation, and that any access constraints particularly in so-called Exclusive Zones which should be addressed at source through improved enforcement and effectiveness of PDMA obligations rather than through the introduction of a new regulated dark fibre service. TM further argues that concerns relating to exclusivity arrangements, permitting and rights-of-way, as well as data centre POEs, do not justify dark fibre regulation, as these issues are not caused by the absence of a Layer 1 access product.

1.30. TM additionally noted the limited international precedent for regulating dark fibre and submits that Malaysia does not exhibit the type of persistent bottleneck conditions that would justify such intervention. TM also highlighted the absence of industry consensus in support of the proposal and reiterates that a more appropriate regulatory response would focus on addressing underlying structural constraints, rather than mandating access to dark fibre.

1.31. TM does not support limiting the scope of Access to Dark Fibre to Exclusive Zones and Restricted Data Centre POEs, as TM does not support the inclusion of dark fibre on the Access List in any form. TM considered that narrowing the scope does not address its fundamental concerns regarding necessity, proportionality, and adverse impacts on investment incentives, and therefore remains inconsistent with the LTBE.

1.32. TM noted that while MCMC has sought to confine the proposal to areas with perceived bottlenecks, TM agrees with MCMC's own recognition that nationwide regulation of dark fibre risks reducing investment incentives and that infrastructure-based competition is the preferred "first-best" outcome. However, TM submitted that these risks are not mitigated by restricting the application of the obligation, as the introduction of a regulated Layer 1 access product would still distort investment incentives and duplicate existing remedies.

1.33. In relation to Exclusive Zones, TM does not accept that the proposed "fewer than three independent operators" threshold or Layer 1 access requirement is an appropriate regulatory test, arguing that existing remedies (namely regulated transmission services and PDMA) already enable effective competition and infrastructure deployment. TM further considered that any access constraints are more appropriately addressed through strengthened enforcement of PDMA obligations and resolution of underlying issues such as exclusivity arrangements and permitting barriers, rather than introducing a new dark fibre obligation.

1.34. TM also highlighted the lack of clarity regarding the geographic definition of Exclusive Zones, noting the absence of a definitive list or boundary specification. TM considered this creates regulatory uncertainty and undermines the ability of stakeholders to assess the impact of the proposal, and further risks inconsistent implementation. TM therefore expresses that if such an approach were to be pursued, clear and formally defined geographic designations would be required.

1.35. In relation to Restricted Data Centre POEs, TM does not consider that a separate dark fibre obligation is justified, noting that the underlying constraints identified relate primarily to duct and manhole capacity rather than dark fibre itself. TM observes that data centre connectivity is generally commercially driven and does not exhibit systemic market failure. TM therefore considered that any site-specific issues should be addressed through targeted measures and existing regulatory frameworks, rather than through ex-ante Layer 1 regulation.

1.36. TM reiterated that limiting the scope does not cure the underlying defects in the proposal. It submits that Access to Dark Fibre should not be included on the Access List, and that regulatory focus should instead remain on strengthening PDMA implementation, refining transmission service regulation, and addressing structural barriers such as exclusivity arrangements and permitting processes in a targeted and proportionate manner consistent with LTBE.

1.37. TM submitted that the proposed service description particularly the definitions of "Exclusive Zones" and "Restricted Data Centre POEs" would require substantial revision should MCMC proceed, in order to ensure clarity, proportionality and legal certainty.

1.38. In relation to "Exclusive Zones", TM considered the proposed definition to be overly broad and vague, relying on subjective and non-verifiable concepts. TM submitted that these terms could capture a wide range of ordinary operational or commercial constraints, including permitting delays, and therefore risk expanding the scope of regulation beyond what is intended. TM further highlighted the absence of a published and definitive list of Exclusive Zones, which TM considered undermines regulatory transparency and creates uncertainty for both Access Providers and Access Seekers. TM therefore submitted that any such framework should be limited to clearly defined geographic areas supported by objective evidence of legal or contractual exclusivity, and that MCMC should publish a definitive list of applicable zones.

1.39. TM also does not support the proposed "three independent operators" test, considering it to be impractical and insufficiently defined, particularly given the lack of clarity around the concept of independent operators and the difficulty of assessing competition at a route level. TM submitted that, if retained, the test should be supported by clear, objective criteria or replaced with a more administrable approach.

1.40. In relation to "Restricted Data Centre POEs", TM considered the definition to be insufficiently precise and not reflective of practical deployment conditions. TM noted that its data centres operate on a carrier-neutral basis and that Access Seekers are generally able to deploy their own fibre within data centre compounds, subject to standard requirements. TM further stated that it does not observe systemic congestion at POEs and therefore does not consider that the proposed definition is evidence-based.

1.41. Accordingly, TM reiterated that the proposed service description is not suitable for implementation and submits that, if MCMC proceeds, significant refinement would be required. Therefore, TM recommended the amendments as follows:

1.41.1 The definition of Exclusive Zones should be narrowed to apply only where there is a clear, formal and enforceable legal or contractual restriction preventing fibre deployment, and should exclude vague concepts such as "materially hinders," "understanding" or "practice." MCMC should publish a definitive list of such zones to provide transparency and certainty.

1.41.2 The definition of Restricted Data Centre POEs should be limited to objectively demonstrable and persistent physical constraints outside the data centre compound and should exclude situations where Access Seekers are able to deploy fibre within carrier-neutral facilities subject to standard requirements. Again, a list of such routes/POEs should be provided.

1.41.3 The service description should include an explicit exhaustion requirement, whereby Access Seekers must first utilise existing remedies such as PDMA and regulated transmission services before seeking access to dark fibre.

1.41.4 The service should be limited to existing fibre infrastructure and should not require Access Providers to deploy new fibre, reconfigure networks, or provide access where it is not technically feasible.

1.42. TIME opposes the inclusion of Access to Dark Fibre due to significant costs and risks borne by the fibre infrastructure providers. TIME expressed the concern that regulating this service could reduce future investment and expansion of fibre infrastructure, potentially affecting industry growth and the achievement of national connectivity objectives.

1.43. U Mobile partially supports the inclusion of Access to Dark Fibre on the Access List, noting that it could help to address access bottlenecks in Exclusive Zones and Restricted Data Centre POEs where infrastructure replication may not be feasible.

1.44. While generally supportive of the proposed regulatory approach, U Mobile recommended expanding the scope beyond Exclusive Zones and Restricted Data Centre POEs to encompass other areas where supply bottlenecks exist and infrastructure is not economically replicable. This includes government-funded fibre deployments and other locations where access constraints may persist despite the presence of competition.

1.45. U Mobile proposed amendments to clause 20(a) as follows:

"(iii) part of government-funded dark fibre initiative; or

(iv) any other location where the Access Seeker can demonstrate, on the basis of objective and verifiable evidence, that fewer than three independent providers offer dark fibre on commercially viable terms between two locations to which the Access Seeker is requesting access."

1.46. U Mobile stated that the pricing framework for Access to Dark Fibre should reflect the characteristics of the underlying infrastructure. For government-funded areas, U Mobile proposed to exclude public contributions from the asset base to avoid double

recovery. For Exclusive Zones and Restricted Data Centre POEs and other regulated areas, U Mobile suggested pricing based on an efficient network model with reasonable demand and asset lifetime rather than actual incumbent costs.

1.47. Xenith IG is of the view that it would promote connectivity, more efficient utilisation of infrastructure, interconnection between fibre networks and the development of long-term business ecosystems. Xenith IG also requests clarification that all fibre network operators within Exclusive Zones and Restricted Data Centre POEs should be required to provide access to dark fibre, regardless of whether the service forms part of their standard product offering.

1.48. Xenith IG supports the proposed focus on Exclusive Zones and Restricted Data Centre POEs but highlights the potential for disputes relating to market concentration assessments, zone classification, interconnection arrangements, restrictions at data centre POEs and access to facilities on commercially reasonable terms.

1.49. Xenith IG proposed the amendments as follows:

> *"(i) there are fewer than three independent ~~providing connectivity~~ operators providing access to dark fibres connecting between the two locations to which the Access Seeker is requesting access.*
>
> *(ii) any publicly or privately owned or controlled area, including a state, a federal territory, a district, a development area, concession areas along highways, train tracks, gas pipelines, areas with special wayleaves or right of way, an industrial park or other estate or any other land or location.*
>
> *(iii) where a licensee demonstrates, at the time of the access request, that it has been unable to secure, or there are reasonable grounds to conclude that it will be unable to secure, whether due to a prevailing law, regulation, policy, requirement, contract, arrangement, understanding, practice or otherwise, including where an application for deployment has been rejected due to capacity constraints or any other reason not due to the technical or financial capability of the licensee, or where the application for deployment has not progressed without reasonable excuse for a period of six months or more.*
>
> *(iv) Access to optical fibre cables under paragraph (a) includes the provision of access to (i) any manhole with a fibre joint closure, (ii) fibre end distribution boards; or (iii) fibre termination panels at specified network facilities owned or controlled by the Access Provider to enable an Access Seeker to interconnect with the Dark Fibre; and (b) includes the Access Seeker's right to install equipment to enable the carriage of communications over the relevant fibre cables and to use the fibre cables for such carriage of communications. Any network extension, cabling, rack space, termination panels or cross-connection required for interconnecting the Dark Fibre shall be carried out, installed or procured by the Access Seeker, unless agreed otherwise between the Access Provider and the Access Seeker.*
>
> *(v) A "Restricted Data Centre POE" means a point of entry into a data centre to which the Access Seeker is:*
>
> > *(i) unable to deploy its own fibre infrastructure ~~because of space or capacity constraints in the relevant ducts or manholes at that point of entry;~~ into the data centre, whether due to a prevailing law, regulation, policy, requirement, contract, arrangement, understanding, practice or otherwise, including where*

an application for deployment has been rejected due to capacity constraints or any other reason not due to the technical or financial capability of the licensee, or where the application for deployment has not progressed without reasonable excuse for a period of six months or more; or

(ii) economically limited from deploying its own fibre infrastructure into the data centre due to the rates being charged by the data centre, whether for access to the point of entry or lead-in ducts, or rack space for terminating the lead-in cables, where such rates imposed by the data centre are not commercially reasonable or materially in excess of a commercially reasonable rate. ~~prohibited from deploying its own fibre infrastructure because of contracts, arrangements, understandings or practices between the Access Provider and any person."~~

1.50. XMT suggested that Access to Dark Fibre shall be open access to all providers.

2. Mobile Network Sharing Arrangements

Submissions Received

Question 4:	Do you agree with listing a new 4G MOCN Access Service on the Access List? Please provide reasons.
Question 5:	Do you have any proposed amendments to the proposed service description of 4G MOCN Access?

2.1. CelcomDigi disagreed with listing 4G MOCN Access service on the Access List.

2.2. CelcomDigi submitted that primarily, there is no clear evidence of market failure in Malaysia to warrant regulation of 4G MOCN Access. On the contrary, commercially negotiated MOCN arrangements have been successfully implemented across multiple operators. This is evidenced by several positive developments since 2011, including:

2.2.1. U Mobile network evolution: U Mobile's network development, leading to its current role as the second 5G wholesale network was built on commercially driven arrangements, including domestic roaming (DR) and 4G radio sharing enabled collaboratively by mobile network operators (including Celcom, Digi and Maxis);

2.2.2. Maxis 4G MOCN arrangement: Maxis commercially negotiated 4G MCON arrangement with a service provider. It has been extended until 2029. This demonstrated the sustainability and effectiveness of voluntary network sharing arrangements; and

2.2.3. Six (6)-way MOCN deployments: Malaysia's experience with 6-way MOCN illustrates the ability of industry players to coordinate complex active network sharing arrangements on a commercial basis.

2.3. These developments collectively demonstrate that MOCN arrangements in Malaysia have evolved through market-driven negotiations and cooperative industry practices, without the need for regulatory intervention.

2.4. Further, the proposed regulation of 4G MOCN Access presents several practical and structural considerations, including the following:

2.4.1. Inherently Customised and Non-Standardised Arrangement;

MOCN is a highly customised arrangement requiring a tailored site-specific network sharing configurations involving the following:

2.4.1.1. Integration between radio access network (RAN) and core networks;

2.4.1.2. Spectrum pooling across participating operators; and

2.4.1.3. Site-specific configurations, including traffic management, prioritisation and quality of service.

Given the significant variation across characteristics, MOCN implementations cannot be standardised or treated uniformly across sites and deployments. It is more appropriately treated as a commercially negotiated arrangement, rather than a standardised access service.

2.4.2. The pricing of MOCN arrangements is complex, deployment specifics and highly dependent on site-specific factors, including:

2.4.2.1. Geographic location (urban vs rural) and deployment conditions;

2.4.2.2. Traffic demand and utilisation levels;

2.4.2.3. Transmisssion and backhaul capacity requirements; and

2.4.2.4. Site rental, power consumption, and maintenance costs.

In terms of cost structures, Access Providers typically incur substantial upfront capital expenditure and ongoing operational expenditure (OPEX) prior to any sharing arrangement.

A regulated pricing framework may not adequately capture these variations, potentially resulting in inefficient pricing outcomes, cross-subsidisation between operators and misalignment between cost recovery and resource utilisation. This raises concerns regarding the sustainability and fairness of mandated access and underscores that a one-size-fits-all access and pricing framework will not work.

2.4.3. Applicability Limited to Specific Deployment Scenarios

MOCN is most effective in rural, remote, or low-density areas and/or locations where network utilisation is relatively low and standalone deployment is not economically viable.

Conversely, in high-density, high-demand or urban environments, where network capacity constraints are more acute:

(a) Sharing spectrum and RAN resources may lead to performance degradation and congestion risks; and

(b) Reduce operational flexibility and ability to manage network quality which may lead to degradation in customer experience.

This reinforces that MOCN is not universally applicable across all sites and should not be treated as a generalised access obligation.

2.4.4. Impact on Investment Incentives and Competition

Mandating MOCN access may have unintended consequences on market structure and investment behaviour, such as, reduced incentives for operators to invest in their own network infrastructure-prudent investment, potential over-reliance on shared networks, heightened investment risks and sustainability challenges to deploy infrastructure in marginal or high-cost areas and weakened infrastructure-based competition over time.

2.5. Regulatory measures that materially align or consolidate infrastructure investment decisions at the active network layer may risk weakening investment incentives over time. Therefore, the presence of independently planned and operated networks remains crucial to supporting the LTBE. Such independence preserves incentives for operators to compete through network quality enhancements, ongoing technical upgrades and capacity expansion.

2.6. CelcomDigi provided international regulatory precedents from European Union (BEREC/EECC), Australia and ITU that recognises MOCN as a voluntary, efficiency-enhancing network sharing arrangement considering that MOCN involved shared active radio elements and in many cases, pooled spectrum resources.

2.7. Finally, CelcomDigi submitted that it is important to limit regulatory obligations for MOCN to government-funded or Universal Service Provision (USP) site or clearly defined rural or underserved areas where market failure is more evident.

2.8. CelcomDigi added that the 4G MOCN framework should ensure transparency in access terms and conditions, non-discriminatory access principles, appropriate dispute resolution mechanisms and empowering market-driven commercial agreements that accurately reflect site-specific costs and complexities.

2.9. In summary, while MOCN may have a role in specific and limited contexts, and as such, CelcomDigi does not consider it appropriate to mandate MOCN as a standardised access service. If required regulation though, CelcomDigi proposes targeted regulatory safeguards i.e. in areas where clear market failure is demonstrated.

2.10. DNB, PPIT, SDEC and TM agrees with listing 4G MOCN Access service in the Access List.

2.11. DNB is of the view that the listing will support continuity of 4G services, seamless mobility and handover between 5G and 4G whilst ensuring coverage parity across multiple MNOs whilst SDEC commented that listing 4G MOCN is necessary to ensure that appropriate regulatory standards are in place, including requirements for upgrades at congested sites to comply with the Mandatory Standards for Quality of Service.

2.12. Maxis does not agree with listing a new 4G MOCN Access service on the Access List. In Maxis' view, the proposed listing risks undermining infrastructure investment incentives and introducing inefficiencies into a market that remains structurally competitive and capable of delivering outcomes through commercial arrangements.

2.13. Maxis' position is based on the following arguments:

2.13.1. There is no demonstrated need for new regulation;

2.13.2. Proposed design is disproportionate and goes against international precedent;

2.13.3. The regulation may have potential adverse effects on quality of service ("QoS"); and

2.13.4. The regulation may potentially distort investment incentives.

There is no demonstrated need for new regulation

2.14. According to Maxis, established regulatory good practice requires that there be first an economic assessment of the market, i.e. a public consultation on market definition and assessment of dominance prior to deciding on the addition of the 4G MOCN to the Access List. With the absence of such a thorough assessment in public consultation, it is difficult to see how the PI's proposals can be shown to be necessary or proportionate.

2.15. Maxis fear that there is no demonstrated need for regulation given that there is no proven evidence-based case for new regulation, the mobile market is competitive and well-functioning and commercial MOCN arrangements are effective at scale without regulation.

2.16. Maxis also submitted that there is no proven evidence-based case for new regulation. Ex-ante regulation is ordinarily introduced only following a robust economic assessment that defines the relevant market, assesses the strength of competition (including any finding of dominance), and identifies a clearly evidenced market failure or adverse effect on competition. This analysis is a necessary precursor to demonstrating that intervention is necessary, proportionate and targeted at clearly identified harms.

2.17. Maxis highlighted that the MCMC's Guideline[1], which were developed "with regards to international best practice and the guidelines issues by overseas competition regulators"[2], reflect this approach. As summarised in MCMC's approach to the assessment of dominance, MCMC's Guidelines set out a structured analysis, beginning with market definition before proceeding to an assessment of dominance, competitive conditions, and competitive dynamics. Critically, these steps are undertaken before conclusions can be drawn on the nature and effectiveness of competition or the need for regulatory intervention.

2.18. MCMC last published formal findings on market definition and dominance in the mobile sector in 2014[3], at which time it concluded that both wholesale and retail mobile telephony markets were competitive. MCMC also recognised that market structures and competitive dynamics in the sector are subject to ongoing change and stated that its findings would be revisited where necessary[4].

2.19. Consistent with this, MCMC initiated a refreshed market definition and dominance exercise in 2019 and subsequently issued a questionnaire in 2022 seeking stakeholder views on the current and future state of competition in mobile markets. However, the outcomes of these exercises have not been published. Maxis further understand that a market definition study may have been done during a recent market consolidation but also informed that Maxis was not aware of the published findings.

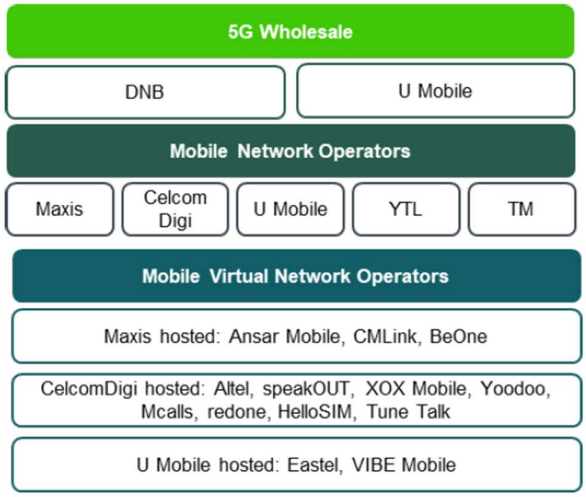
[1] MCMC (2014), Guideline on Dominant Position, Guideline on Dominance in a Communications Market https://www.mcmc.gov.my/skmmgovmy/media/General/pdf/Commission-Guideline-on-Dominance-in-a-Communications-Market-Final.pdf
[2] MCMC (2014), Guideline on Dominant Position, Section 1.5
[3] MCMC (2014), Public Inquiry Report: Assessment of Dominance in Communications Market, Section 6.3
[4] MCMC (2014), Public Inquiry Report: Assessment of Dominance in Communications Market, Sections 6.3 and 2.3(a).

2.20. As a result, while MCMC has previously concluded that the Malaysian mobile market is competitive, it has not published an updated assessment of market definition, dominance or competitive effects since 2014.

2.21. Although MCMC has not undertaken a formal assessment of competitive conditions in the Malaysian mobile market, observable market outcomes point clearly to effective infrastructure and access-based competition. Malaysia benefits from multiple MNOs operating nationwide 4G infrastructure, which in turn supports a broad and active Mobile Virtual Network Operator (MVNO) segment.

2.22. As illustrated below, Maxis showed evidence that competition is present at multiple levels of the mobile value chain as shown below:

Figure 1: Malaysian mobile market value chain



Source: Maxis' analysis.

2.23. Since MCMC's last published assessment of the mobile market in 2014, the competitive landscape has changed significantly, reflecting the rise of MVNOs. In the period between 2015 and 2024[5], MVNO market share has increased from 9% to 16% whilst Maxis' market share has fluctuated up and down, reflecting the impact of competitive forces and efforts to regain market share through improved offerings.

2.24. These competitive dynamics have delivered strong coverage outcomes. 4G coverage stands at approximately 99% nationally and reaches 100% in several states, including WP Kuala Lumpur, WP Putrajaya, Pulau Pinang, Selangor and Melaka[6]. Coverage has also continued to expand in rural areas, with Sarawak reaching approximately 92% coverage as of Q2 2025, reflecting ongoing investment incentives and competitive rollout[7].

2.25. Maxis has included data on Malaysian coverage 4G by state as well as average mobile ARPU which has clearly indicated that the Consumers also benefit from extensive choice and differentiated offerings across both postpaid and prepaid segments. Operators compete across premium and value propositions, offering variation in

[5] MCMC (2024), Industrial Performance Report.
[6] Nomura (2025), Malaysia Telecoms.
[7] Ibid.

pricing, data allowances, speeds, contract terms, bundled services and validity periods. This differentiation reflects sustained competitive intensity rather than uniform or constrained offerings.

2.26. Maxis noted that competition has translated into tangible price outcomes. Headline postpaid prices fell by approximately RM10 across various postpaid plans between Q2 and Q3 2025[8], and longer-term trends show declining average revenues per user. Between 2020 and 2024, average postpaid ARPU fell by RM11 and prepaid ARPU by RM2, indicating competitive pressure on prices as provided in Maxis's submission.

2.27. Maxis opined that overall, these outcomes (strong infrastructure competition, widespread coverage, falling prices and sustained product differentiation) indicate a competitive and well-functioning mobile market. On this basis, there is no clear evidence of a market failure that would warrant the imposition of mandated MOCN access regulation. It also not clear on how MCMC's proposals would improve LTBE services.

2.28. Mandated MOCN access regulation is unnecessary because active sharing is already taking place effectively through commercial arrangements. Access Seekers have a range of credible and substitutable options available to them. This disciplines infrastructure owners to compete actively to attract access demand on commercial terms. Competition is evidenced by numerous instances of Access Seekers switching between Access Providers through competitive tender and request-for-proposal processes, often securing improved commercial terms as a result.

2.29. Active sharing is also well established at non-commercial sites. For example, at USP sites, host network infrastructure systems and network design already support other mobile operators through MOCN. This demonstrates that policy objectives such as coverage, access and efficient infrastructure utilisation are being met under existing frameworks, without the need for mandatory access regulation.

2.30. Given the wide variety and inherent complexity of mobile network sharing arrangements (spanning bilateral and multilateral structures, parity and non-parity terms, and MOCN and MORAN models) commercially negotiated agreements are inherently better suited than mandated access to align incentives, accommodate local conditions, and support efficient investment.

2.31. Accordingly, the evidence indicates that commercial arrangements are already delivering active sharing effectively. There is therefore no demonstrated market failure that would justify the imposition of mandatory MOCN access regulation.

2.32. In addition, industry evidence submitted to MCMC indicates that some deployment and cost challenges arise from state-level approval structures, including additional costs imposed by the OSA and potential conflict of interest between the OSA and state-backed NFPs, and exclusivity arrangements or preferred partner models for tower development[9]. In these circumstances, a nationwide mandate for MOCN is unlikely to be proportionate or well targeted to the underlying issue.

[8] Ibid
[9] Various Malaysia telecoms operators (2025), Isu Pembangunan infrastruktur telekomunikasi dan peningkatan kos permit caj di peringkat negeri.

Proposed design is disproportionate and goes against international precedent

2.33. In Maxis' view, mandated nationwide access to MOCN goes against international precedent on MOCN regulation and is disproportionate in terms of the proposed goals as active sharing arrangements are tightly constrained by regulators to avoid weakening competition where it is already effective.

2.34. International regulators are largely aligned in terms of how they treat MOCN regulation:

2.34.1. international best practice treats active sharing arrangements as fundamentally voluntary;

2.34.2. rather than mandatory, MOCN arrangements are typically scrutinised on a case-by-case basis to avoid anticompetitive effects; and

2.34.3. where practiced, MOCN arrangements typically exclude urban, high-density areas and are limited to areas with low population density.

2.35. Maxis has furnished some case studies from France, Czechia and Germany to illustrate the bespoke, case-by-case treatment of MOCN arrangements by key European regulators and highlighted the importance of robust evidence when considering ex-ante and mandatory access regulations.

2.36. Maxis concluded that Malaysia's already-extensive regulatory framework and competition in the market means there is no need for additional regulation. Maxis once again noted the international regulatory precedent that showed that mandated access to MOCN arrangements is neither necessary nor proportionate where markets are competitive and subject to robust regulatory oversight.

2.37. In comparable jurisdictions, regulators have consistently treated MOCN as a voluntary, commercially negotiated arrangement, assessed on a case-by-case basis, and potentially inappropriate in specific circumstances e.g. in urban high-density areas. Where spectrum sharing risks weakening infrastructure-based competition or investment incentives, regulators have explicitly refrained from imposing mandated access, relying instead on existing regulatory and competition law tools to manage any potential risks.

2.38. This approach is reinforced by European precedent on ex-ante regulation more broadly, where additional access obligations have been rejected in markets characterised by effective competition and comprehensive sector regulation. Regulators and institutions have emphasised that ex-ante intervention requires clear evidence of market failure and insufficiency of existing remedies, not merely precautionary concerns. Where multiple network operators compete and regulatory safeguards already exist, further intervention has been deemed disproportionate.

2.39. The point about market structure is reinforced by the German example, which adopted its regulatory stance towards MOCN because there were only three MNOs on the German market at that time.

2.40. In light of this precedent, Malaysia's telecommunications market already appears extensively regulated as provided by Maxis in its submission and the market has many players who actively compete. international experience indicates that there is no

justification for mandating access to MOCN arrangements. Allowing operators to reach MOCN agreements commercially, supported by existing regulatory and competition law powers, best aligns with global best practice and avoids the risk of undermining competition and long-term investment incentives.

The regulation may have potential adverse effects on quality of service

2.41. In Maxis' view, mandated MOCN may adversely impact QoS by loading more users onto finite radio resources while restricting operators' ability to actively manage congestion. Specifically, the position is based on the following arguments:

2.41.1. Congestion risk rises with increased access demand;

2.41.2. Commercial solutions are more effective at handling operational detail than prescriptive regulation; and

2.41.3. Spectrum incompatibility limits efficiency.

2.42. MCMC positions regulated 4G MOCN access as a tool to improve service outcomes. However, technical and economic realities of shared RAN mean that mandated MOCN access dilutes radio resources and increases congestion risk. Since RAN capacity is inherently finite and site-specific, as additional operators are introduced onto a shared RAN, the available radio resources are divided among a greater number of users. This dilution of fixed capacity has a direct and observable impact on end user QoS, particularly during peak demand periods. Unlike backhaul or core network elements, radio spectrum and power at a given site cannot be scaled freely or instantaneously, and their limitations are binding.

2.43. Furthermore, active network sharing arrangements introduce material operational and technical challenges. Mandating MOCN reduces operators' ability to independently manage and optimise their networks, increasing complexity and the risk of inefficiencies. These challenges may adversely affect network performance and service quality, particularly where operators are required to integrate and operate shared network elements at scale.

2.44. From a technical perspective, additional optimisation effort or cost is required to manage mobility between 4G MOCN and 5G sites, particularly where the 4G Access Provider and Access Seekers are not aligned on the same 5G network. This can introduce complexities in mobility management, handover performance, and interworking between networks.

2.45. From an operational standpoint, access seekers may also require differentiated support services or enhanced service level agreements (SLAs), such as dedicated handling of high-priority or VIP customer complaints. These requirements increase operational complexity and drive up the overall cost of delivering MOCN services.

2.46. Based on this, Maxis submitted that the commercial arrangements are a better tool for navigating through these challenges as opposed to regulatory intervention as they allow parties to negotiate terms that reflect technical realities and operational requirements. In contrast, regulators may face difficulties in determining the correct cost-sharing formula, capacity allocation rules, or QoS parameters given the scale and information asymmetry.

2.47. Moreover, sharing active infrastructure through regulated MOCN access effectively entails sharing the market for the duration of the arrangement. When networks approach saturation or markets grow rapidly, this model becomes increasingly ineffective. Capacity constraints materialise faster than they can be addressed and all operators on the shared RAN face deteriorating service performance.

2.48. In addition, significant technical challenges arise in radio network configuration and optimisation. For example, defining and maintaining neighbour cell lists on 4G sites becomes increasingly complex as more parties share the network, with multiple frequency layers, multi-sectors and technologies (2G,4G and 5G) involved.

2.49. Vendors' equipment typically has limits on the number of neighbour relations that can be configured per cell or site. As a result, not all required neighbour cells can be defined, potentially leading to incomplete neighbour lists, degraded mobility performance, and increased risks of dropped calls.

2.50. Finally, commercial solutions are better placed at addressing the significant variation in cost structures across different sites, as provided by Maxis in its submission. Maxis provided an overview of network upgrade types including the requirement and upgrade specific details. Upgrade types that require complex and capital-intensive solutions, including additional capacity sites, advanced antenna configurations, and network densification would take longer time to be completed and at higher cost. By contrast, simple upgrade that are often less complex and lower cost can be implemented within shorter timeline. These differences result in materially different costs per unit and timeline of traffic across sites.

2.51. Maxis reiterated that commercially negotiated arrangements allow for this flexibility, whereas regulated access risks imposing pricing outcomes that do not reflect underlying cost realities. For example, current MNO commercial MOCN sharing are on bilateral site swap basis for sites with similar traffic profile i.e. macro sites or antenna count i.e. IBC sites.

2.52. Maxis summarised that multilateral arrangements that do not undermine the ability or incentives for all operators to improve QoS are difficult to determine, but more likely to be achieved commercially. Regulators setting terms that are simultaneously efficient, competitively neutral, and dynamically adjustable as traffic grows is far beyond standard regulatory competence.

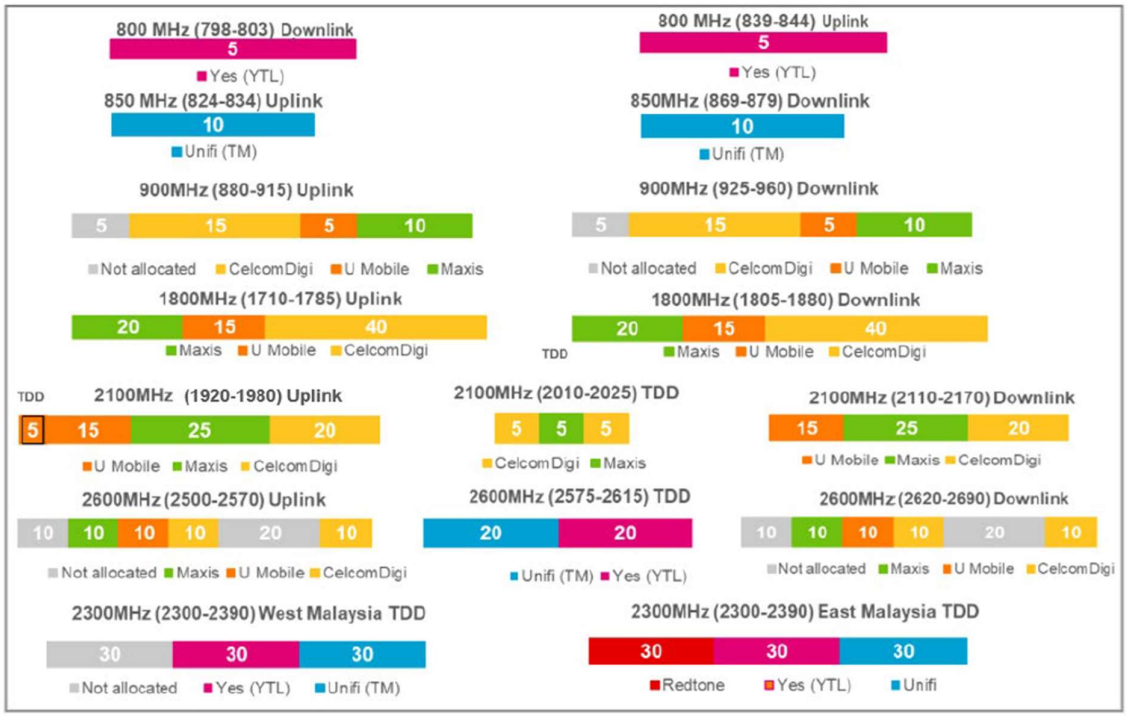
2.53. Apart from the above, Maxis pointed out that spectrum incompatibility limits efficiency as the efficiency gains from spectrum pooling depend critically on spectrum compatibility and, in practice, may structurally favour operators whose holdings already align with the host's deployed bands.

2.54. MOCN delivers meaningful capacity and efficiency gains only where both operators hold aligned spectrum in the same band and duplex mode. Where spectrum holdings differ between FDD and TDD in 4G and 5G, bands cannot be jointly pooled on a shared core network without significant reconfiguration. In such cases, MOCN functions primarily as a coverage-sharing mechanism rather than delivering the capacity efficiencies often associated with spectrum pooling.

2.55. In the case of Malaysia, operators seeking access often hold TDD spectrum, while Maxis primarily uses FDD (see Figure below), which cannot be readily pooled without

additional hardware and network reconfiguration, requiring further investment by the host operator. This can further exacerbate congestion risks and MCMC's assessment does not address this.

Figure 2: Operator Spectrum Holdings by Duplex Mode (FDD vs TDD)



Source: Spectrum Tracker.

2.56. Under MOCN, shared carriers broadcast multiple PLMN IDs on the same RF spectrum, allowing user devices to attach to their service provider while using the common RAN. This implicitly assumes that the shared spectrum is accessible, device-supported, and useful to the Access Seeker. In Malaysia, however, newer and smaller MNOs often hold spectrum in less common bands or in bands with less mature device ecosystems. In practice, such spectrum may be used only as a supplementary layer rather than as the primary connectivity layer, limiting the practical value of mandatory MOCN for these operators.

2.57. Although MOCN with spectrum pooling across aligned FDD bands can theoretically deliver better capacity efficiency, in practice most MNOs' networks are designed and deployed based on their existing spectrum holdings, traffic forecasts, and targeted utilisation thresholds. The hardware is typically dimensioned to meet current capacity requirements, rather than to accommodate additional spectrum.

2.58. As a result, introducing additional carriers would require upgrades to existing hardware, such as higher output power configurations or the deployment of additional RRUs and antennas at site level. Furthermore, combining certain FDD bands within the same antenna system may introduce third-order intermodulation interference issues, potentially affecting network performance.

2.59. By contrast, in the JENDELA implementation, networks were designed from the outset to support multi-operator sharing, with aligned spectrum holdings, coordinated network dimensioning, and equipment procurement specifically tailored for MOCN. Spectrum pooling arrangements were also pre-coordinated to mitigate intermodulation risks.

The regulation may potentially distort investment incentives and undermine network resilience

2.60. Maxis is of the view that mandating 4G MOCN would materially alter the risk-reward balance associated with network investment as mobile networks are characterised by high upfront, largely sunk capital expenditure, with returns realised over long-time horizons and subject to demand, technology, and regulatory risk.

2.61. Requiring Access Providers to make active network capacity available on regulated terms would expose those sunk investments to appropriation by Access Seekers, while leaving the underlying investment risk with the Access Provider. This increased investment risk and reduced ability to recuperate costs can hamper future investment in network roll-out, reducing infrastructure-based competition and harming the resilience of Malaysian telco sector.

2.62. Maxis believes infrastructure investment and competition are essential to Malaysia's mobile market, particularly because parallel deployment of network infrastructure supports resilience by creating redundancy and reducing single points of failure. Regulation should preserve incentives for operators to invest in new sites, improving both QoS and resilience. Mandated 4G MOCN access, therefore, risks weakening these incentives, particularly if applied nationwide.

2.63. Mandated active network sharing would effectively be attempting to realise the benefits of a consolidated network (such as highly efficient spectrum use and shared RAN CAPEX) without allowing the host operator to realise the commercial synergies that fund those investments in the first place. It thus introduces a free-rider problem which dampens investment incentives for both Access Seekers and Access Providers.

2.64. Simultaneously, the host operator's incentive to proactively upgrade congested cell sites or deploy new active network technologies diminishes significantly, as the financial benefits of those proactive upgrades must immediately be shared with competitors who bore none of the initial capital investment risk.

2.65. Maxis understands that the investments may be limited to the minimum requirements specified in the regulation, rather than what promotes better QoS, as QoS-enhancing investments would have a limited financial upside compared to the status-quo-ante of no mandated MOCN regulation.

2.66. Mandatory active network sharing may also incentivise Access Seekers to cherry pick profitable sites. If MOCN is mandated on a site-by-site basis nationwide, Access Seekers may prefer to focus their investments in areas with higher profitability, as the ability to differentiate on quality through active infrastructure investment would enable them to compete for market share. On the other hand, they would not have the incentive to invest in sites with low profitability and would choose to access these sites on regulated MOCN terms. This in turn reduces the host provider's incentives to invest in maintaining and upgrading equipment in these sites because the mandated

sharing of active network equipment limits how much differentiation the host operator can achieve. This may again result in an outcome where investment in active network infrastructure in non-profitable and remote areas is limited to what is mandated by regulation rather than what enhances QoS.

2.67. There is also a further concern that a regulated MOCN obligation could extend to bespoke or targeted network deployments, designed to meet specific enterprise or high value customer requirements. These deployments often involve high upfront investment, customised design, and relatively low traffic volumes. Mandated access to such facilities at regulated prices may result in the original investment being unrecoverable and could discourage operators from undertaking similar deployments in future. This would not be conducive to continued improvements in service quality, particularly for enterprise and specialised use cases.

2.68. While assisting smaller or newer operators is a relevant consideration, Maxis concluded that regulatory settings should ensure that operators which undertake sustained investment in nationwide networks continue to have appropriate incentives to deploy, densify, and upgrade infrastructure.

2.69. PPIT supported listing 4G MOCN in the Access List as acknowledged by MCMC at paragraphs 8.7, 8.15 and 8.23 of the PI Paper. PPIT submitted that it has stated this earlier as well as quoted by MCMC in paragraph 8.23 of the PI Paper that "MOCN/MORAN arrangements decrease their rental revenue from tower tenancies and increase structural demands on their towers, thereby diminishing the capacity available for other Access Seekers".

2.70. PPIT noted that the proposed inclusion of 4G MOCN Access appropriately focuses on active RAN sharing involving spectrum and radio equipment. It reinforces Infrastructure Sharing at the active layer, which is complementary to PPIT's neutral-host passive infrastructure model and is expected to increase utilisation, site consolidation and demand for high-quality shared sites.

2.71. SDEC proposes that the pricing of the 4G MOCN Access service should not be regulated under the Mandatory Standard on Access Pricing although the 4G MOCN is listed in the Access List.

2.72. TM is of the view that the 4G MOCN reflects modern network sharing practices and is non-substitutable. TM also submitted that the 4G MOCN represents a modern and technically advanced form of active network sharing which enables multiple operators to share radio access infrastructure, including RAN elements and spectrum resources, while allowing Access Seekers to retain control over their own core network functions. This gives Access Seekers materially greater control over network performance, traffic management and service quality than legacy access models, while avoiding unnecessary CAPEX duplication in areas where building parallel infrastructure would be inefficient or commercially challenging.

2.73. TM also stated that MOCN supports more efficient use of spectrum, sites and radio equipment, and provides a scalable and futureproof framework for mobile network sharing.

2.74. TM agrees with MCMC that Domestic Inter-Operator Roaming and MVNO Access are not substitutes for MOCN. Domestic Roaming is primarily designed to support end-

user service continuity, particularly in areas where the deployment of multiple networks is not commercially feasible. It does not provide the Access Seeker with site-level deployment flexibility, meaningful control over RAN performance, or the ability to manage service quality in the same way as MOCN.

2.75. MOCN is designed for operators with their own core network and spectrum rights. It enables targeted, site-specific access to radio infrastructure and associated spectrum resources, allowing Access Seekers to expand coverage, improve network quality and manage customer experience in a more controlled manner.

2.76. This distinction is important because the access constraint addressed by MOCN is a RAN-level bottleneck, not merely a need for retail continuity or wholesale service resale. TM's own experience demonstrates this, in particular, excessive reliance on roaming has resulted in its customers having a comparatively inferior experience.

2.77. In contrast, MOCN provides a more technically robust model for delivering seamless mobile services. MOCN is also increasingly the prevailing model for efficient mobile network sharing. Malaysia's 5G rollout demonstrates the benefits of regulated active sharing, where MOCN has supported broad coverage, more efficient spectrum utilisation and reduced infrastructure duplication. For example, under the regulated 5G wholesale access framework, Malaysia has achieved strong outcomes, ranking #1 in 4G/5G availability among upper-middle-income countries and #4 in 5G download speeds in the East Asia and Pacific region.

2.78. TM also submitted that 4G MOCN remains unregulated despite 4G continuing to be a critical coverage layer for Malaysian consumers. This creates inconsistent regulatory treatment between 4G and 5G access as 5G MOCN benefits from a structured regulatory framework already. Therefore, the inconsistent treatment with the 4G MOCN exposes the Access Seekers to uncertainty in relation to pricing, site access, service quality and negotiation outcomes.

2.79. Overall, TM is of the view that formalising 4G MOCN in the Access List would align regulation with current industry practice, reduce inefficient infrastructure duplication, and ensure that Access Seekers can obtain the RAN-level access needed to compete effectively.

2.80. TM also noted that the regulation of 4G MOCN would address the following issues:

2.80.1. The structural bottleneck around RAN access.

TM has submitted its white paper on 4G MOCN that evidences this constraint in practice, noting restricted access to key 4G MOCN sites and outright rejections in critical areas such as the Jeli–Gerik East-West Highway and in-building locations.

These constraints materially limit TM's ability to deliver consistent nationwide mobile services, which is critical for any operator seeking to offer a credible retail mobile service.

TM has also experienced rejection rates of up to 51% for site access requests in key areas, often without clear justification or transparency. These limitations have directly affected TM's ability to expand its network footprint

and indicate that reliance on purely commercial negotiations has not been sufficient to ensure effective, non-discriminatory access to 4G RAN infrastructure.

2.80.2. TM noted that the regulation of the 4G MOCN would address the insufficiency of current commercial agreements.

While commercial negotiations exist, they are often selective, opaque, expensive and asymmetric, reflecting the stronger bargaining position of infrastructure owners. Although access is eventually agreed, it may not be supported by committed service level agreements or consistent service performance. This creates uncertainty for Access Seekers, making it difficult to secure coverage and quality on reliable terms and harm the LTBE. These concerns are particularly important given the regulatory quality of service standards that apply to mobile services, including the MSQoS minimum download speed of 10 Mbps effective 1 January 2025.

Where an Access Seeker depends on a host network for MOCN access, but does not have enforceable commitments on quality, performance, restoration or service availability, it has limited ability to ensure that downstream services meet the expected regulatory and customer standards.

For example, TM has identified patterns of conduct among larger operators who restrict access to key sites, including in-building systems and strategically important locations. For example, out of 1,661 JENDELA USP sites, TM is able to access 4G MOCN on only 300 sites and must rely on domestic roaming in all other instances. Despite these sites being funded to support inclusive and nationwide connectivity, access remains constrained.

In this context, the existence of selective commercial arrangements do not demonstrate an effectively competitive wholesale market.

2.80.3. These structural concerns are compounded by prevailing wholesale pricing levels. Current 4G MOCN pricing reflect the imbalance in bargaining power between the Access Provider and Access Seeker. TM has provided its data in this regard and noted that the difference of this magnitude is very unlikely to be explained by the higher costs of deploying sites in more remote areas (where Access Seekers use MOCN) and limits the ability of Access Seekers to compete effectively, thus. undermining the viability of service-based competition.

2.80.4. TM submitted that MOCN should be treated as a necessary wholesale access input as MOCN provides access to a critical upstream input required to compete in downstream mobile markets.

2.80.5. Lastly, TM noted that 4G remains essential for nationwide coverage, service continuity and the transition to 5G, particularly in rural and underserved areas where 5G is not yet pervasive including meeting the JENDELA objectives. Arguments that the regulatory focus should shift solely to 5G therefore overlook the continuing role of 4G as a core coverage layer and the need to address 4G-related access bottlenecks as part of, rather than separate from, MCMC's broader 5G policy objectives.

2.81. In relation to the proposed amendments for the proposed service description of 4G MOCN Access, CelcomDigi proposed that the service description is refined to clarify its scope, intent and boundaries.

2.82. CelcomDigi proposed that the service description should reflect among others, the following:

2.82.1. 4G MOCN Access is a governed active sharing arrangement rather than a default or universal access obligation, and remains subject to technical feasibility, capacity availability and mutually agreed commercial terms;

2.82.2. The service description does not confer any automatic entitlement to spectrum pooling or spectrum usage rights, which remain governed by spectrum licensing conditions;

2.82.3. Recognise that MOCN is most appropriate in contexts where it advances efficiency and coverage objectives, such as high cost or infrastructure constrained environments; and

2.82.4. Clearly demarcate responsibilities between host and participating operators to ensure continued incentives for service quality, innovation, and regulatory accountability.

2.83. CelcomDigi proposed the following amendments, in red:

2.83.1. Clause (a) – Proposed wording is overly broad and may imply standardised or unconditional access.

4G MOCN Access is a Service for access to a 4G radio network, subject to technical feasibility, capacity availability, and mutual commercial agreement between the parties, whether or not as part of a Mobile Network, for the purpose of the Access Seeker providing:

2.83.2. Clause (a) (i)–(iv) - Use cases are broadly defined without refence to capacity constraints and service prioritisation.

(i) MVNO Access or another Service and/or Facility on the Access List that uses access to a 4G radio network as an input;

(ii) services to enterprise and/or government Customers;

(iii) public cellular services to the public; or

(iv) wireless or mobile broadband services to the public.

For the purpose of the Access Seeker providing services, subject to agreed service levels, traffic management policies and capacity allocation between parties.

2.83.3. Clause (b) - Scope of Included Facilities/Services has broad inclusion of network elements and lack clarity on cost responsibility.

(b) 4G MOCN Access may include access to Facilities and/or Services as mutually agreed, and subject to applicable cost recovery and

configuration requirements, used by the Access Seeker to provide one or more of voice, data and application services, as selected by the Access Seeker, provided that the Access Seeker has integrated its 4G core with the Access Provider's eNodeB.

2.83.4. Clause (c) - does not reflect dependency on vendor compatibility and network configuration.

(c) *The functionalities of 4G MOCN Access include:*

(i) integration between the Access Provider's eNodeB and the Access Seeker's 4G core network; and

(ii) support for 3GPP Release 15 and any updates to that standard from time to time.

subject to interoperability, vendor compatibility, and network configuration constraints.

2.83.5. Clause (d) - may be interpreted as mandatory access to all sites.

(d) 4G MOCN Access ~~must be made available~~ may be offered by the Access Provider on a site-by-site basis at ~~any~~ mutually agreed sites, ~~where the Access Provider has installed components of its 4G radio network. s~~ubject to technical feasibility, capacity availability, network performance considerations and commercial agreement between parties.

2.84. CelcomDigi also proposed new clarifications to be added to the description of 4G MOCN Access in relation to:

2.84.1. Pricing and commercial terms

"Pricing, cost allocation and commercial terms for 4G MOCN Access shall be determined through bilateral commercial negotiation, taking into account site specific cost structures, capacity utilisation, required upgrades and investments, ongoing operational expenditure."

2.84.2. Scope limitations

"4G MOCN Access is intended to facilitate efficient network utilisation, particularly in rural, remote or underutilised areas, and may not be suitable for all deployment scenarios, including high density urban environments."

2.85. Maxis does not support the proposed inclusion of 4G MOCN Access on the Access List and propose that the LTBE would be better served by maintaining a commercially driven, flexible approach to network sharing, supported by appropriate regulatory oversight where genuinely necessary.

2.86. Maxis is concerned that the proposed service description would create a de facto obligation to provide 4G MOCN Access at all sites where an Access Provider has deployed 4G radio network components. A blanket "must offer" requirement at any site is disproportionate and inconsistent with the evidence presented by MCMC, which does not demonstrate a generalised or nationwide market failure in access to mobile

active infrastructure. In practice, such an obligation would enable Access Seekers to cherry-pick commercially attractive locations, while transferring sunk investment risk and operational constraints to the Access Provider, without addressing the specific coverage or policy issues cited by MCMC.

2.87. If MCMC nevertheless proceeds with regulating 4G MOCN Access, Maxis submits that the service description should be amended to materially narrow its scope. Any mandated availability should be explicitly limited to clearly defined locations where any alleged market failure or national coverage issue can be demonstrated using evidence, such as JENDELA 2 or specific sites where MCMC has identified a persistent and demonstrable failure of commercial negotiations. Voluntary MOCN/MORAN should remain at other sites, and only existing regulation should apply (e.g. in relation to domestic roaming).

2.88. Maxis provided an extensive data in relation to minimum coverage of populated area (COPA) and JENDELA 2 sites by state to illustrate that highly populated urban and sub-urban areas already enjoy a high degree of coverage. The coverage gap highlighted by smaller mobile operators appears only in rural, remote areas, and these areas already contain the highest proportion of JENDELA 2 sites, for example, 35% of JENDELA 2 sites are in Sabah, 34% in Sarawak, 14% in Kelantan, 6% in Pahang and 6% in Perak which generally are known as not the Urban States, totalling 95% of the JENDELA 2 sites. Thus, any coverage gaps can be effectively addressed by opening up MOCN access in these specific JENDELA 2 sites.

2.89. Furthermore, in all cases, Maxis strongly indicated that access must remain subject to technical feasibility, spectrum configuration compatibility, and the need to safeguard network performance and quality of service.

2.90. Maxis stressed that in the absent of such limitations, the current drafting risks undermining infrastructure-based competition, distorting investment incentives, and weakening long-term network quality for consumers.

2.91. Maxis added that in very remote or rural areas, capacity augmentation is not commercially viable, and mandatory MOCN sharing can lead to persistent capacity issues. In addition, JENDELA 2 sites were designed for six-way MOCN sharing, and as such the infrastructure is already scoped to serve six MNOs without incurring additional investment or risking a persistent reduction in capacity.

2.92. Therefore, Maxis proposes the following modifications to part (d) of MCMC's proposed 4G MOCN service description (in red):

4G Multi-Operator Core Network ("MOCN") Access

(d) 4G MOCN Access must be made available by the Access Provider ~~on a site-by-site basis~~ at ~~any site~~ the JENDELA 2 sites, i.e. sites targeting underserved areas across Malaysia with a focus on rural, remote, difficult terrain and poor-quality coverage sites areas, where the Access Provider has installed components of its 4G radio network.

2.93. PPIT suggested a clear demarcation between passive infrastructure sharing (sites, towers, poles and related facilities), and active RAN sharing arrangements such as MOCN, including shared or pooled spectrum with separate core networks.

2.94. PPIT submitted that they remain supportive of regulatory frameworks that promote infrastructure sharing at all appropriate layers, while recognising the distinct roles and economic characteristics of passive infrastructure providers and active network operators.

2.95. TM broadly supports the proposed service description for 4G MOCN Access and considers it appropriately targeted to address identified radio access network bottlenecks. TM recommends that the service description be clarified in certain targeted areas to ensure that 4G MOCN Access is applied consistently, non-discriminatorily and effectively in practice. These clarifications are important to prevent Access Providers from limiting access through narrow interpretations of site eligibility, deployment type, spectrum availability or permitted use cases.

2.96. TM proposes that MCMC clarify the applicability across deployment environments in the service description. In example, the service description should clarify that 4G MOCN Access applies across all relevant deployment environments, including urban, suburban, rural, indoor, and temporary or event-based locations. Access should not depend on how the Access Provider characterises the location, but on whether RAN components are deployed and technically capable of supporting MOCN access.

2.97. TM also noted that arbitrary exclusions of eligible sites should be prevented in the service description and supports reinforcing the site-by-site nature of the service, while ensuring that this approach is applied consistently and non-discriminatorily. This is particularly important to ensure that Access Providers do not apply blanket exclusions or arbitrary restrictions based on geography, environment, ownership, or deployment category. TM considers it especially beneficial for the service description to clarify that access should not be denied solely on the basis that infrastructure was originally deployed for a specific operational or commercial purpose, provided it is technically capable of supporting MOCN access and serves public mobile connectivity.

2.98. The service description should therefore clarify that access is to be made available at any site where the Access Provider has deployed 4G RAN components, subject only to objective technical feasibility and capacity constraints.

2.99. TM stated that this is particularly relevant for indoor and in-building environments, transit hubs and public venues, rural and semi-rural areas with limited scope for infrastructure duplication, and short-term or event-driven deployments where rapid provisioning is required. This clarification is especially important for publicly funded or priority infrastructure, such as USP and JENDELA-supported sites and in-building systems.

2.100. Additionally, TM submitted that the service description expressly include all categories of 4G deployment, including macro sites, in-building systems and small cells.

2.101. TM also recommends that the service description explicitly state that 4G MOCN Access should be made available:

"…on a site-by-site basis across all spectrum bands assigned to the Access Provider at that site, where 4G RAN components are deployed…"

2.102. The service description proposed above by TM reflects the way modern mobile networks are deployed, with coverage and capacity increasingly delivered through a

combination of site types, particularly in dense urban and indoor environments. TM pointed out that any ambiguity around these categories could create avoidable gaps in coverage and service quality.

2.103. TM further suggested that the service description would benefit from a clarification that 4G MOCN Access should support a range of use cases, including enterprise-related deployments where these rely on shared RAN infrastructure to deliver public mobile communications services.

2.104. TM also recommends that the service description explicitly recognise support for a full range of mobile applications, including consumer mobile services, enterprise applications, and machine-to-machine (M2M) and Internet of Things (IoT) services. Overall, the service description should confirm support for public, enterprise, M2M and IoT use cases.

2.105. TM also considers it important for the service description to recognise the need for seamless interworking and mobility between different IMT systems, including 4G and 5G networks, where technically feasible.

2.106. In practice, the end-user experience depends on continuity of service during handover between networks and technologies. This requires appropriate network coordination, QoS mapping and mobility management. Recognising these requirements would help ensure that 4G MOCN Access supports a consistent and reliable user experience across technologies. Where applicable, TM propose to include established coordination and quality management mechanisms such as SPID, QoS Class Identifier, and relevant frequency and mobility management parameters.

2.107. Finally, TM noted that the service description should make clear that MOCN Access must not preclude an Access Seeker from offering downstream wholesale services, thereby ensuring that MOCN operates as an effective wholesale input consistent with the objectives of the Access List. In example, there should be no restriction on 4G MOCN Access Seekers reselling MVNO Access. TM therefore recommends that the framework clearly prohibit 4G and 5G MOCN Access Providers from imposing restrictions that prevent Access Seekers from offering MVNO Access or other legitimate downstream wholesale services.

2.108. U Mobile partially agrees with MCMC's proposal and supports the listing of a regulated 4G MOCN Access service where it serves to extend coverage to areas in which the Access Seeker cannot economically replicate the Access Provider's 4G RAN infrastructure and has therefore no alternative means of serving end users.

2.109. However, unlike 5G Services where a nationwide scope is justified by the structural characteristics of the dual-network model, U Mobile does not consider that the Access List should mandate 4G MOCN Access on a nationwide basis.

2.110. The 4G market comprises multiple MNOs that have each deployed their own RAN infrastructure over more than a decade. Providing access in areas where the Access Seeker already operates its own 4G network would serve primarily to add capacity rather than to address any bottleneck and should therefore be left to commercial negotiations between parties. Mandating regulated access in such areas would risk distorting competition and reducing the incentive to invest in own-network deployment – without addressing any underlying access bottleneck.

2.111. The position is different in areas where a single MNO has deployed 4G RAN and the Access Seeker does not operate its own infrastructure. In such areas, the Access Provider's 4G RAN would be essential if the Access Seeker cannot economically replicate the MNO's 4G RAN infrastructure. Regulated access in these circumstances support coverage extension and retail competition.

2.112. Accordingly, U Mobile proposes that 4G MOCN Access should be listed in the Access List but limited in scope to areas where the Access Seeker cannot economically replicate the Access Provider's 4G RAN infrastructure. In other areas, 4G MOCN arrangements should remain subject to commercial negotiation, with MCMC retaining its role in mediating disputes and addressing competition concerns.

2.113. U Mobile proposes amending the service description for 4G MOCN, in particular, clause 21 (a) as follows:

"(a) 4G MOCN Access is a Service for access to a 4G radio network whether or not as part of a Mobile Network for the purpose of the Access Seeker providing [existing sub-paragraphs (i) to (iv)], limited to areas where the Access Seeker can demonstrate that it cannot economically replicate the Access Provider's 4G radio access network infrastructure."

2.114. U Mobile proposes five targeted amendments for Clause 21(a) as follows to the proposed service description of 4G MOCN Access:

2.114.1. The phrase "whether or not as part of a Mobile Network" introduces ambiguity, as 4G MOCN inherently involves a shared RAN with separate core networks. U Mobile believes this phrase should be deleted.

Proposed drafting: "(a) 4G MOCN Access is a Service for access to a 4G radio network ~~whether or not as part of a Mobile Network~~ for the purpose of the Access Seeker providing: [...]"

2.114.2. Clause 21(b): The availability of voice, data and applications should be expressly subject to technical feasibility. This clarification would help reduce the risk of access disputes by ensuring that obligations reflect operational reality.

Proposed drafting: "(b) 4G MOCN Access may include access to Facilities and/or Services used by the Access Seeker to provide one or more of voice, data and application services, as selected by the Access Seeker and subject to technical feasibility and the configurations agreed between the parties, provided that the Access Seeker has integrated its 4G core with the Access Provider's eNodeB."

2.114.3. Clause 21(c)(ii): The 3GPP reference should mirror the future-proofing language used elsewhere for 5G. This clarification would help make the Access List future-proof and provide consistency with 5G based services.

Proposed drafting: "(ii) support for 3GPP Release 15 and any updates to that standard (including new releases) from time to time."

2.114.4. Clause 21(d): the "at any site" obligation should be qualified by capacity and technical feasibility, with a reasoned-refusal mechanism. This reflects U

Mobile's experience as both Access Provider and Access Seeker, in particular, its dependencies on Network Facilities Providers (NFPs) for the underlying passive infrastructure.

Proposed drafting: "(d) 4G MOCN Access must be made available by the Access Provider on a site-by-site basis at any site where the Access Provider has installed components of its 4G radio network, subject to capacity and technical feasibility constraints."

Clause 21(e): for consistency with the treatment of 5G Standalone Access and 4G Evolved Packet Core (EPC) with 5G RAN Access, the service description should clarify that 4G MOCN Access does not include any Facilities or Services within the scope of Access to In-Building Mobile Systems (or, as proposed in response to Question #19, "In-Building Mobile Access"). This would avoid overlap between the two services and provide greater consistency and clarity as to the regulatory treatment of in-building mobile systems.

Proposed drafting: "(e) Despite anything to the contrary in paragraphs (a) to (d), 4G MOCN Access does not include any Facilities or Services within the scope of Access to In-Building Mobile Systems."

2.115. Wang Kian Tjun submitted that he is agreeable with MCMC's proposed service description in paragraph 8.55 of the PI paper on the Review on Access List provided MCMC include new sites with MOCN and not decommissioned on existing nearby owned infrastructure unless solid reasons provided.

2.116. With regard to proposed amendments to the proposed service description of 4G MOCN Access, Wang Kian Tjun submitted to include his point above along with MCMC's proposed service description for 4G MOCN Access.

3. 5G Services

Submissions Received

Question 6:	In light of the inherent technical differences between 5G Standalone Access (which allows for the native VoNR via the 5G core) and 4G EPC with 5G RAN Access (which relies on the Access Seeker's 4G core), stakeholders are invited to comment on: (a) whether the service descriptions for 5G Standalone Access and 4G EPC with 5G RAN Access should explicitly distinguish the responsibility for voice capability based on the network architecture used; and (b) the technical and operational feasibility of a "shared responsibility" model for voice services?
Question 7:	Do you consider that the service descriptions of the 5G Services should be amended to reflect that voice service capability is a shared responsibility of the Access Provider and Access Seeker (rather than a responsibility of the Access Seeker only)?
Question 8:	How should "Non-Public Network" functionality introduced in 3GPP Release 16 be captured in the service descriptions of the 5G Services?
Question 9:	Do you consider that Reduced Capability and High-Performance Machine Type capabilities should be explicitly referred to in the service descriptions of the 5G Services? If you are an Access Provider, are you currently providing these capabilities?
Question 10:	Do you agree with specifically referring to SEPP and N32 interface in the examples of Facilities and Services to which Access Seekers may request access under the 5G Standalone Access service?
Question 11:	Do you consider that VoNR and EPS Fallback to LTE/VoLTE should be explicitly referred to within the service descriptions of the 5G Services?
Question 12:	Do you agree that access to in-building 5G mobile systems (both passive and active elements) should be regulated under a new Access to In-Building Mobile Systems service and not under the 5G Services? Please provide reasons.
Question 13:	Should 5G Standalone Access cover 5G MOCN arrangements between the two 5G network providers under the dual network model? If so, are any amendments required to the service description to enable this?
Question 14:	Are there any other changes you consider should be made to the service descriptions of 5G Standalone Access and 4G EPC with 5G RAN Access? Please provide details.

3.1. CelcomDigi supported "shared-responsibility" for voice services. CelcomDigi commented that Under 5G Standalone Access, voice service provisioning (including VoNR enablement) resides primarily within the Access Seeker's core network. However, the Access Provider's RAN also determines the quality level required to provide a reasonable voice service over NR as the RAN remains integral to the delivery of voice services, activation as last mile towards the user devices. Therefore, the

Access Seeker should remain responsible for service provisioning and core network functions, while the Access Provider should be responsible for RAN performance, including its impact on voice service quality.

3.2. As for the service descriptions of 5G services, CelcomDigi viewed that the definitions should be amended to reflect that voice service capability is a shared responsibility of the Access Provider and Access Seeker, rather than a responsibility of the Access Seeker only. CelcomDigi commented that Access Provider's RAN plays a critical role in supporting the activation of voice services at the device level and maintaining radio conditions necessary to deliver a reliable voice experience. Due to the functional interdependence, assigning sole responsibility to the Access Seeker would not accurately reflect the operational realities of 5G service delivery.

3.3. CelcomDigi is of the view that "Non-Public Network" (Private Network) functionality introduced in 3GPP Release 16 should not be incorporated into the service descriptions of the 5G Services. CelcomDigi commented that Private Network is customer-specific network deployments which is designed and configured to meet the requirements of a single enterprise or defined user group. Thus, private networks are not intended for general public access and are deployed to serve specific enterprise use cases under exclusive arrangements. These functionalities do not exhibit the characteristics of a bottleneck service or essential facility that would warrant inclusion in the Access List.

3.4. CelcomDigi supported the inclusion of Reduced Capability and High-Performance Machine Type capabilities within the service descriptions of the 5G Services as these capabilities are increasingly critical in supporting Massive IoT and industrial use cases; Lower-cost, lower-complexity device ecosystems; and a wider range of enterprise and vertical applications. In addition, CelcomDigi viewed that the inclusion of these capabilities should enhance transparency and visibility of available network capabilities, support more predictable and timely access to such functionalities, while remaining technology-neutral and non-prescriptive which allow flexibility in implementation and evolution.

3.5. CelcomDigi agreed with specifically referring to SEPP and N32 interface in the examples of Facilities and Services to which Access Seekers may request access under the 5G Standalone Access service. Celcom Digi commented that inclusion of these elements would help in ensuring 5G Standalone Access is aligned with established 3GPP security standards and facilitate seamless, interoperability interconnectivity.

3.6. CelcomDigi supported the explicit inclusion of that VoNR and EPS Fallback to LTE/VoLTE within the service descriptions of the 5G Services.

3.7. CelcomDigi also agreed that access to in-building 5G mobile systems to be regulated under a new service instead of under 5G Services. CelcomDigi supported this new service to be applicable for both 4G and 5G network technologies, rather than regulating access to in-building 5G mobile systems under the 5G Services as the technology-neutral nature of in-building access makes it appropriate to include 5G element in the new service.

3.8. However, CelcomDigi does not support the inclusion of the active components of in-building solutions (e.g. BTS, active multi-band DAS and other active network components) within the regulated service. CelcomDigi commented that IBS elements are fundamental to network operation and performance, as they are directly linked to

spectrum utilisation, network optimisation, and service delivery. CelcomDigi viewed that Mandating access to such active elements introduces significant technical and operational considerations, including risks to network integrity, security, performance management, and system stability. Therefore, CelcomDigi proposed to only include passive components, which are associated with bottleneck access, in Access to in-Building Mobile Systems. CelcomDigi submitted that active elements should remain as commercial arrangement so that operators are allowed to retain control over network design and performance.

3.9. CelcomDigi supported that 5G Standalone Access cover 5G MOCN arrangements between the two 5G network providers under the dual network model. Any such inclusion should ensure that the service description remains technically aligned with 3GPP standards and supported secure, interoperable interconnection between participating networks.

3.10. CelcomDigi does not consider that further amendments are required to the service descriptions of 5G Standalone Access and 4G EPC with 5G RAN Access to clarify the exclusion of access to the Access Provider's core network. CelcomDigi is of the view that current regulatory framework already provides sufficient clarity through the separate and distinct treatment of MVNO Access, which is intended to be technology neutral.

3.11. DNB submitted that it does not support shared responsibility model for voice services between the Access Provider and Access Seekers as shared responsibility would create ambiguity in accountability, misalign with existing network architecture and operational roles, and introduce unnecessary regulatory complexity. DNB clarified voice services are inherently end-to-end, involving Access Seeker's core network (IMS/VoLTE/VoNR), interconnection, service logic as well as provisioning to the end users. However, DNB's role is limited to the provisioning of 5G Radio Access Network (RAN) only and thus, only issues related to 5G RAN performance can be attributed to DNB. A "shared responsibility" model would blur accountability and complicate fault isolation, as multiple parties would need to be engaged for a single issue.

3.12. Therefore, DNB viewed that maintaining the current model where voice responsibility rests with the Access Seeker, ensures that the Access Seeker retains full end-to-end responsibility for voice services, while any underlying access issues (e.g. RAN, transmission, infrastructure access services) can be separately escalated to the relevant access providers.

3.13. DNB also does not support inclusion of Non-Public Network (NPN) functionality within the regulated scope of 5G services as the current service definition is broad enough to allow provision of services to enterprise and government customers. Furthermore, DNB viewed that there is no bottleneck to justify regulation for NPN as the dual-network model allows multiple options such as access from either 5G wholesale network provider and direct 5G spectrum allocation (e.g. 4.7 GHz via Apparatus Assignment). Furthermore, the current definition allows adoption of alternative technologies such as 4G, LEO, etc.

3.14. DNB does not support inclusion of detailed technical features or specific functionalities within Access List service descriptions such as SEPP, N32, MEC, NEF, UDM and NSSF as these are optional features and dependent on market demand and readiness. In

order to ensure technology neutrality, future innovation and avoid creating rigid regulatory obligations tied to evolving standards, DNB proposed to maintain high-level functional service descriptions and remove prescriptive lists of advanced features.

3.15. DNB does not support explicitly mandating VoNR or EPS fallback within Access List descriptions. DNB submits that reference to 3GPP standards is sufficient and detailed technical features should not be codified in Access List.

3.16. DNB agreed that access to in-building mobile systems should be regulated under a new standalone Access List service covering both active and passive elements, across 4G and 5G networks. DNB views that this approach addresses existing ambiguity (IBS vs Infra Sharing vs 5G services), ensures appropriate and proportionate regulatory treatment and avoids imposing unnecessary 5G obligations on IBS deployments, as well as supported accelerated adoption of in-building coverage solutions.

3.17. DNB is of the view that 5G MOCN / MORAN arrangements between 2 5G network providers are for network sharing between wholesale providers and this is not a conventional wholesale services for Access Seekers. Therefore, DNB submitted that such arrangements should not be regulated under the Access List and should remain commercially negotiated. DNB views that current broad 5G SA/NSA definitions are sufficient to accommodate such arrangements.

3.18. Regarding the scope of 5G services descriptions, DNB suggests for the descriptions to remain high-level and functional without prescribing detailed technical features and evolving functionalities in the 5G services descriptions.

3.19. Maxis is of the view that both SA and NSA service description in Access List (18)(b) and (19)(b) should be amended to shared responsibility and explicitly distinguish areas of responsibility e.g. 5G RAN to POI (Access Provider is responsible), POI to 4G or 5G core of Access Seeker (Access Seeker is responsible). In terms of shared responsibility for voice services, Maxis is of the view that it is technically and operationally feasible by conducting joint testing of these services between Access Provider and Access Seeker.

3.20. Maxis considered it appropriate to amend the service descriptions for both 5G Standalone Access and 4G EPC with 5G RAN Access to reflect that voice service capability is a shared responsibility of the Access Provider and Access Seeker. Maxis proposed amending (18)(b) as follows:

"5G Standalone Access may include access to the Facilities and Services used by the Access Seeker to provide one or more of voice, data and application services, as selected by the Access Seeker, provided that where the Access Seeker has integrated its 5G core with the Access Provider's gNodeB, the Access Seeker and Access Provider are jointly ~~is solely~~ responsible for any voice service capability (and for the avoidance of doubt any such voice services may be delivered using the Access Provider's radio network)."

Maxis proposed amending (19)(b) as follows:

"4G EPC with 5G RAN Access may include access to the Facilities and Services used by the Access Seeker to provide one or more of voice, data and application services, as selected by the Access Seeker, provided that the Access Seeker and Access Provider are jointly ~~is solely~~ responsible for any voice service capability (and for the

avoidance of doubt any such voice services may be delivered using the Access Provider's radio network)."

3.21. Maxis commented that "Non-Public Network" is a 3GPP Release 16 listed functionality that is used to provide Private Network service (also known as NPN service). Maxis is of the view that it is better to capture the full meaning of a Private Network service in item 18(d) of the Access List. Maxis notes that 3GPP Release 15 uses the term "Private Network" and only formally established the term NPN in 3GPP Release 16.

3.22. Maxis considered this to be consistent with the approach taken by Ofcom in the UK. Ofcom explicitly recognised private 5G networks as a distinct category of network deployment in its 2021 review of spectrum and network access.

Maxis proposed amending (18)(d) as follows:

"The 5G Standalone Service shall be supplied to the Access Seeker in compliance with 3rd Generation Partnership Project ("3GPP") Release 15 and any updates to that standard (including new releases) from time to time, and with all technical capabilities, as may be required to enable the Access Seeker to provide the following types of services (or similar services), as selected by the Access Seeker:

(i) mobile broadband services;

(ii) massive IoT services;

(iii) mission-critical services;

(iv) Network Slicing;

(v) Non-Public Network (NPN) services / Private Network services;

(vi) Reduced Capability (RedCap) services; and

(vii) High-Performance Machine Type Communication (HMTC) services."

Maxis is of the view that (i), (ii) and (iii), as well as Network Slicing, Non-Public Network (Private Network), Reduced Capability and High-Performance Machine Type Communication are types of 5G services.

3.23. Maxis considered that explicit reference to Reduced Capability (RedCap) and High-Performance Machine Type Communication (HPMTC) capabilities within the 5G service description is necessary to ensure technical coherence, regulatory certainty, and efficient wholesale access outcomes. This position is grounded in the alignment of the Access List with internationally standardised 5G service categories, the need to provide clarity and predictability in wholesale contracting, the reduction of information asymmetry and transaction costs, and the role of these capabilities in enabling enterprise and industrial 5G use cases. It is further supported by the importance of maintaining a dynamically consistent access framework and allowing 5G standards to continue to evolve.

3.24. Maxis is of the opinion that core network services including SEPP should not be listed in 5G Standalone Access service. If an Access Seeker is seeking for an Access Provider's core network service in place of its own, then that Access Seeker is seeking MVNO Access service and not 5G Standalone Access service. Consequently, Maxis

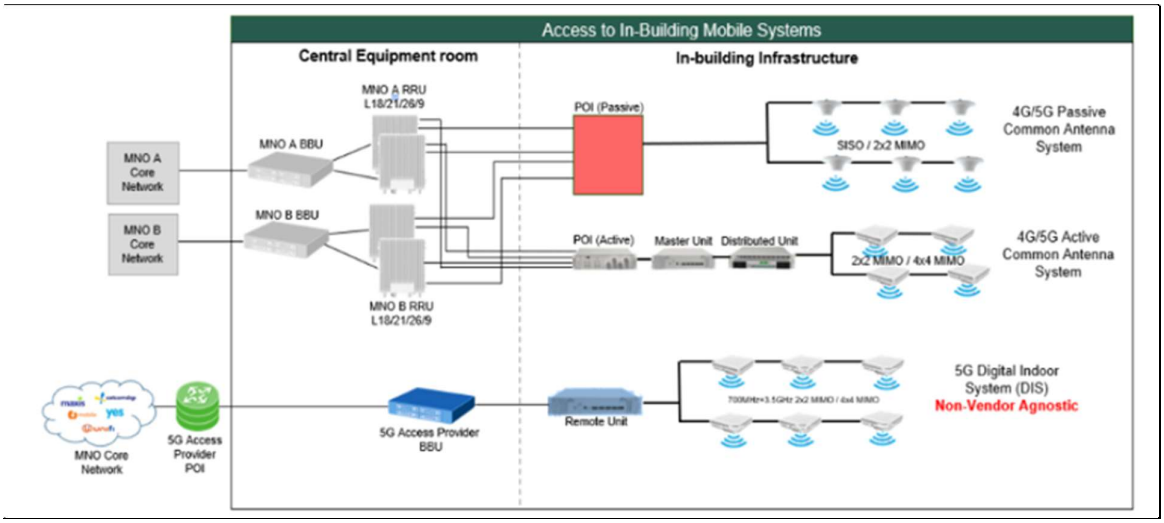
does not support the explicit inclusion of SEPP and the N32 interface in the examples of Facilities and Services. In addition, Maxis commented that N32 interface is only an inherent interface of SEPP.

3.25. Maxis supported explicit reference on VoNR and EPS Fallback to LTE/VoLTE within the service descriptions of 5G Services. Maxis commented that these capabilities are fundamental to ensuring voice service continuity in 5G Standalone deployments and reflect how 5G networks operate in practice, particularly where 5G coverage is non-contiguous. Although Maxis supported explicit reference at a high level, Maxis cautions against embedding detailed implementation or configuration requirements within the service descriptions. Maxis highlighted that voice continuity mechanisms depend on network design and coordination so they should be reflected conceptually rather than through prescriptive technical parameters that could constrain operational flexibility.

3.26. Maxis agreed with MCMC that access to in-building mobile systems (both passive and active elements) should be regulated under a new, standalone AIBMS service, rather than subsumed under the general 5G Services categories. In agreeing with MCMC's proposal, Maxis considered that this position is supported by a set of closely related structural and competition considerations which relate to the facility-level nature of in-building systems and the need for regulatory continuity across radio generations. Taken together, these considerations support regulating AIBMS through a dedicated, standalone access service rather than within the broader 5G Services framework.

3.27. Maxis submitted that in-building mobile systems present an access problem that is qualitative different from that addressed by 5G Services. AIBMS combines non-replicable physical infrastructure (pathways, risers) with Distributed Antennae System (DAS), Indoor Small Cells, Digital Indoor Systems (DIS), Baseband and Radio Units. These systems are inherently site-specific and physically embedded within individual buildings, and subject to landlord permissions, structural limitations, safety requirements and local permitting rules.

Figure 3: Illustrative Shared IBMS Architecture



Dimension	5G SA MOCN on the Access List	Commercial MOCN with light-touch supervision
Policy fit with dual-network model	Poor – converts rivalry into regulated sharing	Strong – preserves infrastructure competition.
Geographic scope	National by default (risk of scope creep)	Targeted (rural, corridors, specific sites).
Investment incentives	Weakened (upside socialised)	Preserved (sharing only where efficient).
Regulatory burden	High (MSAs, pricing, disputes)	Lower (oversight, ex-post powers).
Flexibility/exit	Low (hard to unwind)	High (commercial exit and evolution).
Risk of de facto SWN outcome	Elevated	Low.
Necessity given existing tools	Low necessity	Sufficient (guidelines + CMA 1998 powers).

3.28. Consequently, Maxis proposed to remove (18)(c)(iv) to (x) as UDM, UDR, NEF, MEC, NFV, SEAF, AUSF and VAS platforms are core network services which in Maxis's opinion, should not be listed in the 5G service descriptions. Maxis further submitted that customer billing and CRM are typically managed by the Access Seeker itself and not by the Access Provider, thus should also be excluded from the service descriptions. Maxis is of the view that 18(d)(i), (ii) and (iii), as well as Network Slicing, Non-Public Network (Private Network), Reduced Capability and High-Performance Machine Type Communication are types of 5G services which should be included in the service descriptions. Maxis proposed the following amendments to the service descriptions of 5G Standalone and 4G EPC with 5G RAN Access:

(18) 5G Standalone Access

(a) 5G Standalone Access is a Facility and/or Service for access to a 5G New Radio network, whether or not as part of a Mobile Network, for the purpose of the Access Seeker providing:

(i) MVNO Access;

(ii) services to enterprise or government Customers;

(iii) public cellular services to the public; or

(iv) wireless or mobile broadband services to the public.

(b) 5G Standalone Access may include access to the Facilities and Services used by the Access Seeker to provide one or more of voice, data and application services, as selected by the Access Seeker, provided that where the Access Seeker has integrated its 5G core with the Access Provider's gNodeB, the Access Seeker and Access Provider are ~~is solely~~ jointly responsible for any voice service capability (and for the avoidance of doubt any such voice services may be delivered using the Access Provider's radio network).

(c) Examples of Facilities and Services to which the Access Seeker may request access includes but is not limited to:

(i) radio network, including gNodeB;

(ii) integration between the Access Provider's gNodeB and the Access Seeker's 5G core (5GC);

(iii) Network Slice Selection Function (NSSF and 5G Network Slices as selected by the Access Seeker);

~~(iv) Unified Data Management (UDM)~~

~~(v) Unified Data Repository (UDR)~~

~~(vi) Network Exposure Function (NEF)~~

~~(vii) Mobile Edge Computing (MEC)~~

~~(viii) Network Function Virtualisation (NFV);~~

~~(ix) security-related functions, such as Security Anchor Function (SEAF), and Authentication Server Function (AUSF), Security Edge Protection Proxy (SEPP) and N32 interface;~~

~~(x) value added service platforms (such as its IP Multimedia Subsystem, Short Message Service Centre, Multimedia Service Centre and Voicemail Server);~~

~~(xi) customer billing; and~~

~~(xii) customer relationship management.~~

(d) The 5G Standalone Service shall be supplied to the Access Seeker in compliance with 3rd Generation Partnership Project ("3GPP") Release 15 and any updates to that standard (including new releases) from time to time, and with all technical capabilities, as may be required to enable the Access Seeker

to provide the following types of services (or similar services), as selected by the Access Seeker:

(i) mobile broadband services;

(ii) massive IoT services;

(iii) mission-critical services.

(iv) Network Slicing.

(v) Non-Public Network (NPN) services / Private Network services.

(vi) Reduced Capability (RedCap) services; and

(vii) High Performance Machine Type Communication (HMTC) services.

(e) Despite anything to the contrary in paragraphs (a) to (d), 5G Standalone Access does not include any Facilities or Services within the scope of Access to In-Building Mobile Systems.

(19) 4G Evolved Packet Core ("EPC") with 5G Radio Access Network ("RAN") Access.

(a) 4G EPC with 5G RAN Access is a Facility and/or Service for access to a 5G New Radio radio network, for the purpose of the Access Seeker providing:

(i) MVNO Access;

(ii) services to enterprise or government Customers;

(iii) public cellular services to the public; or

(iv) wireless or mobile broadband services to the public.

(b) 4G EPC with 5G RAN Access may include access to the Facilities and Services used by the Access Seeker to provide one or more of voice, data and application services, as selected by the Access Seeker, provided that the Access Seeker and Access Provider ~~is solely~~ are jointly responsible for any voice service capability (and for the avoidance of doubt any such voice services may be delivered using the Access Provider's radio network).

(c) The functionalities of 4G EPC with 5G RAN Access include:

(i) integration between the Access Provider's gNodeB and the Access Seeker's EPC, ~~whether~~ using anchor technology ~~or otherwise~~; and

(ii) support for 3GPP Release 15 Options 3, 3a and 3x, including E-UTRA New Radio Dual Connectivity (EN-DC) and any updates to that standard from time to time.

(d) 4G EPC with 5G RAN Access shall be supplied to the Access Seeker in compliance with 3GPP Release 15 and any updates to that standard (including new releases) from time to time, and with all technical capabilities as may be required to enable the Access Seeker to provide mobile broadband and similar services.

(e) Despite anything to the contrary in paragraphs (a) to (d), 4G EPC with 5G RAN Access does not include any Facilities or Services within the scope of Access to In-Building Mobile Systems.

3.29. TM supported continued regulation, with targeted refinements to reflect the technical realities of 5G access. In particular, TM considered that voice capability should be treated as a shared responsibility between the Access Provider and Access Seeker, and that VoNR and EPS fallback should be expressly recognised as baseline capabilities required for voice continuity. TM clarified that while there are inherent technical differences between 5G Standalone Access, which supported VoNR and 4G EPC with 5G RAN Access as well as relying on EPS fallback to LTE/VoLTE, these differences do not support a rigid separation of responsibility based solely on network architecture. Instead, the service descriptions should allocate responsibility by reference to the network functions within each party's control, while recognising that voice continuity requires coordinated interworking between the Access Provider's radio access network and the Access Seeker's core network.

3.30. TM highlighted that voice continuity is a core component of 5G access and is significantly dependent on radio and access layer functions controlled by the 5G Access Provider. These include admission control, mobility management, handover behaviour, inter-RAT mobility, and the triggering and execution of EPS fallback. At the same time, successful end-to-end continuity also depends on the Access Seeker's core network and IMS functions being appropriately configured to process the relevant signalling, accept fallback where applicable, and maintain the voice session. Therefore, excluding explicit references to VoNR and EPS fallback risks creating ambiguity as to whether a 5G Access Provider is required to support the radio-layer mechanisms necessary to enable stable voice continuity as part of the access service. Such ambiguity would undermine any-to-any connectivity and prevent Access Seekers from guaranteeing baseline voice quality to end users. It would, therefore, not be in the LTBE.

3.31. TM commented that explicit inclusion would clarify that voice continuity is an inherent element of 5G access, ensure that 5G Access Providers support predictable and non-discriminatory radio-layer behaviour underpinning voice continuity, and align regulatory obligations with the technical realities of 5G voice delivery across both radio and core network layers. Therefore, the service descriptions should therefore recognise that the 5G Access Provider plays a critical role in supporting VoNR and EPS fallback to the extent that these functions are governed by the access and radio network, without displacing the Access Seeker's responsibility for core network voice capability.

3.32. TM considered that a model based on clear functional allocation is technically and operationally feasible. Under such an approach, the Access Provider should be responsible for access and radio-layer functions necessary to support voice continuity, including VoNR stability, fallback behaviour, handover execution and inter-RAT mobility. The Access Seeker should be responsible for core network and IMS functions, including session control and the ability to accept and maintain fallback voice sessions.

3.33. However, TM also recognises that some aspects of voice continuity cannot be completely segregated in practice. For example, the Access Provider may control the RAN mechanisms that trigger fallback or handover, but those mechanisms will only

preserve the call if the Access Seeker's core network and IMS are configured to accept the fallback and maintain the voice session. Therefore, the delivery of seamless voice services also relies on the effective operation of inter-network interfaces through which signalling and control messages are exchanged.

3.34. TM submitted that in practice, this would involve the Access Provider and Access Seeker working together to agree on the relevant interfaces required to support interworking (such as N26 or equivalent), align on applicable standards, versions and configurations, undertake joint testing and validation to ensure interoperability, and coordinate ongoing monitoring and resolution of issues affecting service continuity. Recognising this need for coordination is important to avoid ambiguity in how inter-network voice continuity is supported in practice.

3.35. Accordingly, TM commented that the service framework should reflect two principles. First, each party should remain accountable for the network functions within its own control. Secondly, where those functions interwork across network domains, the framework should recognise the need for coordination between the Access Provider and Access Seeker. This approach avoids an open-ended allocation of responsibility, while ensuring that voice continuity is properly supported across both access and core network domains.

3.36. Therefore, TM supported amending the service descriptions of the 5G Services to reflect that voice service capability should not be treated as the sole responsibility of the Access Seeker. In addition, VoNR and EPS Fallback to LTE/VoLTE should be explicitly included within the descriptions of the 5G Services as baseline capabilities required to deliver reliable and continuous voice access, in conjunction with core network functionality. However, TM considered that any reference to shared responsibility should be framed as a function-based allocation of responsibility, rather than as a broad or open-ended shared responsibility model. This approach would not remove the Access Seeker's responsibilities but would ensure that each party is accountable for the aspects of voice delivery within its control. It would also support reliable any-to-any voice connectivity and help safeguard long-term outcomes for end users.

3.37. Accordingly, TM proposed that the service descriptions clarify that:

"Shared responsibility for voice service capability is defined as an allocation of responsibilities based on control over network domains, whereby the Access Provider is responsible for functions within the radio access network, the Access Seeker is responsible for functions within the core network, both parties coordinate activities relating to inter-network interfaces required to support end-to-end voice continuity. This includes:

- agreeing the relevant interfaces,

- aligning on applicable standards and configurations,

- undertaking interoperability testing,

- collaboratively troubleshooting issues, and

- monitoring performance and coordinating resolution of any issues that arise"

3.38. TM considered that Non-Public Network (NPN) functionality introduced under 3GPP Release 16 should be explicitly and clearly captured within the service descriptions of the 5G Services, rather than treated as an optional or illustrative capability. TM considered that an important distinction should be drawn between access to an existing private NPN and access to the 5G capabilities required to support NPN-based services. TM does not consider that an Access Provider should be required to allow Access Seekers to roam onto, or use the dedicated resources of, an existing private NPN deployed for a specific enterprise or customer. However, Access Providers should be required to provide the necessary infrastructure, services and enabling capabilities to allow Access Seekers to provide private network and enterprise services to their own end customers, where these capabilities are supported by the Access Provider's network.

3.39. While the current draft service description includes reference to NPN capability, it is framed as a non-exhaustive and optional feature ("may include"), which creates ambiguity as to whether Access Providers are required to support NPN use cases on a consistent and non-discriminatory basis. Given the increasing importance of enterprise and industrial connectivity, TM considered that NPN functionality should be recognised as a core component of 5G service capability, rather than an ancillary feature. Therefore, NPN should be explicitly included as a supported use case (not optional), both NPN deployment models (Standalone NPN and Public Network Integrated NPN) defined under 3GPP should be recognised, and the NPN should be linked to key enabling capabilities such as network slicing, local breakout / local user plane functions (UPF), traffic isolation and security controls, and QoS differentiation mechanisms.

3.40. TM recommends that the service description be strengthened with the addition of the following text:

"For the avoidance of doubt, 5G Services shall include support for Non-Public Network (NPN) deployment models as defined under 3GPP Release 16 and subsequent releases, including both standalone and public network integrated NPN configurations, where selected by the Access Seeker."

This should be read together with enterprise services explicitly included in the main service scope, and NPN-related capabilities reflected in the list of supported functionalities. Such an approach will provide regulatory certainty, support innovation, and ensure that the 5G access framework remains future-proof and aligned with the long-term benefit of end users.

3.41. TM does not object in principle to the service descriptions recognising capabilities such as Reduced Capability and High-Performance Machine Type communications, given their relevance to emerging enterprise, industrial and IoT use cases. However, TM considered that these capabilities should be captured in a technology-neutral and future-proof manner, rather than by hard-coding specific capability labels that may evolve over time or be implemented differently across networks.

3.42. TM considered it important that the service descriptions clearly capture capabilities that represent important and increasingly relevant 5G use cases, particularly those supporting enterprise, industrial and IoT applications. The service descriptions should remain sufficiently flexible to accommodate the full range of current and future 5G

functionalities, while ensuring that such use cases are not inadvertently excluded due to overly narrow or static definitions. This would ensure that Access Seekers can utilise the capabilities already supported by the Access Provider's network, without requiring frequent regulatory updates as technology evolves.

3.43. Accordingly, TM proposed that the service descriptions clarify that:

"All 5G-related bearers and services enabled by the Access Provider's network should be made available to the Access Seeker, including those supporting IoT-type communications and other machine-type use cases."

3.44. For clarity, this would include, where supported by the Access Provider's network, capabilities and service features such as reduced capability and IoT-oriented device support, high-performance or mission-critical connectivity use cases, non-terrestrial or extended coverage solutions, enterprise-oriented configurations, inbound roaming scenarios, and inter-network access arrangements between 5G providers. this clarification is not intended to expand the scope of regulatory obligations or require Access Providers to deploy new capabilities. Rather, it reflects the principle that where such capabilities are already supported within the Access Provider's network, they should be made available to Access Seekers on a non-discriminatory basis, consistent with existing access obligations.

3.45. While TM supported maintaining a technology-neutral approach for emerging 5G capabilities, it takes a more explicit position in relation to VoNR and VoLTE. This is because voice provision is a fundamental service, and its reliability is critical to the overall quality of mobile connectivity. In a 5G Standalone environment, VoNR introduces a relatively new scenario where voice calls may need to be handed over between networks, unlike earlier architectures where voice remained anchored in the 4G core. Ensuring seamless voice continuity, including interworking and fallback between 5G and 4G networks, therefore requires specific regulatory clarity. For this reason, TM considered that explicit reference to VoNR and VoLTE is appropriate to safeguard reliable voice services, whereas other capabilities are more suitably addressed within a flexible, technology-neutral framework.

3.46. TM does not object in principle to MCMC referring to SEPP and the N32 interface in the examples of Facilities and Services to which Access Seekers may request access under the 5G Standalone Access service. TM recognises that these functions are relevant to the broader interworking and security capabilities required for practical deployment and operation of 5G Standalone services. However, it must be clearly stated that these are non-exhaustive examples because such interfaces may evolve over time. TM suggested that the service description should state clearly that all relevant interfaces required to support the service, as defined in applicable 3GPP standards or equivalent specifications, must be provided. This would help ensure the service description remains technology-neutral and adaptable to future developments.

3.47. TM supported the inclusion of Access to In-Building Mobile Systems as a distinct Access List service, given the specific operational and infrastructure issues associated with in-building access. However, TM considered that the service should be carefully framed. In particular, it should support operators seeking to use their own spectrum to provide indoor coverage, while avoiding unintended advantages within the 5G access framework, given that 5G access is currently structured around a limited

number of wholesale providers and the PI Paper records stakeholder concerns regarding restrictive practices in indoor 5G equipment procurement. TM viewed that the distinct IBMS service should enable effective indoor access without undermining the existing 5G access framework or creating unnecessary fragmentation.

3.48. To ensure that Access Seekers acquiring 4G or 5G MOCN access receive functionally complete access, including indoor coverage where required, TM considered that IBMS should also be expressly included in, or annexed to, the relevant 4G and 5G MOCN access service descriptions. TM submitted that this is due to in-building mobile systems being an integral part to the RAN, a distinct service should not create artificial separation between indoor and outdoor access, fragmentation could lead to incomplete access outcomes, in-building mobile systems must support 4G and 5G service continuity and existing barriers (i.e. exclusivity arrangements and anti-competitive practices) reinforce the need for integrated access obligations.

3.49. Therefore, TM supported the identification of Access to IBMS as a distinct service to support 4G spectrum holders and TM viewed that this should be accompanied by clear cross-references or annexes within the relevant 4G and 5G access services. TM clarified that this would ensure that in-building mobile systems, including both active RAN elements and passive infrastructure, are covered where they form part of the Access Provider's network and are required to support a functionally complete mobile access service.

3.50. In terms of 5G MOCN arrangements between the two 5G network providers, TM viewed it essential to have two independent and competing 5G networks that would support effective competition, resilience and consumer choice. Accordingly, TM would not wish to see the number of effective 5G networks reduced in practice, with one provider relying on 5G MOCN arrangements with the other. TM does not support extending 5G Standalone Access to cover 5G MOCN arrangements between the two 5G network providers.

3.51. TM highlighted key concerns with allowing 5G MOCN arrangements between the two providers in terms of redundancy and resilience at national level due to increased dependency on shared infrastructure; blurring of competitive boundaries between the two networks which resemble a single shared access network rather than two competing infrastructures; potentially weaken spectrum efficiency particularly in high-demand urban and suburban areas; and could create a risk of delayed investment or under-investment in 5G radio access infrastructure.

3.52. Nevertheless, TM recognises that there may be limited circumstances in which MOCN access could be appropriate such as in deeply rural or high-cost areas where it may not be economically efficient to deploy two separate 5G networks and situations of network failure, where temporary MOCN access could help maintain service continuity for end-users. However, in TM's view the above circumstances are best addressed elsewhere than this set of regulations as 5G Standalone Access is intended to regulate wholesale access by Access Seekers to a 5G provider's network, and not to facilitate generalised sharing between the two licensed 5G network providers themselves. TM submitted that if MCMC intends to allow such arrangements, TM considered that any such access should be tightly limited to exceptional cases, with clear safeguards to preserve investment incentives, spectrum efficiency, competition, and service resilience.

3.53. In addition to TM's earlier proposal, TM submitted that additional changes are required to the service descriptions of 5G Standalone Access and 4G EPC with 5G RAN Access particularly where the services are intended to support MOCN based access. TM proposed that both services be expressly framed as MOCN-based access services. In particular, TM proposed that 5G Standalone Access be redefined as 5G MOCN Standalone Access, and that 4G EPC with 5G RAN Access be redefined as 5G MOCN Non-Standalone Access.

3.54. TM also proposed to make explicit obligation for site-by-site availability for both services in a manner aligned with the proposed 4G MOCN service description. For 5G MOCN Standalone Access, access should cover all relevant 5G spectrum bands used by the Access Provider at the relevant site. For 5G MOCN Non-Standalone Access, access should apply wherever the Access Provider has deployed 5G RAN components in conjunction with a 4G EPC architecture, including macro, in-building and small cell deployments where relevant.

3.55. Further, TM proposed that both service descriptions expressly support seamless interworking and handover between 4G and 5G, including configuration of relevant RAN interworking parameters such as centre frequency and Service Profile Identifier (SPID), where applicable.

3.56. Particularly for 5G MOCN Standalone Access, TM proposed that the list of Facilities and Services be updated to reflect current and forward-looking 5G deployment models. TM supported retaining core access elements such as access to the radio network, gNodeB–5G core integration, network slicing and NEF, while also recognising newer capabilities where supported by the Access Provider's network, including reduced capability and IoT-oriented device support, VoNR with EPS fallback, mission-critical machine-type use cases, non-terrestrial or extended coverage solutions, 5G inbound roaming, enterprise network services, 5G private access network capability and future services introduced in subsequent 3GPP releases.

3.57. In addition, TM considered that the service description should clearly distinguish between 5G RAN/MOCN access and core network, service-platform or customer-facing functions. To avoid uncertainty over the intended scope of the service, while preserving any necessary interworking between the Access Provider's RAN and the Access Seeker's own network, TM suggested that any listed items relate to functions that sit within the Access Seeker's own network or systems should be removed or clarified so that they are not understood as forming part of the Access Provider's 5G MOCN Standalone Access offering.

3.58. As for 5G MOCN Non-Standalone Access, TM proposed aligning the service capability outcomes with other 5G access services by clarifying that 5G MOCN Non-Standalone Access should support the provision of mobile broadband, massive IoT and mission-critical services, as selected by the Access Seeker, consistent with applicable 3GPP standards and where supported by the Access Provider's network.

3.59. TM considered further amendments are beneficial to expressly clarify that 5G Standalone Access and 4G EPC with RAN Access are limited to RAN access and do not include access to the Access Provider's core network functions. TM highlighted that core network access (EPC/5GC) has distinct security and operational implications and should not be implied within RAN access services. Consistent with earlier comments,

TM is of the view that any listed Facilities or Services relate to functions that sit within the Access Seeker's own core network, service platforms or customer-facing systems, those items should be removed or clarified so that they are not understood as forming part of the Access Provider's 5G or 4G MOCN access offering.

3.60. TM submitted that where an Access Seeker requires access to the Access Provider's core network, that arrangement should fall under MVNO Access rather than 5G Standalone Access or 4G EPC with 5G RAN Access.

3.61. U Mobile agreed with retaining the 5G Standalone Access and 4G EPC with 5G RAN Access and excluding in-building mobile systems. Additionally, U Mobile proposed clarifications on voice service responsibility, Non-Public Network functionality, SEPP/N32 interfaces, VoNR/EPS Fallback, 5G MOCN scope between the two 5G providers, and treatment of external BTS serving both outdoor and indoor coverage.

3.62. U Mobile commented that the 5G service descriptions should distinguish the responsibility for voice capability by reference to the underlying network architecture. For 5G Standalone Access, U Mobile commented that there is a basis for a limited shared-responsibility model whereby the Access Seeker remains responsible for the core network elements required to deliver voice services (including the IP Multimedia Subsystem (IMS) and the associated end-to-end service logic). U Mobile submitted that investment in IMS and VoLTE capability is, in practice, a prerequisite for an Access Seeker operating over a 5G SA network, given that circuit-switched fallback introduces significant handover challenges in a standalone architecture.

3.63. The Access Provider, in turn, should be responsible for the radio-level capabilities within its RAN that are essential to enable voice services – including support for handover signalling and EPS fallback triggers. This limited shared responsibility reflects the fact that the Access Provider controls the RAN configuration on which the Access Seeker's voice service depends; it is therefore appropriate that the Access Provider bears responsibility for ensuring that the radio layer supported voice functionality.

3.64. On the other hand, for 4G EPC with 5G RAN Access, U Mobile is of the view that voice capability should remain the responsibility of the Access Seeker as under this architecture, voice services are delivered over the 4G layer – not over the 5G RAN. The 5G NR is only used for mobile data, while the Access Seeker's 4G core, IMS and VoLTE configuration continues to handle voice on the underlying 4G RAN. Therefore, the Access Provider's 5G radio access has no direct role in the voice path, and the Access Provider has no operational control over the Access Seeker's 4G voice infrastructure.

3.65. U Mobile considered that a shared-responsibility model is technically and operationally feasible, provided that it is limited in scope and clearly delineated by network domain. The Access Seeker should retain responsibility for its core network functionality and end-to-end voice service logic. The Access Provider should only be responsible for the radio-level capabilities within its RAN that are required to enable those services. This does not imply that the Access Provider assumes responsibility for the voice service as a whole; rather, it ensures that each party is accountable for the network domain it owns and operates.

3.66. U Mobile is of the view that the 5G service descriptions in paragraph 5(18) and 5(19) of the Access List should be amended to clarify that voice capability is not solely the responsibility of the Access Provider in the case of 5G Standalone Access. U Mobile suggests that in the case of 5G Standalone Access, the Access Provider is responsible for the essential radio-level capabilities within its 5G RAN required to enable voice services. In the case of 5G Standalone Access and 4G EPC with 5G RAN Access, the Access Seeker is exclusively responsible for the core network elements and end-to-end service logic required to deliver voice services to end users, including IMS and VoLTE capability. Additionally, where voice services are delivered via the 4G layer (including under 4G EPC with 5G RAN Access), the underlying voice-core capability, 4GE RAN configuration and supporting infrastructure remain the exclusive responsibility of the Access Seeker.

3.67. U Mobile considered that "Non-Public Network" functionality introduced in 3GPP Release 16 should not be captured in the service descriptions of the 5G Services at this stage as this remains an emerging area and the ecosystem is not yet sufficiently mature to warrant specific inclusion in the Access List. U Mobile commented that Malaysia has set aside spectrum in the 4.7–4.8GHz range (Band n79) for private network use, but the market and equipment ecosystem for this spectrum range remains relatively limited, which has constrained broader adoption and reduces the immediate practical relevance of incorporating Non-Public Network functionality into the regulated 5G service descriptions. Therefore, U Mobile suggests for MCMC to continue monitoring developments in this area and revisit the issue in a future review.

3.68. U Mobile disagreed to explicitly refer Reduced Capability and High-Performance Machine Type capabilities within the service descriptions of the 5G services as the adoption remains constrained by the maturity of the device ecosystem and by market demand. U Mobile views that these capabilities already fall within the scope of paragraph 18(d) and 19(d) of the Access List, which cover all technical capabilities as long as they are supported by the Access Provider's network. Explicitly referencing individual 3GPP capabilities in the service descriptions would, in U Mobile's view, make the Access List unnecessarily prescriptive and risk both obsolescence and regulatory loopholes over the five-year determination cycle, requiring frequent updates as the standards evolve.

3.69. U Mobile disagreed to specifically referring to SEPP and N32 interface in the examples of Facilities and Services to which Access Seekers may request access under the 5G Standalone Access service. U Mobile views that the Security Edge Protection Proxy (SEPP) and N32 are security features intended for international roaming between different Public Land Mobile Network (PLMNs) (which requires interconnecting different 5G cores), and are not designed for domestic inter-RAN handover continuity (which does not require interconnecting different 5G cores). U Mobile has found no 5G-core-to-5G-core signalling path between Access Providers and Access Seekers that would make SEPP or N32 applicable.

3.70. As clarified earlier, U Mobile commented that specifying every facility and service could make the Access List overly technical. Therefore, U Mobile suggests keeping the existing wording: *"Examples of Facilities and Services to which the Access Seeker may request access includes <u>but is not limited to</u> […]."* U Mobile views this wording already offers flexibility, enabling decisions about providing non-essential functions based on specific requirements.

3.71. U Mobile disagreed to explicitly refer VoNR and EPS Fallback to LTE/VoLTE within the service descriptions of the 5G services. Although U Mobile agreed that the Access Provider is responsible for the radio-level capabilities within its RAN required to enable voice services, the AL should establish this principle without prescribing the technical means by which it is achieved. According to U Mobile, embedding specific mechanisms in the service descriptions risks making the Access List obsolete as network technologies evolve over the five-year determination cycle.

3.72. U Mobile submitted that regulating access to in-building mobile systems separately from the 5G (and 4G) Services is aligned with MCMC's objective of reflecting actual market conditions in the Access List, given the distinct deployment model, cost structure and operational characteristics of in-building coverage. However, the proposed approach of combining the in-building infrastructure layer and the base transceiver station (BTS) layer within a single Access to In-Building Mobile Systems service does not fully reflect how the market operates in practice.

3.73. U Mobile clarified that in the majority of buildings, these two layers are owned, operated and supplied by different parties. The in-building infrastructure layer (including the Common Antenna System and all signal distribution components) is typically controlled by an NFP or by an MNO acting in an infrastructure-owner role while the BTS layer is deployed by the MNO delivering the active mobile access. access. Therefore, while U Mobile supported removing in-building mobile systems from the scope of the 5G Services, U Mobile does not support combining these two layers within a single service.

3.74. In terms of the 5G MOCN arrangements between the two licensed 5G network providers under the dual network model, U Mobile is of the view that 5G MOCN arrangements between the two licensed 5G network providers can support coverage extension, but the scope of the regulated service should reflect the competitive conditions in different geographical areas.

3.75. U Mobile proposed that the Access List to mandate 5G MOCN Access between the two 5G network providers only in areas where the coverage footprints of the two providers do not overlap and the Access Seeker cannot reasonably replicate the infrastructure - that is, where the absence of an alternative 5G network constitutes a bottleneck. This is consistent with the key principle that underpins the Access List of addressing bottlenecks where they occur. In areas where both providers have deployed 5G RAN, no such bottleneck exists and 5G MOCN arrangements between 5G Access Providers should be subject to commercial negotiation, with MCMC retaining its role in mediating disputes and addressing competition concerns.

3.76. U Mobile further submitted that the service description should also clarify that 5G MOCN Access does not require interconnection between the 5G core networks of the two providers. Each provider retains and operates its own 5G core independently while the Access Seeker integrates at the radio level only. This is consistent with the standard MOCN architecture.

3.77. U Mobile suggests adding the following to paragraph 18(c) of the Access List:

5G MOCN arrangements with another 5G network provider are to be limited to areas where the Access Seeker cannot reasonably replicate the infrastructure. For the avoidance of doubt, 5G MOCN Access does not require or entail any form of

interconnection between the 5G core networks of the Access Provider and the Access Seeker.

3.78. U Mobile further commented that the service descriptions should clarify the treatment of configurations where a single external BTS serves both outdoor coverage and indoor coverage via an in-building system. In such cases, it is not practical to split the BTS between the outdoor coverage and the indoor coverage. U Mobile suggests that BTS is included within 5G Standalone Access or 4G EPC with 5G RAN Access, while the Access Seeker seeking indoor coverage should be required to acquire the complementary in-building infrastructure service separately. U Mobile adds that the same treatment should apply to equivalent 4G MOCN configurations.

3.79. U Mobile suggests adding the following to paragraph 18(e) and 19(e) of the Access List:

Where an external BTS provides both outdoor coverage and coverage to an in-building system, the BTS falls within this service. Access to the in-building system infrastructure shall be acquired separately under the complementary in-building infrastructure service.

U Mobile commented that without this clarification, there could be regulatory uncertainty over which service governs equipment that serves two distinct coverage purposes.

3.80. U Mobile further submitted that the 5G service descriptions should expressly exclude access to the Access Provider's core network, and access to the core should be acquired under MVNO Access. Therefore, U Mobile suggests the adding the following to paragraph 18 and 19 of the Access List:

For the avoidance of doubt, this service does not include access to the Access Provider's core network. Where an Access Seeker requires access to the Access Provider's core network, it shall acquire MVNO Access.

U Mobile commented that this would assist MCMC in maintaining a clear boundary between RAN-level and core-level access, simplifying the assessment of access requests.

3.81. Wang Kian Tjun submitted that VoNR and EPS Fallback to LTE/VoLTE should be explicitly referred to within the service descriptions of the 5G Services.

4. Broadcasting Transmission Service

Submissions Received

Question 15:	Do you acquire broadcasting transmission services as an Access Seeker or supply broadcasting transmission services as an Access Provider? If so, do you currently acquire or supply these services commercially or using the broadcasting transmission component of the Trunk Transmission Service or End-to-End Transmission Service?
Question 16:	Are you experiencing any difficulties in acquiring or supplying broadcasting transmission services?
Question 17:	Do you agree that broadcasting transmission services should be listed under a new Broadcasting Transmission Service, rather than being a component of the Trunk Transmission Service and End-to-End Transmission Service? Please provide reasons.
Question 18:	Do you have any comments on the proposed new service description for the Broadcasting Transmission Service, including the functionalities and technical parameters?

4.1. MYTV acts as an Access Seeker, not an Access Provider, in relation to broadcasting transmission services, acquiring the End-to-End Transmission Service (STM-1) from an Access Provider for integration into its Digital Terrestrial Multiplexing Broadcasting Service. MYTV considers that broadcasting transmission services should be separately listed due to their distinct technical, operational, and strategic characteristics, including bespoke infrastructure and ancillary components such as SLA commitments, monitoring, maintenance, and NOC support. MYTV further submits that the current proposed definition of Broadcast Transmission Service is inaccurate for digital terrestrial television broadcasting, as it conflates transmission with multiplexing. In the DTBMS context, broadcasters connect to MYTV's multiplexers at the point of interconnection before content is transmitted over the air, making the FM radio analogy inapplicable.

4.2. TM does not support the inclusion of a standalone Broadcasting Transmission Service in the Access List, as it considers broadcasting transmission to be a bespoke, customer-specific service rather than a standard bottleneck input suitable for ex-ante regulation. TM argues that the service is tailored to individual broadcaster requirements, involves dedicated and site-specific infrastructure, and does not give rise to vertical foreclosure concerns since TM does not operate in downstream broadcasting markets. TM further contends that access regulation could disrupt existing commercial arrangements, constrain service design flexibility, extend regulation into managed and ancillary services, and undermine investment incentives and network resilience, without delivering corresponding long-term benefits to end users. Accordingly, TM submits that broadcasting transmission services should remain commercially negotiated and be excluded from regulated transmission service definitions and access obligations.

5. Infrastructure Sharing and Access to In-Building Mobile Systems

Submissions Received

Question 19:	Do you agree that Access to In-Building Mobile Systems should be listed as a new service instead of expanding the scope of Infrastructure Sharing service to include the active components of in-building solutions? Please provide reasons.
Question 20:	Do you have any comments on the proposed new service description for Access to In-Building Mobile Systems? Please provide your suggested amendments if you believe the service description should be amended.
Question 21:	Do you agree with the new concept and definition of "Active In-Building Elements", which seeks to capture all active elements relating to mobile in-building solutions within the scope of Access to In-Building Mobile Systems? If not, please propose alternatives for MCMC's consideration.
Question 22:	In relation to physical access to the central equipment room, are the proposed requirements for power, environmental services such as heating, ventilation and air-conditioning, and security sufficient to allow Access Seekers to access the service? If not, please provide suggestions on any ancillary services required.
Question 23:	As an Access Provider, do you anticipate any challenges in providing the proposed service? Please provide details.

5.1. CelcomDigi, DNB, CTS, PPIT, Maxis, XMT, TIME, TM and U Mobile support listing Access to In-Building Mobile Systems as a new service in the Access List instead of expanding the scope of Infrastructure Sharing service.

5.2. However, CelcomDigi does not support the inclusion of the active components of in-building solutions (IBS) (e.g. BTS, active multi-band DAS and other active network components) within the regulated service because active IBS elements are integral to the operation of the mobile network itself, directly linked to spectrum use, network optimisation, and service delivery. Mandating access to such elements introduces significant technical and operational considerations, including risks to network integrity, performance management, and system stability.

5.3. CelcomDigi has provided its views on the Quality of Service ("QoS") accountability and regulatory compliance. Since active elements directly affect end-to-end service quality and regulatory compliance obligations i.e. MSQoS requirements, including them within a regulated access framework risks create ambiguity in accountability between Access Providers and Access Seekers, particularly where both parties contribute to service delivery.

5.4. CelcomDigi is of the view that a clear demarcation is necessary to ensure operators retain full responsibility and control over performance outcomes and regulatory compliance, especially since, active IBS elements are closely linked to licensed

spectrum usage and core network functions, and extending regulated access may inadvertently blur the boundaries of spectrum rights and obligations.

5.5. CelcomDigi added that active elements handle signalling and user traffic, requiring appropriate safeguards that may not be suited to a standardised access framework and thus, considerations in relation to network security and data governance need to be taken into account.

5.6. CelcomDigi submitted that the proposal to carve out that Access to In-Building Mobile Systems as a standalone service is broadly aligned with global approaches, as it enables clearer scoping of access obligations and reflects the distinct characteristics of in-building deployments. In particular, CelcomDigi made reference to BEREC Guidelines on the access to in-building infrastructure in relation to Article 11(6) of the Gigabit Infrastructure Act (2 October 2025) to supports its view on the clear distinction between passive and active elements.

5.7. CTS noted the complexity of IBS in comparison to the conventional infrastructure as they require stricter technical specifications, QoS management, environmental controls, and system integration requirements. Although CTS does not currently acquire or provide IBS services, this would provide clearer guidance and useful reference for future participation in this segment.

5.8. Edotco commented that there is a strong public interest rationale for IBS regulation that extends well beyond ordinary commercial considerations. One of the strongest arguments in favour of IBS regulation is the value of the neutral-host model. A shared or neutral-host approach can reduce duplication, minimise disruption within buildings, improve deployment efficiency, and provide a common in-building platform capable of serving multiple mobile operators. This is demonstrably more efficient than a fragmented model in which each operator separately negotiates access, installs overlapping equipment, and duplicates infrastructure inside the same premises. Edotco further added that IBS is not a niche add-on — it is a necessary condition for meaningful 5G service delivery.

5.9. Edotco highlighted that currently IBS is not recognised as a distinct regulated service in the Access List. Edotco is of the view that it is critical to define IBS both passive and active elements as a distinct service category.

5.10. PPIT highlighted that in-building solutions involve complex active components (antennas, fiber, remotes) and require different commercial and technical models. Hence, PPIT supported that the Access to In-Building Mobile Systems be considered as a new, distinct service rather than merely expanding the definition of existing Infrastructure Sharing is generally advantageous for regulatory clarity and market development.

5.11. PPIT also noted that adding the Access to In-Building Mobile Systems as a new service would focus on 5G and future technologies. 5G signals often fail to penetrate modern building materials, making robust in-building systems critical. These systems are highly technology-dependent and need tailored, up-to-date regulations that standard infrastructure rules might not cover. The current conundrum in Malaysia on 5G IBC deployment between the current two (2) 5G networks need to be proactively managed via an agreed framework. Likewise, the increase in small cells and active components

for 5G requires different regulatory approaches to site access than traditional passive macro-cells.

5.12. TIME noted its opinion that the nature of in-building mobile systems (IBMS) can be provided by either a Provider/Operator or a pure solution provider. Further, TIME highlighted the regulation should only be applicable to Providers/Operator who owns IBMS electronics, operate the system, and at the same time are the spectrum holders. IBMS should not be regulated in service provision by solution providers who do not meet the criteria explained previously and provides the service on an equipment rental basis. TIME proposed that the Commission should develop a custodian to ascertain the applicability of the regulation, if enforced on a group of license providers fulfilling the criteria. TIME also highlighted that IBMS services are not meant for sharing or an MOCN environment, and that the IBMS solutions are meant to support a single operator only.

5.13. U Mobile supported the principle of listing a dedicated in-building service rather than expanding the scope of Infrastructure Sharing. However, U Mobile noted that MCMC's proposed approach of combining the in-building infrastructure layer and the BTS layer within a single Access to In-Building Mobile Systems service does not reflect how the market operates in practice. As such, U Mobile suggested that the Access List should include two separate but related services for in-building mobile systems which are the followings:

(a) In-Building Infrastructure Access: Covering the in-building infrastructure layer, including the Common Antenna System, the central equipment room and all associated distribution and civil-works elements. This service would be provided by the party that owns or operates the in-building infrastructure (whether an NFP or an MNO acting in an infrastructure-owner role) and would govern physical access, including co-location and the associated environmental, power and maintenance obligations (including right-of-way for power installation by the Access Seeker).

(b) In-Building Mobile Access: Limited to the BTS layer, being the 4G or 5G mobile service provided using the radio equipment installed by the MNO for in-building coverage. This service would be provided by the MNO delivering active mobile access. It would not include access to the Common Antenna System, the central equipment room or any element of the in-building infrastructure layer.

5.14. U Mobile proposed the definition of "Common Antenna System" should be amended to read:

"a system of Facilities inside a building, owned or operated by an Operator (including one or more Mobile Network Operators or a Network Facilities Provider), in association with in-building coverage, comprising antennas, cabling to the antennas and other associated in-building signal distribution elements – including distributed antenna systems (DAS), digital indoor systems (DIS), splitters, combiners, amplifiers, repeaters and related equipment – but excluding any Base Transceiver Station or other radio equipment forming part of the BTS layer."

5.15. U Mobile further suggested that the defined term "Active In-Building Elements" should be removed from the Access List.

5.16. Maxis supported that Access to In-Building Mobile Systems should be listed as a new standalone service, as the separation of the two services provides clearer regulatory treatment given their fundamentally different nature and network topology (outdoor versus in-building). Listing In-Building Mobile Systems as a standalone service will enable more proportionate and tailored access obligations that better reflect the unique physical, operational and commercial characteristics of in-building environments.

5.17. However, Maxis reiterates the importance of preserving the principle of technological neutrality within the definition of Infrastructure Sharing service, particularly where access is based on the allocation and use of physical space. In this regard, Maxis proposes that the following text (in red) should be added to the Infrastructure Sharing definition new item (e):

"For the avoidance of doubt, the provision of physical access is technologically neutral. An Access Provider shall not impose different terms, conditions, or charges based on the nature and/or type of the technology deployed by the Access Seeker. The right to access is determined by the equipment's adherence to the agreed physical space, weight, loading and related parameters, rather than by the technology it enables to end users."

5.18. TM noted that this proposal is particularly relevant where an Access Seeker seeks to use its own spectrum to provide indoor mobile coverage, especially in the 4G context. However, TM considers that the service should be recognised within the mobile services framework and closely linked to the relevant 4G and 5G MOCN Access Services, rather than treated as a rigidly separate standalone access regime.

5.19. TM submitted that Expanding Infrastructure Sharing alone would not be sufficient. TM considers that simply expanding Infrastructure Sharing to include active in-building components would risk stretching that service beyond its intended function. Infrastructure Sharing is primarily directed at access to physical space and passive supporting infrastructure. While that framework is appropriate for towers, rooftops and similar outdoor facilities, it may not provide a complete or sufficiently targeted basis for regulating indoor mobile systems.

5.20. TM also highlighted its concern with the access to the full indoor system, not merely passive infrastructure. Access issues for in-building mobile systems concern the practical ability to duplicate or access the full indoor system, not merely the availability of passive infrastructure. As MCMC notes, although an MNO may in principle construct its own in-building mobile system, this is likely to be significantly more expensive than obtaining shared access to existing in-building systems, including active elements. Duplication may also be constrained by limited space within buildings and the risk of interference with existing systems, further limiting an operator's practical ability to construct a parallel indoor system.

5.21. TM recognises that creating a standalone service could raise concerns about overlap or fragmentation if it is not clearly drafted. However, this risk can be managed through a clear demarcation between the two services. Infrastructure Sharing should remain focused on general physical infrastructure, particularly outdoor infrastructure such as towers, associated sites, rooftop space and street furniture. Access to In-Building Mobile Systems should cover the specific indoor mobile infrastructure needed to

provide in-building coverage, including common antenna systems, active inbuilding elements and physical access to the central equipment room.

5.22. DNB, Maxis and PPIT and TM are agreeable with the proposal and PPIT highlighted that the amendments to the service description for Infrastructure Sharing is reasonable and the new service description for Access to In-Building Mobile Systems is reasonably clear.

5.23. CelcomDigi proposed the following amendment to the service description for Access to In-Building Mobile Systems. In particular, the amendments clarify that regulated access should be limited to passive inbuilding infrastructure, which constitutes the relevant bottleneck facility, while excluding active network elements that are integral to network operation, spectrum usage and service delivery.

Access to In-Building Mobile Systems

(a) Access to In-Building Mobile Systems is a Facility and/or Service which comprises:

(i) the provision of access to in-building Common Antenna Systems and ~~Active In-Building Elements~~ other passive in-building infrastructure, including cabling and antenna distribution systems, which are intended to host or support network elements without becoming active elements of the network; and

(ii) the provision of physical access to the central equipment room of a building.

5.24. U Mobile considers that the proposed service description should be restructured into two separate services: one governing the in-building infrastructure layer and one governing the BTS layer. U Mobile proposes the following drafting for both services.

5.24.1. In-Building Infrastructure Access:

(a) In-Building Infrastructure Access is a Facility and/or Service which comprises:

(i) provision of access to the in-building Common Antenna System, being the system of facilities inside a building used for the distribution of radio frequency signals, including distributed antenna systems (DAS), digital indoor systems (DIS), combiners, amplifiers, splitters, repeaters, internal cabling and related in-building signal distribution equipment; and

(ii) provision of physical access to the central equipment room of a building, to enable the Access Seeker to install and maintain its own Base Transceiver Station and associated radio equipment for the purpose of providing mobile services within the building.

(b) Physical access includes power (including right-of-way for power installation by the Access Seeker), environmental services (such as heat, light, ventilation and air-conditioning), security, site maintenance and access for the personnel of the Access Seeker.

(c) For the avoidance of doubt, the In-Building Infrastructure Access service does not include access to any Base Transceiver Station or other radio equipment forming part of the BTS layer, which shall be governed under In-Building Mobile Access;

5.24.2. In-Building Mobile Access:

(a) In-Building Mobile Access is a Facility and/or Service for the provision of access to 4G and/or 5G mobile services within a building, using the radio equipment (Base Transceiver Station) installed and operated by the Access Provider for in-building mobile coverage.

(b) For the avoidance of doubt, the In-Building Mobile Access service does not include the provision of:

(i) access to the Common Antenna System;

(ii) access to the central equipment room of a building; or

(iii) access to any other element of the in-building infrastructure layer, which shall be governed under In-Building Infrastructure Access.

(c) An Access Seeker acquiring In-Building Mobile Access is not required to separately acquire In-Building Infrastructure Access in order to receive the service.

(d) An Access Provider is not obligated to provide In-Building Mobile Access to an Access Seeker that holds a licence to provide 5G wholesale services. Any such arrangement between two 5G wholesale providers shall be subject to commercial negotiation.

5.25. Maxis submitted that MCMC's proposal to introduce Access to In-Building Mobile Systems (AIBMS) as a service on the Access List applicable to both 4G and 5G technologies. This is directionally consistent with existing technology neutral treatment of in-building systems under Common Antenna Sharing (CAS) within Infrastructure Sharing. However, Maxis considers some additional amendments would ensure an effective use of these services.

5.26. Maxis noted that the current 4G in-building framework, which is regulated within the Infrastructure Sharing service, MNOs typically obtain access to shared CAS, owned either by an infrastructure company or an MNO, via a point of interconnection. In some cases, in-building coverage is also provided through MOCN arrangements with an MNO that already has access. Such infrastructure may comprise passive and/or active elements and is generally vendor-agnostic, consistent with a neutral-host, multi-operator access model. However, in practice, access to in-building systems may be constrained by factors outside the Access Provider's control, including building management requirements, interference considerations, limitations on space, power and air-conditioning, or restrictions arising from local authority approvals. These practical constraints can hinder the effective implementation of regulated access obligations.

5.27. For 5G IBMS, which primarily involves Digital Nasional Berhad (DNB) and U Mobile, Maxis considers that appropriate access arrangements between Access Providers are

necessary to avoid unnecessary duplication of in-building infrastructure. Maxis is concerned that certain infraco-imposed arrangements may not be neutral, binding in-building systems to a single 5G Access Provider and effectively restricting Access Seekers' choice while requiring parallel agreements with both the 5G Access Provider and the infraco. Accordingly, Maxis proposed the definition for Access to In-Building Mobile Systems to be as follows (changes in red):

(20) "Access to In-Building Mobile Systems

(a) Access to In-Building Mobile Systems is a Facility and/or Service which comprises:

(i) the provision of access to in-building passive and/or active Common Antenna Systems and/or ~~Active In-Building Elements~~ Digital Indoor Systems; and

(ii) the provision of physical access to the central equipment room of a building.

(b) Physical access includes power (including right-of-way for power installation by the Access Seeker), environmental services (such as heat, light, ventilation and air-conditioning), security, site maintenance and access for the personnel of the Access Seeker.

For clarity, Digital Indoor Systems means an active distributed antenna system or indoor small cell architecture or components such as baseband unit and remote unit that convert radio signals into digital data, transports such data over fibre or ethernet within a building, and reconverts the data into radio signals at indoor radio units to provide high quality in building coverage and capacity."

5.28. TM recommended that the new service description to be clarified to explicitly include passive in-building radio frequency components and Distributed Antenna Systems (DAS). For Access Seekers to effectively utilise 4G and 5G MOCN services in indoor environments, access must extend beyond active equipment to include the passive antenna and distribution layer that determines whether radio signals can be supported, combined, or expanded. In practice, access constraints often arise not from the absence of active elements, but from limitations in passive infrastructure that prevent integration or require reasonable modification. Explicitly referencing DAS and passive RF components in the service description would remove ambiguity, reflect common in-building deployment models, and ensure the service supports meaningful access outcomes rather than purely nominal access.

5.29. CTS, PPIT, XMT and TM agreed with MCMC's proposal.

5.30. CelcomDigi does not agree with the proposed concept and definition of "Active In-Building Elements" to be included solutions within the scope of Access to In-Building Mobile Systems. Mandating access to active elements may ave broader implication for:

5.30.1. network integrity and security, as these components handle signalling and user traffic;

5.30.2. spectrum management, given their direct linkage to licensed spectrum usage; and

5.30.3. innovation and investment incentives, due to reduced flexibility in network design and deployment.

5.31. While CelcomDigi recognises the intent to provide clarity on the components of in-building solutions, the proposed definition, which seeks to capture all active elements, would effectively extend the scope of regulated access into active network infrastructure. This would go beyond the traditional and internationally established boundary of infrastructure access regulation, which is primarily focused on passive bottleneck facilities.

5.32. U Mobile disagrees with the proposal and proposes that the definition of "Active In-Building Elements" to include two types of "active" components that belong to two potentially distinct Access Providers:

5.32.1. the BTS (which forms part of the active mobile access layer); and

5.32.2. powered signal distribution equipment – including active DAS master units, remote units and bi-directional amplifiers – which forms part of the in-building infrastructure layer. These distribution components are functionally part of the signal chain between the BTS and the antennas, and are typically owned and operated by the in-building infrastructure provider rather than by the MNO delivering the mobile service.

5.33. Retaining a defined term that combines equipment from both layers would undermine the separation between In-Building Infrastructure Access and In-Building Mobile Access proposed by U Mobile in responses to Questions #19 and #20. It would also reintroduce into the BTS-layer service the active infrastructure elements that are owned by the infrastructure provider.

5.34. Accordingly, U Mobile proposes that the defined term "Active In-Building Elements" be removed from the Access List. U Mobile highlighted that those two service descriptions proposed under Question #20 directly reference the relevant equipment within each layer – the Common Antenna System and all distribution elements under In-Building Infrastructure Access, and the BTS under In-Building Mobile Access – without the need for a cross-cutting defined term.

5.35. Maxis submitted that "Active In-Building Elements" to be replaced with "Digital Indoor System (DIS)" and DIS means an active Distributed Antenna System (DAS) or indoor small cell architecture or components such as baseband unit and remote unit that converts radio signals into digital data, transports such data over fibre or ethernet within a building, and reconverts the data into radio signals at indoor radio units to provide high quality in building coverage and capacity. Maxis noted that the proposal is because the term "Active In-Building Elements" is over-broad and DIS are the relevant class of active IBS for 5G.

5.36. TM considers that the definition is appropriate because in-building mobile systems are not limited to passive infrastructure. Effective indoor coverage may depend on having access to active components such as base transceiver stations, small cells, active distributed antenna systems, master units, remote units, bi-directional amplifiers and

other powered equipment used for radio signal processing, amplification or distribution within buildings. Capturing these elements within the scope of any new Access List service, or within the 4G MOCN and 5G Access List services is therefore necessary to ensure that the service reflects how indoor mobile systems are deployed and operated in practice.

5.37. TM notes that active in-building elements do not operate in isolation. Their effectiveness depends on the characteristics and configuration of the underlying passive inbuilding infrastructure, including antenna systems, cabling, risers, signal distribution components, equipment rooms and other building-specific facilities. This is particularly relevant in brownfield environments, where legacy passive components may constrain integration, enhancement or upgrade, even where active elements are available.

5.38. Accordingly, TM supports the proposed definition, provided that it is applied within a service framework that recognises the functional interdependency between active and passive inbuilding elements. This will help ensure that access obligations translate into usable indoor network capability, rather than merely capturing access to active equipment in isolation.

5.39. CelcomDigi, CTS, PPIT, XMT and TM noted that the proposed requirements are sufficient.

5.40. CelcomDigi submitted that requirements relating to power supply, environmental services (including heating, ventilation and air conditioning), and security are necessary and appropriate baseline elements to facilitate physical access to central equipment rooms by Access Seekers. These elements are fundamental to ensuring that equipment can be installed and operated safely and reliably. While necessary, these requirements may not on their own be sufficient to enable effective access in practice. In building environments present operational and logistical constraints that warrant clearer recognition of certain ancillary services to ensure that access obligations are meaningful. Without limitation, this shall include:

5.40.1. reasonable physical access to central equipment rooms or equivalent facilities, including transparent and non-discriminatory access management procedures.

5.40.2. adequate power supply and environmental services, including heating, ventilation and air conditioning, and where applicable, access to existing backup power and monitoring facilities on a proportionate basis.

5.40.3. reasonable allocation of space, including rack or cabinet space or equivalent mounting arrangements, subject to applicable safety and building requirements.

5.40.4. access to necessary cable routes, pathways, trays or ducts connecting equipment within the premises, subject to capacity and safety constraints; and

5.40.5. reasonable security arrangements that enable timely and secure access to equipment.

5.41. CelcomDigi submitted that Ancillary services shall be provided on a technology neutral and application neutral basis. Charges for such services shall be reasonable, transparent, and reflective of cost causation, and shall not vary solely by reference to the technology deployed or the fact that the In Building Mobile System supports multi operator use, wholesale access, or active sharing arrangements. Each Access Seeker shall remain responsible for its own equipment and compliance obligations. Nothing in this service description shall be construed as conferring rights to spectrum usage or network wide active elements beyond the scope of the In Building Mobile System.

5.42. U Mobile partially agrees with MCMC's proposal and explains that the proposed requirements for power, environmental services, security and site maintenance are broadly sufficient. However, consistent with U Mobile's position set out in responses to Questions #19 and #20, these requirements should apply under the In-Building Infrastructure Access service – not under the Access to In-Building Mobile Systems service.

5.43. U Mobile noted that the access to central equipment room, and the associated power, environmental and security provisions, form part of the in-building infrastructure layer. The party that owns or controls that infrastructure should bear the corresponding obligations; they should not be imposed on the BTS provider, which may have no ownership or operational control over the room or its facilities. For the avoidance of doubt, this should not remove the Access Seeker's right-of-way for power installation in respect of its own BTS equipment once it has acquired access to the central equipment room under In-Building Infrastructure Access.

5.44. TM raised concerns on the effectiveness of the proposed requirements as it will depend on certain practical considerations including the operational and technical enablers, compatibility of existing in-building infrastructure, and ongoing access and service assurance.

5.45. CelcomDigi anticipated a number of practical implementation challenges that should be taken into account to ensure the service is effective, proportionate, and sustainable in practice. A primary challenge arises from the fact that in building access is frequently subject to third party control, including building owners, landlords, and management corporations. Access Providers often have limited ability to unilaterally determine physical access arrangements, available space, installation conditions, or maintenance windows, and these constraints may affect the timing and manner in which access can be provided. In addition, physical capacity limitations within buildings — including space constraints, power availability, and load bearing considerations — may restrict the ability to accommodate multiple Access Seekers simultaneously, particularly in older or densely occupied premises. Managing such limitations will require flexibility and clear principles to balance competing access requests. The provision of Access to In-Building Mobile Systems also involves operational and coordination complexity, including the need to manage access scheduling, security procedures, and maintenance activities in shared and safety critical environments. Without clear and workable access management processes, there is a risk that administrative or operational friction could impede timely deployment and service restoration. Finally, the sustainable provision of the service depends on clarity around cost recovery and scope boundaries. Ancillary services such as power, environmental services, security, and access management must be provided on a cost reflective and application neutral basis. In addition, clear

delineation is needed between IBMS obligations and other regulatory frameworks, to avoid overlapping or uncertain responsibilities that could affect compliance and investment planning.

5.46. CTS noted that although CTS is not an access provider for this service, CTS anticipated limitations in available building space, as well as high building space charges, which may increase costs for access seekers.

5.47. PPIT highlighted the challenges that may exist arose because some of the elements may not be provided by the Access Provider for example right-of-way requires the building owner's permission whilst environmental services, security, site maintenance and access may require the facility manager's approval or assistance.

5.48. U Mobile anticipates challenges under the current proposal. U Mobile further highlighted that the service combines the in-building infrastructure layer and the BTS layer as currently proposed, U Mobile as a BTS Access Provider would be subject to delivery, maintenance and service-level obligations in respect of elements it does not own or control in the majority of the buildings where it operates – including the central equipment room, the Common Antenna System and the associated power and environmental services. Compliance would therefore depend on the actions of third parties (the infrastructure provider, building owner or building management), without the BTS provider having any regulatory levers over those parties.

5.49. U Mobile holds that separating the two layers into distinct services, as proposed in responses to Questions #19 and #20, would resolve this. Under the proposed framework:

(a) The in-building infrastructure Access Provider would be responsible for the obligations attached to In- Building Infrastructure Access, including physical access to the central equipment room, site readiness, power and environmental services.

(b) The BTS Access Provider would be responsible only for the obligations attached to In-Building Mobile Access, being the provision of the 4G or 5G mobile service using the radio equipment it owns and operates.

5.50. XMT noted that the challenges include obtaining local council approval and work permit.

5.51. Maxis submitted that for Infrastructure Sharing and AIBMS, Access Seekers shall be granted the right to choose whether to deploy their own fibre or to utilise fibre provided by other operators. In this regard, Access Seekers should not be compelled to utilise the fibre infrastructure deployed by the Access Provider where they could elect to deploy their own fibre, particularly to support high-capacity requirements (i.e. fiberisation). For AIBMS, Maxis considers the proposed requirements are appropriate but wishes to highlight that physical access to the central equipment room should also include approval access to the building from the building management and/or owner. Accordingly, Maxis proposes the following changes in red:

(f) "Physical access includes power (including right-of-way for power installation by the Access Seeker), right-of-way for fibre installation by the Access Seeker, environmental services (such as heat, light, ventilation and air-conditioning), security, site maintenance and access for the personnel of the Access Seeker".

5.52. TM submitted that there may be operational, technical and commercial challenges for Access Providers to offer Access to In-Building Mobile Systems (IBMS), particularly in relation to legacy deployments, multi-operator integration, and coordination with third-party building owners or neutral host operators. However, TM considers that these challenges are manageable and do not outweigh the broader benefits of establishing a clear and regulated access framework for this infrastructure.

6. IP Transit Service

Submissions Received

Question 24:	Do you agree with MCMC's proposal to remove IP Transit Service from the Access List? Please provide evidence of any remaining bottleneck characteristics or market failures that would justify its retention.

6.1. CelcomDigi, Symbio, TM and U Mobile supported MCMC's proposal to remove IP Transit Service from the Access List. TM adds that IP Transit Service no longer exhibits bottleneck characteristics given the availability of commercial alternatives, private peering, MyIX and regional connectivity options. TM considers that IP Transit Service should therefore be left to commercial negotiation. Furthermore, U Mobile has not encountered material difficulties in acquiring IP Transit on commercial terms given that IP Transit market in Malaysia is competitive. Therefore, removing IP Transit Service is consistent with the principle of regulating only where necessary.

6.2. CTS submitted that it does not agree with MCMC's proposal to remove IP Transit Service from the Access List. Continued regulation would help ensure fair pricing and healthy competition, particularly in areas with limited provider and peering options.

6.3. Maxis submitted that it also does not agree to remove IP Transit Service from the Access List because these services are critical inputs for operators without international gateway facilities. Access may not be provided on competitive or efficient terms in the absence of regulation.

6.4. MEASAT is in the opinion that IP Transit Service should be retained to preserve flexibility for future expansion and service diversification as well as to maintain strategic optionality in responding to evolving market and technology developments. Retaining IP Transit Service provides regulatory certainty that access to an essential upstream input remain available on fair, reasonable and non-discriminatory terms. This is particularly relevant in the context of providing consistent broadband services to rural and underserved areas where maintaining reliable and continuous connectivity remains a key operational requirement. Predictable access to IP Transit Service supports the continued ability to extend and maintain connectivity, thereby contributing to efforts to bridge the digital divide over time.

6.5. PDC is of the view that removal of IP Transit Service from the Access List is premature and would result in adverse consequences for competition, cost efficiency and regional digital development, particularly in the Northern Regional Zone. Retention of IP Transit Service is necessary to incentivize more Access Providers to establish local peering facilities in the Northern Regional Zone. This would reduce dependence on Klang Valley or international routing, promote efficient traffic localization and strengthen Malaysia's overall digital ecosystem.

7. Interconnect Link Service

Submissions Received

Question 25:	Do you agree with MCMC's proposal to remove SS7-based interconnection link from the Interconnect Link Service description? If not, please provide reasons.
Question 26:	Are bandwidth increments of 100 Mbps and 100 Gbps feasible to be mandated under the scope of the Interconnect Link Service? If not, please provide details.
Question 27:	What are your views on the inclusion of BoD as a feature of the Interconnect Link Service? As an Access Provider, would you face significant challenges in providing BoD if it is mandated under the Access List?

7.1. CelcomDigi, CTS, Maxis, Symbio, TM, TIME, U Mobile and XMT supported the removal of SS7 based interconnection links from the Interconnect Link Service description.

7.2. CelcomDigi commented that the telecommunications industry has undergone a sustained transition from legacy circuit switched architectures to IP based networks, with SS7 based interconnection increasingly being phased out in favour of more efficient, secure, and scalable IP based interconnection solutions. Retaining SS7 based interconnection as a regulated access service risks anchoring the access framework to legacy technologies that no longer reflect prevailing network deployments or forward-looking investment strategies.

7.3. CelcomDigi viewed that the removal of SS7 based interconnection links from the service description does not prevent Access Providers and Access Seekers from maintaining such arrangements on a commercially negotiated basis where operationally required during transitional periods. This preserves flexibility while avoiding the need for ongoing access regulation of services that are no longer central to the functioning of the market.

7.4. CelcomDigi included that aligning the Interconnect Link Service with current and emerging interconnection practices also promotes regulatory clarity and coherence, reduces unnecessary complexity within the access framework, and supports a more proportionate approach to access regulation. These outcomes are consistent with international practice, where regulators have progressively withdrawn legacy interconnection services from regulated access regimes as markets migrate to IP based networks.

7.5. CTS agreed on the basis that SS7 is a legacy technology, and most operators are progressively migrating towards IP-based networks. MCMC may consider adopting a technology-neutral approach to signalling interconnection to accommodate evolving network technologies and industry practices.

7.6. Maxis observed that this service is no longer used within the industry, has reached its end of life, and faces no vendor support.

7.7. Symbio emphasized that modern network runs on IP-based connections and SS7-based connections has obsolete and no longer suits today's need.

7.8. TM noted that it no longer acquires, and no longer provides, SS7-based interconnect links. All legacy SS7-based connections have been migrated to IP-based ILS, and SS7-based interconnection is no longer offered for new service orders. The continued inclusion of SS7-based interconnection within the Access List would therefore regulate a service that is no longer in active use and does not reflect prevailing industry practices.

7.9. TM considered that removing SS7-based interconnection from the ILS description is appropriate, proportionate, and consistent with the objective of ensuring that the Access List remains technologically current and relevant. The proposed amendment will improve regulatory clarity and avoid the need to maintain legacy regulatory constructs that no longer serve a practical purpose.

7.10. CelcomDigi submitted that mandating fixed bandwidth increments of both 100 Mbps and 100 Gbps may not be feasible or proportionate across all interconnection scenarios and may give rise to practical implementation challenges.

7.11. CelcomDigi noted that while 100 Gbps increments are appropriate and widely supported for modern optical interconnection in high-capacity core and metro environments, 100 Mbps increments are increasingly misaligned with prevailing transmission technologies and network design practices. Contemporary interconnection links are typically provisioned using standardised Ethernet and optical interfaces (e.g. 1 Gbps, 10 Gbps, 25 Gbps, 50 Gbps, 100 Gbps and above), and granular sub gigabit increments are often not efficiently achievable or cost reflective at the physical transmission layer.

7.12. CelcomDigi highlighted mandating 100 Mbps increments may therefore:

7.12.1. require artificial capacity partitioning that is not supported natively by underlying transmission equipment;

7.12.2. increase operational complexity and cost; and

7.12.3. result in inefficient utilisation of interconnection links, without delivering corresponding benefits to end users.

7.13. CelcomDigi suggested that the Interconnect Link Service adopt a technology aligned and scalable approach to bandwidth increments. This could be achieved by:

7.13.1. specifying interoperable industry standard capacity increments (such as 1 Gbps and above, including 10 Gbps, 100 Gbps and higher); or

7.13.2. allowing bandwidth increments to be provisioned in multiples of a minimum base increment, subject to mutual technical feasibility and efficient use of network resources.

7.14. CelcomDigi added that such approach would provide Access Seekers with sufficient flexibility to scale capacity progressively, while ensuring that mandated increments remain feasible, cost reflective, and aligned with modern interconnection practices.

7.15. CTS highlighted that only the bandwidth increments of 100 Gbps capacity is feasible to support modern network deployments and future high-capacity requirements, including hyperscale interconnects.

7.16. Maxis was of the view that the ranges proposed by MCMC were appropriate, even though at the time only up to 10 Gbps is sufficient.

7.17. Symbio believed that increments of 100Mbps is feasible to be mandated especially for licensees that runs services that requires smaller bandwidth such as Voice SIP Trunking Services whereas the 100Gbps may be seen feasible for licensees that runs services that require larger bandwidth such as Content Delivery Network ("CDN") for video related applications.

7.18. TM disagreed that mandating bandwidth increments of 100 Mbps and 100 Gbps under the ILS is appropriate in the current regulatory context. Other bandwidths outside of 1 Gbps and 10 Gbps increments are already captured under item (b)(v) of the ILS service description, which covers *"any other amount or increment of bandwidth agreed between the Access Provider and the Access Seeker".*

7.19. TM highlighted that modern interconnection equipment is designed and supplied on the basis of standardised high-capacity ports. The smallest physical interface that is economical to deploy is a 1 Gbps port. Where an Access Seeker requires bandwidth below 1 Gbps, this is achieved by provisioning a 1 Gbps interface and applying logical rate-limiting or traffic shaping (e.g., capping throughput at 100 Mbps). Mandating a 100 Mbps increment would therefore create a mismatch between regulated service descriptions and the cost drivers of modern ILS infrastructure, undermining cost reflectivity and efficient investment signals.

7.20. TM stressed that mandating 100 Gbps increments is unnecessary. There is no operational or technical requirement for such capacity in the context of ILS, which is primarily used to support interconnection services consisting of voice and SMS traffic. The bandwidth requirements for these services are modest and can be efficiently accommodated using existing 1 Gbps and 10 Gbps interfaces. TM observed that even the highest bandwidth subscribed for voice and SMS can be sufficiently served using a 1 Gbps port.

7.21. TIME proposed to maintain a minimum 1Gbps capacity for the voice interconnect to align with the available technology infrastructure.

7.22. U Mobile considered that the 100 Mbps and 100 Gbps increments are a beneficial baseline for interconnection to meet current demand. However, given that the determination cycle spans approximately five years, it is possible that larger bandwidths (e.g. 400 Gbps) may be necessary in the future.

7.23. U Mobile affirmed that if other operators argued for 400 Gbps to be added to the Access List, U Mobile would not object to that. However, 5(b)(v) allows for "any other amount or increment of bandwidth agreed between the Access Provider and the Access Seeker" which may be sufficient, should the need arises, as it should be in the common interest of the Access Provider and the Access Seeker to have, for example, one 400 Gbps link rather than four 100 Gbps links.

7.24. XMT agreed that the bandwidth increments of 100 Mbps and 100 Gbps are feasible.

7.25. CelcomDigi was of the view that BoD may provide benefits in certain circumstances, however CelcomDigi does not consider it appropriate to mandate BoD as a standard feature under the Interconnect Link Service.

7.26. CelcomDigi highlighted that from a technical perspective, mandating BoD would introduce several material challenges including, among others:

7.26.1. require fundamental shift in network architecture, moving from existing fixed interconnect to a more dynamic configuration. This would necessitate significant additional CAPEX to upgrade existing infrastructure, systems and interfaces to support dynamic bandwidth allocation and provisioning;

7.26.2. requires end-to-end capability across both Access Seeker and Access Provider. This includes compatible system that support interconnection, for example monitoring system;

7.26.3. order processing must be real-time and implementation almost immediately. This would necessitate dedicated and operational resources and processes; and

7.26.4. complicated Service Level Agreement (SLA) management and enforcement. Unlike traditional ILS, BoD involves dynamic changes in capacity. This makes it difficult to monitor performance consistently.

7.27. CelcomDigi emphasised more broadly that mandating BoD may impose disproportionate technical and cost burdens on Access Providers and reduce flexibility in interconnection design. CelcomDigi would therefore support BoD being made available on a commercial and voluntary basis, where mutually agreed and technically feasible, rather than as a mandated access obligation.

7.28. CTS anticipated significant challenges if BoD is mandated due to the high upfront CAPEX required for BoD readiness, while actual demand may not materialize immediately. Therefore, CTS agreed that BoD is better managed through commercial arrangements.

7.29. Maxis preferred to retain Interconnect Link Service as it is, with the bandwidth to be mutually agreed between Access Provider and Access Seeker. It is not necessary to have the BoD features as this would require additional investment for both operators.

7.30. Symbio believed that the inclusion of BoD as a feature of the Interconnect Link Service would be positive as this could offer lower start-up for new licensees and to grow based on business demand. Symbio is not providing BoD related services itself hence we would not be facing any significant challenges.

7.31. TM supported MCMC's preliminary view that BoD should not be regulated as part of the ILS and should instead be addressed through bilateral commercial arrangements. The purpose of access regulation in this context is to ensure the availability of a standard, baseline interconnection service that enables operators to interconnect networks on reasonable and non-discriminatory terms. The ILS, as a regulated service, is therefore appropriately focused on providing fixed-capacity interconnection that meets the core needs of inter-operator connectivity.

7.32. TM highlighted that BoD is a value-added capability. It enables dynamic scaling of bandwidth in response to short-term or variable demand. While such functionality may be beneficial for certain Access Seekers or specific use cases, it goes beyond what is necessary for many Access Seekers to obtain effective interconnection. Mandating

BoD as part of the regulated service would risk extending regulation beyond a baseline access product into optional service features that are more appropriately tailored through commercial negotiation.

7.33. TM viewed that preserving flexibility for parties to negotiate BoD arrangements commercially is the proportionate approach. This allows Access Seekers with specialised requirements to obtain such functionality, while avoiding unnecessary complexity and cost being imposed on the standard regulated service. In TM's view, this approach is consistent with principles of proportionality and ensures regulation remains focused on core access needs rather than value-added service features.

7.34. TM remarked that there is no BoD requirement for voice interconnect at TIME. The bandwidth is fixed during the interconnect setup.

7.35. U Mobile partially agreed with MCMC's consideration of BoD. As an Access Seeker, U Mobile recognises the potential benefits of BoD for flexible interconnection planning. However, from a market-wide perspective, mandating BoD would require automation capabilities that are not uniformly available across Access Providers today. This would impose significant implementation costs for a very uncertain level of demand. BoD could therefore be referenced as an optional feature offered on commercial terms, with the possibility for MCMC to revisit this position in a future review if demand materialises and supply bottlenecks occur. For the avoidance of doubt, U Mobile does not anticipate making use of this feature at present.

7.36. XMT mentioned that no issues faced for BoD.

8. Origination and Termination Services

Submissions Received

Question 28:	Do you agree with MCMC's position that Fixed Network Origination Service, Fixed Network Termination Service, Mobile Network Origination Service and Mobile Network Termination Service should remain on the Access List without modification?

8.1. CelcomDigi, Maxis, Symbio, TM, TIME and U Mobile agreed with MCMC's position that the Fixed Network Origination Service, Fixed Network Termination Service, Mobile Network Origination Service, and Mobile Network Termination Service should remain on the Access List without modification.

8.2. CelcomDigi stressed that these origination and termination services continue to perform a foundational role in ensuring end to end connectivity, interoperability, and the exchange of traffic between networks, and remain critical to the effective functioning of both fixed and mobile telecommunications services. Retaining these services on the Access List provides regulatory certainty and continuity, which is important for maintaining seamless communications across networks.

8.3. CelcomDigi observed that from the perspective of the LTBE, regulated access to origination and termination services continues to support:

8.3.1. universal connectivity and call completion;

8.3.2. competitive neutrality between network operators;

8.3.3. the ability of smaller or newer service providers to interconnect efficiently; and

8.3.4. consumer choice across fixed and mobile services.

8.4. CelcomDigi noted that these services are technology neutral in nature, focusing on functional outcomes rather than specific network architectures. As such, their continued inclusion on the Access List does not impede the ongoing transition to IP based networks or next generation technologies and allows origination and termination to remain regulated in a manner that is adaptable to evolving network implementations.

8.5. CelcomDigi further considered that maintaining these services without modification avoids unnecessary regulatory disruption in areas where existing arrangements are broadly understood, operationally mature, and not subject to the same technology specific challenges as other elements of the access framework currently under review. Where future evolution of origination and termination arrangements becomes necessary, this can be addressed through targeted review rather than pre-emptive changes.

8.6. Maxis agreed MCMC's position to retain on the Access List as these are still bottleneck services and considered the existing service description to be sufficient.

8.7. Symbio suggested introduction and regulation of a Number Hosting Service within the Access List as this would serve as a mean for new licensees to establish their operations more rapidly and cost-effectively, before potentially transitioning into fully interconnected network operators as their businesses grow. For clarity, the Number Hosting Service refers to an arrangement whereby an operator with numbers allocated by MCMC may have such numbers hosted and conditioned by an existing NSP operator, enabling immediate interconnection with all existing local operators.

8.8. TM viewed that these services continue to be fundamental interconnection inputs that support any-to-any connectivity and the effective functioning of downstream retail and wholesale markets. Retaining them is consistent with the LTBE.

8.9. TM noted that practical issues in pricing and treatment. Calls to 1300 (toll-free) numbers originating from mobile networks are, in some cases, charged above the applicable local call rate. This appears inconsistent with the policy intent of the NEAP, which provides that 1300 services are to be charged at the local call rate. TM considered this issue warrant further examination to ensure transparency, consistency, and consumer protection.

8.10. TM highlighted similar concerns with CISC 15XXX short codes. These services are intended as consumer-friendly mechanisms for accessing important numbers, with NEAP approvals historically conditioned on local call rate pricing. However, current practices often treat them as premium-rated services, resulting in charges above local call rates. Consumers are often unaware of these charging arrangements, as MNOs and MVNOs exclude such calls from bundled allowances or unlimited plans, raising concerns about transparency and consumer detriment.

8.11. TM referenced the implementation of the 15555 National Mental Health Contact Centre. Commercial negotiations among operators extended over two years before MCMC intervention facilitated zero-rated charges for mobile-originated calls. This example demonstrates the complexity of achieving alignment on origination charges, pricing structures, and retail treatment, and that additional time may reasonably be required to reach mutually agreeable positions.

8.12. TM reiterated its view that international inbound calls should be recognised separately from domestic calls. While technically equivalent at the point of termination, international traffic involves additional cost drivers and operational requirements not captured by domestic termination rates. These include higher fraud risks requiring dedicated monitoring, blocking mechanisms, and specialist operations, as well as inefficient network utilisation and capacity planning challenges. TM noted that separate recognition of international inbound calls provides a principled basis for ensuring MSAP pricing reflects full cost causation.

9. Transmission Services

Submissions Received

Question 29:	Should the Trunk Transmission Service be defined with the same technical parameters as those existing for the WLLC Service and End-to-End Transmission Service? If not, please provide details of any alternative parameters that should be included in the service description.
Question 30:	Do you consider that these are specific routes for Trunk Transmission Service, End-to-End Transmission Service and WLLC Service that should be removed from the Access List? If so, please identify the specific routes and provide evidence regarding the levels of competition and supply characteristics for these routes.

9.1. CelcomDigi submitted that the Trunk Transmission Service should not be subject to the same technical parameters and SLA requirements as WLLC and End-to-End Transmission Service, as these services perform different network functions and possess distinct operational characteristics. CelcomDigi explained that Trunk Transmission Service operates as a shared and aggregated backbone transport layer, whereas WLLC and End-to-End Transmission Service are generally point-to-point services with defined endpoints and performance requirements. CelcomDigi considered that applying a common set of technical parameters and SLA constructs may not accurately reflect these differences and could create challenges in service monitoring, performance attribution and compliance.

9.2. CelcomDigi further suggested that network availability targets should be assessed over longer measurement periods and proposes differentiated annual availability targets across network layers as follows:

9.2.1. At access segment: ≥ 99.5% per year;

9.2.2. At aggregation layer: ≥99.9% per year; and

9.2.3. At core transmission layers: ≥99.99% per year.

9.3. CelcomDigi also recommended amendments to the network availability description for WLLC and End-to-End Transmission Service to better reflect service provisioning arrangements, including redundancy and protection configurations.

9.4. In relation to the removal of routes from the Access List, CelcomDigi considered that such decisions should be undertaken on a case-by-case basis and supported by clear evidence of competitive conditions and supply characteristics. CelcomDigi emphasised that any delisting should ensure that competition remains effective and sustainable, while protecting Access Seekers from potential adverse impacts on service availability and pricing.

9.5. CTS agrees that Trunk Transmission Service should be defined with the same parameters as WLLC and End-to-End Transmission Service. CTS also submitted that routes involving submarine infrastructure should be excluded from the relevant routes and assessed separately from terrestrial transmission services, given their distinct

technical, operational and commercial characteristics, including different deployment, maintenance, resiliency and access requirements.

9.6. Edotco expressed that regulatory framework for Transmission Services should reflect the operational complexity of service delivery through proportionate SLA requirements, clear allocation of liability between infrastructure providers and flexibility to provision services using a combination of owned and leased infrastructure.

9.7. Maxis submitted that Trunk Transmission Service should be subject to clearer and more explicit technical parameters, consistent with the approach adopted for WLLC and End-to-End Transmission Service. Maxis noted that Trunk Transmission Service is a key wholesale input underpinning various downstream services and expresses concerns that the absence of defined technical parameters could undermine the effectiveness of access obligations.

9.8. Maxis considered that introducing baseline technical parameters would improve regulatory certainty, reduce the scope of disputes and ensure that Trunk Transmission Service remains a practical and effective wholesale input, consistent with the LTBE. Therefore, Maxis proposed Trunk Transmission Service to adopt the existing technical parameters for WLLC and End-to-End Transmission Service as follows:

"(12) Trunk Transmission Services

…

(g) The Trunk Transmission Service includes any Trunk Transmission Service supplied to the Access Seeker with:

(i) any network availability between 99.90% and 99.992%, whether per month or otherwise

(ii) any latency < 40ms;

(iii) zero or more routes of redundancy; and

(iv) any other technical parameters specified or utilised by the Access Provider from time to time, including parameters of a type referred to in subparagraphs (i) to (iii) above."

9.9. Maxis is also of the view that no routes for Trunk Transmission Service, WLLC or End-to-End Transmission Service should be removed from the Access List. Maxis considered that competition is generally not present at both ends of these services, particularly for End-to-End Transmission Service where access is highly localised to specific premises. Maxis further submitted that route-based exclusions would be difficult to define and administer, could create regulatory uncertainty and disputes and may reduce Access Seekers' options for redundancy and resiliency. Accordingly, Maxis considered that the existing Transmission Services should remain regulated in their entirety.

9.10. MSA Resources agrees for Transmission Service to be defined with the same technical parameters as WLLC and End-to-End Transmission Service, but proposed to

categorise the service based on performance, characteristics and SLA (i.e. service over DWDM vs. service over Layer 2 Metro-E network).

9.11. MSA Resources however is of the view that Transmission Services should not apply where at least three independent fibre owners serve both end points, alternative route/access are available without civil works and Access Seeker can reasonably self-deploy.

9.12. SDEC submitted that Trunk Transmission Service should not be defined with the same technical parameters as WLLC and End-to-End Transmission Service. SDEC considered that technical parameters, including network availability, latency and redundancy should not be specified in the Access List, but should instead be governed under the MSA. SDEC highlighted that removing such parameters from the Access List would promote consistency between Access List and the MSA and avoid duplication of regulatory requirements.

9.13. SDEC expressed that the TransBorneo Trunk should be excluded from the Access List, as the route bypass multiple countries and therefore differs from conventional domestic transmission routes.

9.14. Symbio agrees to define Trunk Transmission Service with the same technical parameters as WLLC and End-to-End Transmission Service. Symbio also submitted given that most services are now IP-based, service providers are adequately served by existing access products, including Access to Dark Fibre and Transmission Services to meet their requirements.

9.15. TM submitted that Trunk Transmission Service should be defined using the same technical parameters as End-to-End Transmission Service and WLLC, on the basis that these services share broadly similar technical and economic characteristics as point-to-point transmission services provided over the Access Provider's transmission network. TM considered that all three services involve the carriage of traffic over transmission links and are provisioned using similar network architectures and interfaces, performing an upstream connectivity function for downstream services.

9.16. TM further highlighted that distinguishing these services through separate technical parameters risks creating artificial differentiation between services that are, in practice, substitutable and supported by the same underlying infrastructure. TM therefore recommended harmonising the relevant technical parameters to enhance consistency and regulatory clarity.

9.17. However, TM also noted that the relevant parameters are currently reflected in both the Access List and the MSA. TM recommended that MCMC rationalise the regulatory framework by including them in only one instrument to avoid duplication and potential inconsistencies.

9.18. TM added that transmission services have historically been included on the Access List where they exhibit bottleneck characteristics and constitute an essential input into downstream retail and wholesale communications services. TM recognised that in certain contexts particularly where sunk costs are high, demand density is limited and infrastructure duplication is constrained, access regulation can support the LTBE by enabling downstream competition, ensuring any-to-any connectivity and promoting efficient use of existing infrastructure.

9.19. However, TM contended that these characteristics are not present uniformly across all transmission routes. In commercially dense areas and on routes where multiple providers operate or where alternative network configurations are viable, TM considered that market conditions are capable of delivering competitive outcomes without ex-ante regulation. In such circumstances, continued inclusion of transmission services on the Access List may impose unnecessary regulatory costs, distort investment incentives and weaken price and service signals, without delivering material incremental benefits to end users.

9.20. Accordingly, TM submitted that a differentiated regulatory approach is appropriate, with transmission services remaining regulated only where competitive conditions are insufficient to constrain pricing and service quality. In particular, TM proposed that transmission routes in commercially dense and competitive areas should be excluded from the Access List, noting that competition in such areas typically operates at the level of broader commercial precincts rather than individual point-to-point routes, given the ability of providers to extend connectivity to adjacent demand clusters at relatively low incremental cost.

9.21. TM further submitted that in these areas, the presence of multiple viable providers and the ability for customers to switch or procure alternative routing solutions acts as an effective competitive constraint, reducing the need for ex-ante access regulation. TM considered that deregulation in such circumstances would enhance efficiency and support service differentiation, consistent with international approaches in jurisdictions such as the UK, EU and Australia, where evidence-based assessments are used to identify competitive areas for deregulation.

9.22. TM also noted that MCMC has not undertaken a detailed empirical or cost-based assessment to identify areas where transmission competition is effective. TM submitted that such analysis is necessary to support a proportionate regulatory approach, and that reliance on blanket national regulation without granular market assessment is inconsistent with evidence-based decision-making principles.

9.23. TM considered that transmission services located in commercially dense areas anchored by data centres should be excluded from the Access List where effective competition is demonstrably present. TM submitted that such locations operate as competitive transmission hubs, characterised by the presence of three or more fibre-based operators already connected to the relevant data centres, indicating a high degree of underlying infrastructure competition.

9.24. TM further explained that once connected to a data centre or major commercial building within these hubs, fibre operators are generally able to extend transmission services to surrounding buildings, business parks and nearby demand clusters at relatively low incremental cost. As a result, TM considered that competitive conditions are not limited to individual point-to-point routes, but extend across broader commercial precincts, including routes within and between these areas.

9.25. In these circumstances, TM submitted that transmission routes both within and between such defined areas are subject to effective competitive constraints, with multiple providers capable of offering substitutable transmission solutions. TM therefore considered that competition operates as a sufficient discipline on pricing, service quality and contractual terms, such that ex-ante access regulation is not

required. TM accordingly supported an area-based approach to deregulation in data centre–centric locations where market conditions indicate that continued regulation is unlikely to deliver material incremental benefits to end users.

9.26. TM also submitted that routes with fundamentally different supply characteristics should be excluded from the Access List, including transmission links requiring local submarine connectivity (such as Langkawi) and other remote or hard-to-serve areas. TM emphasised that these routes differ materially from domestic terrestrial transmission in terms of capital intensity, risk profile, asset life and capacity economics.

9.27. TM contended that applying domestic access regulation to such routes risks setting access prices that do not reflect underlying costs, thereby distorting investment incentives and potentially leading to inefficient outcomes that are inconsistent with the LTBE. It further notes that submarine transmission routes are not natural extensions of domestic terrestrial networks, and therefore should not be treated as equivalent for regulatory purposes.

9.28. TM considered that excluding both commercially competitive domestic routes and routes with fundamentally different cost structures from the Access List would better align regulatory intervention with the LTBE framework, ensuring that access regulation is applied only where necessary and proportionate.

9.29. TIME disagrees that Trunk Transmission should be defined with the same technical parameters as WLLC and End-to-End Transmission Service, as network availability requirements differ across these services depending on fibre route characteristics and redundancy design.

9.30. U Mobile supports the proposal as the proposal would enhance regulatory clarity. U Mobile is of the view that routes should only be deregulated where there is robust evidence of effective competition and suggests that route removal be contingent on the presence of multiple independent providers or the availability of regulated dark fibre to ensure Access Seekers retain meaningful choice.

10. Domestic Connectivity to International Services

Submissions Received

Question 31:	Are the current scope and definition of Domestic Connectivity to International Services adequate to support a competitive international gateway market in Malaysia? If not, what specific physical connection services or operational enhancements should be mandated to ensure an equitable and non-discriminatory environment for all players?

10.1. CTS submits that the current scope and definition of Domestic Connectivity to International Services is adequate and also currently not acquiring the same.

10.2. Maxis supports MCMC's position to retain Domestic Connectivity to International Services on the Access List as it is a bottleneck service and is agreeable with the existing scope and service description.

10.3. TIME is of the opinion that the current scope and definition of Domestic Connectivity to International Services is adequate to support a competitive international gateway market in Malaysia.

10.4. U Mobile agrees with MCMC's proposal. U Mobile submits that the current scope and definition of Domestic Connectivity to International Services are adequate. U Mobile acquires this service through commercial arrangements and has not encountered material impediments or unfair operating that would warrant further physical-connection or operational mandates under the Access List at this stage.

10.5. CelcomDigi considers that the current scope and definition of Domestic Connectivity to International Services are generally adequate to support a competitive international gateway market in Malaysia.

10.6. TM considers the current scope and definition of the Domestic Connectivity to International Services adequate to support a competitive international gateway market. TM proposes that the service be retained on the Access List in its current form without amendment to the existing service description.

11. Fixed Network Pole, Duct and Manhole Access

Submissions Received

Question 32:	Do you have any comments on the proposed amendments to the description of Duct and Manhole Access?
Question 33:	Do you have any comments on the proposed definition of Pole, including its scope? Please provide your suggested amendments if you believe the definition should be modified.

11.1. Bullish Aim, in submitting its views on dark fibre, also suggests that the MCMC strengthen the provisions relating to duct and manhole access under the Access List, as this would help address the root cause of access difficulties, namely the inability of competing providers to deploy new fibre infrastructure due to duct access constraints or exclusive duct arrangements.

11.2. CelcomDigi supports the inclusion of poles within the scope of Duct and Manhole Access and considers the proposed definition of Pole, including its scope, to be appropriate and sufficiently clear. In many deployment scenarios, particularly in suburban and rural areas, pole infrastructure serves as a practical substitute for underground ducts, as both perform equivalent functions in supporting cable deployment and network expansion. Accordingly, aligning their regulatory treatment is appropriate to ensure consistent access obligations across comparable infrastructure types.

11.3. CTS disagrees with the inclusion of Pole within the scope of Duct and Manhole Access, as pole infrastructure involves distinct technical, operational, safety, and maintenance considerations compared to duct and manhole infrastructure.

11.4. PPIT considers the inclusion of Pole within the scope of Duct and Manhole Access to be reasonable and notes that the proposed definition of 'Pole' sufficiently distinguishes poles supporting fixed network equipment from those falling within the scope of Infrastructure Sharing for mobile network infrastructure. While the proposed amendments to the Infrastructure Sharing service description and the exclusion of Pole under paragraph 5(9)(f) of the Access List provide clarity on this distinction. PPIT suggests further clarifying the definition of 'Pole' as follows:

"Pole" means any pole, including a utility pole or traffic pole, that supports, or has the capability to support, the installation of fixed network equipment <u>but exclude 'poles' under Infrastructure Sharing of paragraph 5(9) of the Access List.</u>

11.5. TIME agrees with the proposed amendments to the description of Duct and Manhole Access.

11.6. U Mobile welcomes the inclusion of Poles within the scope of the service and the removal of the restriction on access to sub-ducts. The proposed definition is broadly appropriate for poles used to support fixed telecommunications infrastructure (for example, aerial fibre cables). U Mobile suggests clarifying that the scope of "Pole" under Pole, Duct and Manhole Access covers poles used for fixed network facilities,

consistent with the boundary between this service and the Infrastructure Sharing service (which already captures street furniture used to support small cells and similar mobile equipment).

11.7. Maxis supports the inclusion of poles for fixed equipment under the same section for Duct and Manhole Access as both are used for the same purposes and functionality, i.e. to carry fibre cables. Maxis notes that this approach is consistent with international regulatory practices where access to ducts, poles, chambers and manhole is regulated as a single infrastructure access remedy and that maximising access to existing poles is considered particularly important. However, Maxis proposes the removal of item (c), as it has been addressed under the existing MSA e.g. 6.11.9, 6.11.15, 6.11.16, 6.11.19, 6.11.21, 6.11.22 etc. Maxis also agrees with the proposed definition and scope of "Pole".

11.8. Xenith IG supports the continued listing of Duct and Manhole Access but submit that access to ducts and manholes should be more targeted and conditional, having regard to the significant capital investment by infrastructure owners and the security requirements of high specification inter-exchange duct networks. Xenith IG submits that the provision of access to ducts and manholes should only be mandatory in the following circumstances:

11.8.1. Where the Access Seeker is seeking access to ducts and manholes due to (i) an inability of the Access Provider to provide access to dark fibre at commercially reasonable rates or materially in excess of a commercially reasonable rate; or (ii) access to dark fibre is inadequate for the Access Seeker to deliver the intended downstream services;

11.8.2. Where the Access Seeker is unable to deploy its own network infrastructure due to the area being an Exclusive Zone. The definition of Exclusive Zone can be broadly defined as:

"any publicly or privately owned or controlled area, including a state, a federal territory, a district, a development area, concession areas along highways, train tracks, gas pipelines, areas with special wayleaves or right of way, an industrial park or other estate or any other land or location where a licensee demonstrates, at the time of the access request, that it has been unable to secure, or there are reasonable grounds to conclude that it will be unable to secure, the necessary permits or authorisations to deploy new fibre infrastructure in that area, whether due to a prevailing law, regulation, policy, requirement, contract, arrangement, understanding, practice or otherwise, including where an application for deployment has been rejected due to capacity constraints or any other reason not due to the technical or financial capability of the licensee, or where the application for deployment has not progressed without reasonable excuse for a period of six months or more."

11.8.3. Where it is in the LTBE for provision of access to ducts and manholes as compared to sharing of existing ducts due to the nature and usage of the ducts and manholes. One example of a case where sharing of ducts and manholes is appropriate is Fibre to the Home (FTTH) services where multiple operators can share a lead-in to the home and in most circumstances there

will be no need for multiple duct lead-ins serving the same premises. A similar position applies to building manholes, residential townships and other areas predominantly serving retail end-users.

11.8.4. In the alternative, Xenith IG suggest only a maximum of 25% capacity of the network infrastructure be required to be made available for access under the Mandatory Standard on Access regime. In this manner, operators can budget to overbuild their network by 25% after accounting for their requirements, and be assured that 75% of the network will be exclusively reserved for them to recover their significant capital investment.

11.9. Xenith IG submits that while regulating all ducts under a single category may reduce classification disputes, eliminating all differentiation would be counterproductive. Distinctions between lead-in, mainline and inter-exchange ducts should be retained where relevant as different duct types involve varying capital costs, risk profiles and operational requirements, making uniform pricing inappropriate, making uniform pricing inappropriate. In addition, differentiated security and operational obligations for inter-exchange and data centre connectivity ducts remain important and should be preserved within the MSA framework even if not reflected in the Access List service description.

11.10. Xenith IG also submits that access to ducts should be provided at the sub-duct level, particularly for mainline, inter-exchange and data centre-serving ducts, to enhance network security, resilience and maintainability. This is a necessity from a security and resilience point of view and should be a mandatory requirement for such ducts. Sub-ducts reduce the risk of cable damage and entanglement with existing cables, while reducing operational complexity and enabling maintenance activities without affecting other cables. Pulling bare cables through ducts without sub-ducts significantly increases the risk of damage and entanglement, and creates future difficulty in pulling and removing individual cables, as well as increasing the risk of collateral damage during maintenance. Where technically feasible, mandatory access should be provided only at sub-duct level, with installation undertaken by the Access Provider using qualified personnel to minimise risks to existing infrastructure.

11.11. Edotco submits that the inclusion of utility poles and street furniture as mandated access assets raises significant operational readiness concerns as pole infrastructure in Malaysia is owned and managed by a diverse range of entities, including TNB, local authorities, and private developers, with Edotco's involvement remaining limited compared to tower infrastructure. Edotco supports the inclusion of duct and underground infrastructure as mandated access assets, subject to physical capacity constraints. Access should be limited to locations with verified spare capacity, supported by clear co-location standards on cable separation, earthing, and maintenance, and cost recovery based on cost causation where new duct construction is required due to demand.

11.12. Edotco is broadly neutral on the principle of including poles within the MSA but notes that implementation requires careful consideration of three key areas: (i) availability of accurate asset registry, condition data and structural load assessments, which are currently incomplete or held by third-party owners; (ii) safety and structural certification requirements, including clear liability arrangements for pole-mounted equipment; and (iii) the need for subcontractor flexibility, as pole works typically

require specialised contractors and restrictions would increase operational risk and cost. As such, Edotco recommends a phased implementation starting with poles under its direct management, requiring pole asset owners to develop accessible asset registries as a precondition for mandated access, and preserving Edotco's right to engage approved subcontractors for pole-related works.

11.13. TM notes MCMC's proposed amendments to the Duct and Manhole Access description, as these improve clarity, reduce administrative complexity, and better reflect practical access to fixed passive infrastructure. However, TM considers that certain aspects should be refined to ensure the service description remains technically accurate, operationally workable, cost-reflective, and aligned with the MSAP. TM's position is as follows:

11.13.1. TM supports MCMC's proposal to consolidate access to poles, ducts, and manholes under a single service category, noting that fixed telecommunications poles are functionally similar to ducts and manholes and their inclusion would improve administrative coherence and simplify regulatory and contractual arrangements.

11.13.2. TM also agrees with the proposed broadening of the ducts description, including recognition of sub-duct level access, as this aligns with its current RAO practice and supports efficient operational deployment consistent with MSAP principles.

11.13.3. However, TM does not support manholes being offered as a standalone access service, as they are not independent infrastructure but are instead functionally tied to ducts and sub-ducts for access, inspection, maintenance, and fibre installation purposes.

11.14. TM proposes that the Pole, Duct and Manhole Access description should explicitly state that manholes are only provided when they are associated with a duct, and suggests revised drafting for paragraph 15(a)(iii) as follows:

(15) Pole, Duct and Manhole Access

(a) Pole, Duct and Manhole Access is a Facility and/or Service which comprises provision of physical access to, at the Access Seeker's discretion, one or more of the following elements:

(i) Poles,

(ii) ducts, including any or all of the following:

(A) Lead-in Ducts,

(B) Mainline Ducts, and

(C) Inter-exchange Ducts,

(iii) any manholes associated with a duct ~~manholes, including any manholes associated with a duct~~,

(iv) sub-ducts

11.15. TM submits that in the event MCMC proposes to introduce standalone manhole access, an explanation and practical examples should be provided of situations where an Access Seeker would require such access without any associated duct, sub-duct, cable route, or physical pathway.

11.16. TM notes MCMC's proposal for modular and unbundled Pole, Duct and Manhole Access and supports modularity where it enables Access Seekers to obtain only required network components such as duct routes, pole segments, or sub-duct capacity. However, TM considers that modularity should not extend to independently supplying all physical elements where they lack standalone technical or commercial function. TM views manholes as ancillary to duct networks rather than independent deployment structures, and therefore considers that modularity should apply to practical network components rather than disaggregated elements inconsistent with network engineering. TM also reiterates that any expansion or clarification of PDMA should continue to take into account security, safety, and operational constraints.

12. Network Co-Location Service

Submissions Received

Question 34:	Have you acquired or offered virtual co-location services in the last 24–36 months?
Question 35:	If you have considered but ultimately decided against using virtual co-location, what were the primary deterrents? (e.g., pricing, lack of physical control over equipment, or better alternatives)
Question 36:	If virtual co-location were removed from the Access List, would this create a barrier to entry for smaller licensees or new market entrants who lack the capital to invest in their own physical hardware?
Question 37:	Do you have any comments on the proposed amendments to the description of Network Co-Location Service?

12.1. CelcomDigi submitted that it includes virtual co-location services as part of its Reference Access Offer (RAO). However, to date, it has not established or entered into any virtual co-location arrangements in the past 24–36 months.

12.2. Maxis submitted that it acquired or offered virtual co-location services in the last 24–36 months. As an example, it may be required for the case where Access Seeker subscribed to the Trunk Transmission Services together with the HSBB and/or Services from the Access Provider. The equipment at the Access Provider premises is owned and maintained by the Access Provider but it is for the Facilities and/or Services subscribed by the Access Seeker from the Access Provider. In addition, Maxis agrees to retain virtual co-location and considers its removal from the Access List would create a barrier to entry for smaller licensees or new market entrants.

12.3. Maxis supported MCMC's proposed amendments to the description of Network Co-Location Service but argues that the definition of network premises should make direct reference to 'data centres' in 11(b) given their growing role as aggregation points, as shown in red:

(11) Network Co-Location Service

> *b. Network premises at which co-location is to be provided includes switching sites, submarine cable landing centers, earth stations, exchange buildings, data centres, other Customer Access Modules including roadside cabinets, any location where a main distribution frame is housed and such other network facilities associated with the provision of a Facility or Service in the Access List.*

12.4. While MCMC has indicated that data centres are already captured through "other network facilities", Maxis believes that explicit reference is warranted as they are increasingly as important as other listed co-location sites. Maxis has identified barriers that can directly affect competition and resilience for customers located in data centres, including limitations on POE and exclusivity constraints affecting the ability of operators to deploy their own fibre infrastructure into data centre compounds. Explicitly listing data centres within the network premises definition provides clarity and consistency. This also reduces the risk of disputes about access to the technical

and physical space and in-building interconnection facilities like meet-me rooms. Internationally, policy and regulatory frameworks are evolving to specifically include data centres.

12.5. MYTV is of the opinion that the changes to the description of Network Co-Location Service are fair and balanced. They provide greater clarity, reduce ambiguity and ensure obligations are consistently applied. Most importantly, they safeguard competition by retaining both physical and virtual co-location, which is essential to maintaining equitable access. As both an Access Provider and an Access Seeker, MYTV supports these refinements, as they promote transparency and efficiency.

12.6. Symbio submitted that it has neither acquired nor been offered virtual co-location services in the past 24–36 months. This is likely because it has deployed their network switches in two separate carrier-neutral data centres located in Kuala Lumpur and Cyberjaya. Symbio is of the view that the primary deterrents to using virtual co-location are the limited control over pricing, physical access and equipment options. Virtual co-location services offered are typically provided on a single-provider basis, which may result in reduced flexibility and choice for alternative options such as alternative connectivity link, alternative equipment and so on.

12.7. Symbio opines that the removal of virtual co-location from the Access List could potentially create a barrier to entry for smaller licensees or new market entrants. For instance, a new entrant licensees could utilise virtual co-location services from an Access Provider to deploy its necessary equipment closer to the Access Provider's network infrastructure. This proximity could significantly improve latency performance and reduce the risk of network outages, as the equipment would be physically located within the same facility as the Access Provider. In addition, Symbio thinks the proposed amendment to the description is adequate.

12.8. TM does not acquire or supply virtual co-location in the last 24–36 months and considers that its removal would not create a barrier to entry, as physical co-location remains the effective and widely used model. TM considers that virtual co-location offers limited cost advantages over physical co-location, as key cost drivers such as power and cooling, system integration, security and monitoring, and ongoing operational support remain unchanged.

12.9. In practice, virtual co-location can introduce additional cost and complexity. It typically requires additional logical separation and virtualisation layers, bespoke provisioning and configuration, more complex fault isolation between Access Provider and Access Seeker assets, and increased coordination where infrastructure is hosted in shared facilities. These additional requirements can offset or exceed any savings associated with a reduced physical footprint.

12.10. TM also submitted that Item 11(a)(iii) of the Access List on in-span interconnection should be retained in its original form, without the inclusion of the words "owned and/or operated by an Access Provider", to avoid unnecessary restriction or ambiguity in scope. This is particularly as the same wording is not applied in respect of the Access Seeker, notwithstanding that in-span interconnection inherently involves the interconnection of both Access Provider and Access Seeker cables. In these circumstances, there is no need to explicitly include such language in the definition, as it is already implicit in the nature of the service.

12.11. In addition, TM agrees with MCMC's views on the scope of access to data centres, including that Network Co-Location obligations should not apply where a data centre is not owned or operated by a licensee, or where access to the data centre is not associated with the provision of an Access List service. TM agrees that these limitations are necessary to ensure that access obligations remain targeted, proportionate and aligned with the intended scope of the access regime. TM requests that these restrictions be made explicit in the service description to provide clarity and regulatory certainty for both Access Providers and Access Seekers.

12.12. TIME submitted that it has not acquired or offered virtual co-location services in the last 24–36 months. Currently, TIME's interconnection arrangements with other operators are IP-based, with the POI located at the AIMS Data Centre, where most operators maintain their POPs. As such, Network Co-Location Service is not applicable. TIME is of the opinion that the virtual co-location is no longer applicable in the current IP-based interconnection. Further to this, TIME supports MCMC's proposal to remove virtual co-location for the description of the service.

12.13. U Mobile submitted that it has neither offered nor acquired any virtual co-location service and may consider providing or acquiring this service in the future, subject to reasonable cost. U Mobile further adds that its standard practice for POI connectivity is based on a clear equipment demarcation between the Access Provider and the Access Seeker, which is best served through physical co-location. From U Mobile's own operational perspective, virtual co-location is of limited relevance to date. However, it does not object to retaining virtual co-location in the Access List as virtual co-location may serve specific use cases where physical presence at the Access Provider's premises is not operationally necessary or feasible.

12.14. U Mobile partially agrees with MCMC's proposed amendments to the description of Network Co-Location Service. U Mobile welcomes the clarification on the scope of "Access Provider's premises". One refinement is proposed: where the Access Provider operates (rather than owns) the premises, co-location should be expressly made subject to the consent of the underlying property owner. This would align the Access List with practical property-law constraints, reducing disputes that MCMC would otherwise need to mediate. U Mobile suggests adding the following clarification to clause 11(a): "*Where the Access Provider's rights in the premises are based on a lease, licence or other operational arrangement, co-location is subject to the consent of the property owner, which the Access Provider shall use reasonable endeavours to obtain.*"

13. Digital Terrestrial Broadcasting Multiplexing Service

Submissions Received

Question 38:	Do you agree that Digital Terrestrial Broadcasting Multiplexing Service should remain on the Access List without any modification to the service description? If not, please provide reasons, including suggested amendments to the service description.

13.1. Maxis is not active in this area, however, if it is a bottleneck service then Maxis is of the view that it should be retained on the Access List, for consistency and clarity purposes.

13.2. MYTV agrees with MCMC's preliminary view that the Digital Terrestrial Broadcasting Multiplexing Service (DTBMS) should remain on the Access List without modification, recognising its importance in ensuring nationwide free-to-air broadcasting and protecting broadcasters and consumers from price distortions, and also supports the view that free-to-air broadcasters should not be forced into online-only delivery due to economically infeasible and inefficient in terms of infrastructure investment. This statement, "MYTV operates a nationwide network of multiplexing equipment (installed at broadcasting towers)" in para 19.4, is incorrect. MYTV installed transmitter equipment at broadcasting towers. It is recommended to change the second sentence in the para as follows: Based on this concession, MYTV operates national multiplexers (as its broadcast hub) and transmitters (installed at broadcasting towers) that convey the multiplexed signal to the end-user premises.

13.3. TM notes MCMC's proposal to retain the service on the Access List without modification. As the service is not applicable to TM, it offers no further comment on this.

13.4. Wang Kian Tjun agrees with MCMC's proposal and did not provide further comments.

14. High-Speed Broadband (HSBB) Network Services

Submissions Received

Question 39:	Do you agree with the proposed new bandwidth profile of 2,000 Mbps downstream and 500 Mbps upstream in respect of both Layer 2 HSBB Network Service and Layer 3 HSBB Network Service? If not, please provide reasons, including your proposed changes to the bandwidth profiles.
Question 40:	Should the low-speed bandwidth profiles of 30 Mbps and 50 Mbps downstream be removed from the Access List? If not, please provide reasons for retaining them on the Access List?
Question 41:	Do you agree that the service description for both Layer 2 HSBB Network Services and Layer 3 HSBB Network Services should specifically capture any network availability parameters specified, utilised or agreed by the Access Provider from time to time?
Question 42:	Do you consider that any further changes need to be made to the descriptions of the HSBB Services to capture the TR069 protocol and any evolutions to it (such as TR369)?

14.1. CTS, TM and TIME agree with MCMC's proposal to include a new bandwidth profile of 2,000 Mbps downstream and 500 Mbps upstream. TM agrees to include these additions for Layer 3 HSBB Network Service whilst TIME agrees to include the additions for its Layer 2 HSBB Network Service. CelcomDigi and CTS on the other hand generally agree that the new bandwidth profile is added to both types of HSBB Network Services.

14.2. CelcomDigi submitted that the addition is necessary as it reflects growing demand for higher-capacity services. It is also of the view that the bandwidth profiles should incorporate a broader range of higher bandwidth profiles to future-proof the framework and support evolving market requirements and therefore, proposes the inclusion of additional tiers such as 2 Gbps, 5 Gbps, 8 Gbps and 10 Gbps.

14.3. CTS agrees but further commented that it should remain a commercial arrangement, as network and infrastructure upgrades may be required to support the service.

14.4. Maxis agrees with the broad direction that MCMC has taken to increase the bandwidth profiles for Layers 2 and 3 but argues that this should go further and incorporate packages up to 10,000 Mbps downstream and 10,000 Mbps upstream.

14.5. Maxis does not consider the proposed 2,000 Mbps downstream and 500 Mbps upstream profile sufficient when considering the direction of the market. Future demand is expected to quickly exceed 2 Gbps downstream, while concurrent use cases can quickly exceed the proposed 500 Mbps upstream limit. Some international markets include symmetrical 10Gbps packages in wholesale frameworks and commercial offers.

14.6. Maxis instead proposes retaining the existing bandwidth profiles including the following:

Table 1: Additional Bandwidth Profiles

Bit Rate	
Downstream	Upstream
2,000 Mbps	500 Mbps
2,000 Mbps	1,000 Mbps
2,500 Mbps	
5,000 Mbps	
6,000 Mbps	
7,000 Mbps	
8,000 Mbps	2,000 Mbps
10,000 Mbps	5,000 Mbps
10,000 Mbps	10,000 Mbps

14.7. Globally, as fibre access networks migrate from GPON to next-generation PON standards, the feasible range of standardised profiles increases materially with XGS-PON providing up to 10 Gbps symmetrically. These upgrades increase headroom for profiles above 2 Gbps and incorporating higher speeds into the Access List futureproofs beyond today. It also reduces reliance on non-standard arrangements for higher speed packages which potentially risks unfair access.

14.8. Based on the above, Maxis noted the importance of future proofing the Access List given the expected rapid rise in demand for multi-gigabit bandwidth profiles. Future demand is expected to be focused on multi-gigabit speeds. Maxis quoted The World Broadband Association forecasts that stated that the average broadband speed in Asia will reach over 1.4Gbps by 2030 and, with this being an average, some customers will be using above this level[1].

14.9. Maxis also considers that a 500 Mbps upstream limit is increasingly inadequate and should be more proportionate to the downstream rate. While individual use cases may not require large or sustained upstream throughout, concurrent usage where multiple applications are using upstream capacity simultaneously can materially increase upstream demand beyond the proposed 500 Mbps limit.

14.10. Maxis went on to highlight the international precedent for including multi-gigabit, symmetrical tiers by providing examples of profiles extending to 3 Gbps, 8 Gbps and 10 Gbps across different market contexts (including wholesale frameworks and commercial offers), supporting the case for defining higher profiles now, as shown below:

Figure 4: International examples of the highest bandwidth packages regulated or offered commercially

	Country	Provider	Package (down/up, Mbps)
Wholesale product	New Zealand	Chorus	8,000 / 8,000
	Canada	Bell	3,000 / 3,000
	Australia	NBN	2,000 / 500 (trials at 10,000)
Wholesale access	Italy	Open Fiber	10,000 / 10,000
	Singapore	Netlink Trust	10,000 / 10,000
	Bahrain	BNET	2,000 / 1,000
	UK	Openreach	1,800 / 120
Commercial retail	Japan	NTT East/West	10,000 / 10,000
	UK	B4RN	10,000 / 10,000
	Switzerland	Swisscomm	10,000 / 2,000

14.11. TM supports the principle that the Access List should evolve in line with current and anticipated broadband usage patterns, and the technical capabilities of modern fibre access networks.

14.12. The proposed 2,000/500 Mbps bandwidth profile reflects the sustained growth in bandwidth intensive use cases across both residential and business segments, including cloud computing applications, high-definition content delivery, enterprise connectivity requirements and other emerging digital services. Incorporating this profile ensures that the Access List continues to reflect the realities of how the HSBB network is being used today and remains fit for purpose as demand for bandwidth continues to grow.

14.13. TM further notes that this bandwidth profile is already supported by TM's existing HSBB network architecture and has been incorporated into Unifi's commercial offerings. Accordingly, recognising this profile within the Access List does not require material changes to network design, operational processes or service interfaces, and provides alignment between regulated HSBB services and capabilities that are already available in the market.

14.14. TM also acknowledges MCMC's summary of international regulatory practice, which indicates that regulation of higher speed wholesale broadband tiers is consistent with international precedent.

14.15. Comparable bandwidth profiles are already reflected in regulated or wholesale fibre offerings in a number of international jurisdictions, including Australia, the United Kingdom, New Zealand and Singapore. This supports the appropriateness of updating HSBB bandwidth profiles in Malaysia to align with prevailing global practice and demonstrated market availability.

14.16. U Mobile disagrees with the proposed new bandwidth profile of 2,000 Mbps downstream and 500 Mbps upstream in respect of both types of HSBB Network Services. U Mobile believes that the Access List already provides a sufficiently granular set of regulated bandwidth profiles. Where Access Seekers require speeds above the regulated tiers, these can be negotiated with Access Providers on a commercial basis. The existence of regulated bandwidth profiles provides an effective anchor for any

such commercial negotiation, ensuring that Access Seekers retain a credible baseline from which to negotiate higher-speed services on reasonable terms.

14.17. Whilst Wang Kian Tjun disagrees with inclusion of the 2000 Mbps downstream & 500 Mbps, he went on to comment that the speeds are currently in the market and we have entered the AI era. He noted that the consumers will mass using AI to perform their task. Furthermore, online platform AI would generate a lot of speeds and response time. Online meeting and live streaming markets are basic wants rather than needs. As such, bandwidth occupancies are crucial to deal with. Wang Kian Tjun also pointed out how the Internet of things are considered necessary. Speed is crucial on home use especially smart home devices & smart electrical appliances, or even electric vehicles. Wang Kian Tjun is interested to see the bandwidth profile revised as proposed by MCMC in paragraph 20.65 (13)(d)(i) for both layer 2 & 3 HSBB Network Services.

14.18. CelcomDigi, CTS, TM, TIME, U Mobile and Wang Kian Tjun agree that the 30 Mbps and 50 Mbps downstream bandwidth profiles should be removed from the Access List.

14.19. CelcomDigi submitted that bandwidth profiles below 100 Mbps are typically associated with legacy copper-based technologies. With the ongoing transition towards full fibre networks and the planned cessation of copper-based services by 2026, the Access List should focus on bandwidth profiles of 100 Mbps and above to reflect current and future connectivity needs.

14.20. Maxis disagrees with the proposal to remove low-speed bandwidth profiles from the Access List given the following reasons:

14.20.1. Low bandwidth profiles are still being widely used;

14.20.2. Sub-100 Mbps profiles are entry-level products that are needed to support digital inclusion;

14.20.3. Removing low-speed profiles risks harming affordability and competition; and

14.20.4. Explicitly retaining low-speed profiles provides greater regulatory certainty.

14.21. Maxis believes that removing sub-100 Mbps, entry-level products where affordability and choice are particularly important runs counter to the objectives of digital inclusion and nationwide internet availability.

14.22. Other jurisdictions have retained sub-100 Mbps packages and refer to them as regulatory anchor products and/or as part of universal service obligations to ensure that households can access a basic level of connectivity at an affordable price. For example, this is 10 Mbps downstream and 1 Mbps upstream in the UK and applicable

to both residential and business premises[10], and around 10-30 Mbps downstream in EU Member States[11].

14.23. This is particularly relevant in the Malaysian context given the disparity in rural versus national internet availability. Official statistics from Department of Statistics Malaysia (DOSM)[12] show that 96.8% of Malaysian households have access to the internet in 2024, but this is lower in rural areas at 90.3%[13].

14.24. Additionally, a substantial body of academic research further demonstrates that internet access and effective use tend to be lower among vulnerable groups, particularly low-income households and women. In this context, maintaining entry-level fixed broadband options can play an important role in supporting digital inclusion, consistent with the objectives of the Malaysia Digital Economic Blueprint[8].

14.25. Sub-100 Mbps products are entry-level packages and removing them can reduce affordability and consumer choice, particularly for price-sensitive households and businesses like small and medium enterprises. Evidence from other jurisdictions show that removing low-speed wholesale products can adversely affect affordability and competition.

14.26. Maxis submitted that Canada provides a particularly clear precedent on the risk of removing lower/entry tiers to substantiate its assertions. For example, the Canadian regulator rejected a proposal to remove sub-100 Mbps wholesale services finding that this would disproportionately affect competitors, increase access costs during migration to higher-speed services, and "run counter" to the objective of improving affordability[14].

14.27. Maxis also provided other examples in its submission which include instances where regulators, particularly, in UK[15] and Australia[16] that have retained low-speed or entry-level broadband products as regulated "anchor" or baseline services, even as higher-speed tiers are introduced.

14.28. Finally, Maxis considers that explicitly retaining 30 Mbps and 50 Mbps profiles on the Access List provides greater clarity and certainty and reduces ambiguity and supports

[10] Ofcom (2019), Delivering the broadband universal service, https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/129180-delivering-the-broadband-universal-service/associated-documents/statement-delivering-the-broadband-universal-service.pdf?v=323978

[11] BEREC (2024), BEREC report on Member States' best practices to support the defining of adequate broadband internet access service, https://www.berec.europa.eu/system/files/2024-03/BoR%20%2824%29%2040_Best%20Practice%20Adeq%20Broadband%20final.pdf

[12] Department of Statistics Malaysia (2024), Statistics on ICT use and access by individuals and households, https://www.dosm.gov.my/portal-main/release-content/ict-use-and-access-by-individuals-and-households-survey-report-2024

[13] Raihan et al (2025), Dimensions and barriers for digital (in)equality and digital divide: a systematic integrative review, https://www.emerald.com/dts/article/4/2/111/1246345/Dimensions-and-barriers-for-digital-in-equity-and

[14] CRTC (2026), Telecom Order CRTC 2026-7, https://crtc.gc.ca/eng/archive/2026/2026-7.htm

[15] Ofcom (2026), Promoting competition and investment in fibre networks: Telecoms Access Review 2026-31, https://www.ofcom.org.uk/siteassets/resources/documents/consultations/statement-promoting-competition-and-investment-in-fibre-networks-telecoms-access-review-2026-31/main-documents/volume-1-overview-summary-and-structure.pdf?v=413672

[16] ACCC (2026), ACCC draft replacement module determination, https://www.accc.gov.au/system/files/accc-draft-replacement-module-determination-march2026.pdf

predictable wholesale and retail outcomes than relying on a general obligation to offer "any bit rate".

14.29. TM supports MCMC's view that the continued retention of very low speed HSBB profiles is no longer appropriate in light of current market conditions and evolving end-user expectations.

14.30. As an example, TM highlighted that the broadband demand in Malaysia has shifted decisively towards higher speeds, driven by changing consumer behaviour, increased device proliferation, and the growing reliance on digital services by both households and businesses. Against this backdrop, these low-speed legacy profiles are increasingly misaligned with the efficient use of modern fibre networks and have limited relevance to prevailing demand conditions in Malaysia.

14.31. TM further notes that these low-speed bandwidth profiles are no longer being widely acquired by Access Seekers or offered in the retail market in Malaysia, reflecting limited underlying demand for such services.

14.32. Consistent with this market outcome, TM submitted that its Unifi HSBB services commence at 100 Mbps downstream and above, with plans offering 30 Mbps and 50 Mbps downstream speeds no longer made available.

14.33. From a regulatory perspective, TM explained that the continued inclusion of very low speed HSBB tiers in the Access List risks anchoring wholesale regulation to service levels that no longer reflect the service quality expected by end users. Retaining these legacy profiles may introduce unnecessary complexity into regulated offers without delivering commensurate competition or consumer benefits.

14.34. TM also notes that the removal of these legacy profiles does not foreclose access to affordable broadband outcomes as the Access Seekers retain the flexibility to design appropriately priced retail offerings using higher regulated bandwidth tiers that better reflect end-user demand, which is consistent with LTBE principles.

14.35. U Mobile agrees with MCMC's position to remove the low-speed bandwidth profiles of 30 Mbps and 50 Mbps downstream as demand has shifted to higher tiers and the 30 Mbps and 50 Mbps downstream profiles are no longer commercially relevant for new acquisitions. Legacy customers should be migrated to higher-speed services on equivalent commercial terms. Any such migration should be coordinated between the Access Providers and the Access Seekers in accordance with the network change obligations set out in the MSA.

14.36. Wang Kian Tjun stated that he strongly agrees with the removal of the low-speed bandwidth profiles proposed by the MCMC because the speeds are unsuitable in the current market.

14.37. CelcomDigi agree that the Layer 3 HSBB service descriptions should automatically capture network availability parameters specified, utilised or agreed by the Access Provider from time to time, including, ports availability by buildings or *Taman* or streets and capacity utilization on each OLT to core networks

14.38. CTS, TM and Wang Kian Tjun disagree that the Layer 3 HSBB service descriptions should automatically capture network availability parameters specified, utilised or agreed by the Access Provider from time to time.

14.39. CTS is of the view that it is not necessary for the service description to specifically capture network availability parameters, as such parameters should remain subject to discussion and mutual agreement between access provider and access seekers.

14.40. Maxis considers core network availability and other Quality of Service parameters should be specifically mentioned in the Access List to enable fair and equivalent access to these markets. Specifying network service descriptions limits the scope for vertical discrimination and interpretational disputes by ensuring that wholesale inputs can be replicated on an equivalent basis to the Access Provider's own downstream services to residential and enterprise end users.

14.41. Maxis submitted that core network availability is a key parameter that should be specified in the Access List. Maxis noted that the need for including network availability in the service description ensures the Access Provider does not claim that it is not part of the regulated HSBB service or a 'premium' product.

14.42. Maxis included international precedent from Singapore[17] i.e. NetLink Trust's regulator-approved Interconnection Offer for residential end-user connections includes 99.99% service level availability as well as Australia[18] where availability is 99.95% for NBN and 99.9995% for Telstra[19]. In addition, Maxis noted 99.99% in the US for AT&T – basically all countries that specifically include network availability in standard or reference offers for wholesale connectivity services.

14.43. Maxis propose to add the following amendment to item 14(d)(iii) as below to ensure all scope of core network availability are subjected and within the scope of the Access List definition, to be consistent with the network availability for the Transmission Services.

(14) Layer 3 HSBB Network Service

d. The Layer 3 HSBB Network Service shall be supplied to the Access Seeker as follows:

iii. Any other technical parameters or standards (including any network availability parameters between 99.90% and 99.992%, and network and CPE management systems, such as TR069 and subsequent evolutions) specified, utilised or agreed by the Access Provider from time to time.

14.44. Maxis also noted that Layer 2 and 3 should be treated the same, including specifying other QoS parameters. This is because Layer 3 is an essential part of wholesale broadband access. Unlike other countries where there has been growth in the use of Layer 2 access, the main Access Provider which operates the majority of Malaysia's

[17] IMDA Schedule 1: residential end-user connection, https://www.imda.gov.sg/-/media/imda/files/regulation-licensing-and-consultations/frameworks-and-policies/nationwide-broadband-network/netlink-trusts-ico/02-schedule-1.pdf

[18] NBN (2026), NBN Enterprise Ethernet, https://www.nbnco.com.au/business/enterprise/enterprise-ethernet

[19] Telstra (2026), Adaptive Enterprise Networks, https://www.telstra.com.au/business-enterprise/products/networks/adaptive-networks/nbn/nbn-enterprise-ethernet

fibre network only offers Layer 3 access and has almost 80% of the wholesale HSBB market[20].

14.45. This means that Layers 2 and 3 should both remain on the Access List for the foreseeable future and be treated equally, including for other QoS parameters in addition to network availability. Layer 2 and Layer 3 HSBB Services are functionally substitutable inputs for downstream HSBB services. Under the principle of Equivalence of Inputs, substitutable products should be subject to comparable quality obligations. Without this, Access Seekers selecting Layer 3 HSBB Services are exposed to greater quality uncertainty and risk. This outcome is inconsistent with the technology-neutral approach underpinning MCMC's Access List, as it implicitly favours one layer over another.

14.46. MCMC notes that international regulatory models have historically defined QoS requirements at Layer 2 on which Maxis broadly agrees, but Maxis also submitted that there is international precedent of having QoS obligations at Layer 3 where it is used.

14.47. Maxis pointed out international precedents from UK regulator who had previously included "Transparency as to quality of service" obligation in relevant Wholesale Broadband Access markets (broadly the equivalent of Layer 3[21]) before progressively deregulating as Layer 2 became more widely used.

14.48. According to Maxis, Ofcom noted that without this obligation "…it may be difficult for Access Seekers to assess whether to raise complaints regarding the provision of services on a non-discriminatory basis[22].

14.49. This aligns with Maxis' view that specifying QoS at Layer 3 also is needed for clarity and completeness, especially in the Malaysian context where Layer 3 HSBB Services are more relied upon as wholesale inputs given the main Access Provider only offers these. As such, the absence of QoS parameters at Layer 3 gives rise to a regulatory gap rather than a neutral outcome. Consequently, extending the existing QoS parameters as proposed in 13(d)(ii) to Layer 3 HSBB Services would improve completeness in the Access List by ensuring quality at all access levels.

14.50. TM has concerns that the proposed changes will promote inconsistency with the objectives of access regulation. Access regulation is intended to prevent the denial of access to essential facilities and to promote downstream competition. It is not intended to compel the provision of all customised, premium or enterprise grade service levels that go beyond standard access functionality. In line with these objectives, regulated services should be clearly defined, standardised and limited to baseline wholesale service obligations, rather than extending to premium or tailored offerings that are more appropriately negotiated on a commercial basis.

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[20] Telekom Malaysia has a domestic fibre network of over 740,000 km. Telekom Malaysia (2024), TM Integrated Annual Report 2024, https://tm.listedcompany.com/misc/ar/ar2024.pdf

[21] Ofcom defined the Wholesale Broadband Access market as sitting between the Wholesale Local Access market which relates to the physical connections to consumers' premises and retail services such as those that end consumers buy. It includes the access network, the broadband equipment at the local exchange, backhaul connectivity using the provider's network, and the functionality of the Broadband Remote Access Server.

[22] Ofcom (2018), Wholesale Broadband Access Market Review 2018, https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/103158-wholesale-broadband-access/associated-documents/statement-wba-review.pdf?v=323391

14.51. TM submits that the proposed wording risks rendering the regulated Layer 3 HSBB service descriptions overly broad, such that they capture services that are qualitatively and economically distinct from the standard HSBB services required to address competition concerns.

14.52. TM elaborated that very high network availability commitments (for example, availability levels of 99.99% or above) are not mere contractual variations of a standard HSBB service. Rather, they typically require materially different network architectures and operational arrangements, including additional redundancy, network diversity, enhanced monitoring, escalation and restoration processes, and higher ongoing capital and operational costs. Services supplied with premium availability characteristics are not homogeneous with standard HSBB services.

14.53. As such, automatically deeming all such services to fall within the same regulated service, regardless of the level of availability or resilience provided, risks extending regulation beyond its intended scope in a manner that is inconsistent with the LTBE.

14.54. Secondly, TM pointed out impact on investment incentives and efficient product differentiation. According to TM, capturing very high availability services within the regulated HSBB service risks blurring the distinction between basic wholesale access services and value-added offerings and may weaken incentives for Access Providers to invest in network resilience, redundancy and advanced service management capabilities.

14.55. In this regard, enhancements would be subsumed within the regulatory framework rather than recognised as legitimate service differentiation. This outcome would be inconsistent with longer-term objectives of promoting network quality, innovation and efficient infrastructure investment.

14.56. TM also noted that the proposed reference to network availability parameters specified or agreed "from time to time" introduces material regulatory uncertainty by causing the scope of regulated services to vary dynamically with bilateral negotiations or customer-specific SLAs.

14.57. TM submits that a foundational principle of access regulation is that regulated services must be clearly defined, stable and predictable to ensure that access obligations are transparent, administrable and proportionate, and that both Access Providers and Access Seekers have certainty as to the services that are subject to regulation. Where service scope is allowed to expand or contract over time based on bespoke commercial arrangements, the Access List risks losing its function as a clear and durable boundary for regulated obligations. Such uncertainty complicates compliance, increases the potential for disputes, and undermines long-term network planning and investment decisions, all of which are inconsistent with the objectives of a stable and effective access regime.

14.58. Finally, TM's concerns on the disagreement for Question 41 is due to lack of service scope clarity that has immediate and material implications for pricing under the MSAP. The cost reflective pricing depends on a well-defined and homogeneous service, against which costs can be consistently identified, allocated and recovered. Where the scope of the regulated service is uncertain or overly broad, this becomes significantly more difficult as the MSAP price should be to mandate basic features only.

14.59. TM submits that a more proportionate approach would be to specify that the regulated Layer 3 HSBB Network Services include standard or baseline network availability parameters. Services with materially higher or bespoke availability commitments (such as ultrahigh availability or customised redundancy arrangements) should be treated as distinct services that should be negotiated on a commercial basis rather than included on the Access List.

14.60. U Mobile agrees with MCMC's proposal that capturing availability parameters within the service description improves transparency and supports informed commercial decisions by Access Seekers.

14.61. Wang Kian Tjun submitted that he strongly disagrees with MCMC's proposal to capture any network availability parameters specified, utilised or agreed by the Access Provider from time to time as it could be very general regarding bit rates deployment. He went on to add that there are no specific time frame nor specific details to comment further for the paragraph 20.65 (13)(d)(i) in the PI paper on the Review of Access List.

14.62. CelcomDigi and Maxis considers that the description of both Layer 2 and Layer 3 HSBB Services should be updated to accommodate TR069 and its evolutions, including TR369.

14.63. CelcomDigi is of the view that the framework should be forward-looking and technology-neutral, allowing for the adoption of current and emerging device management protocols.

14.64. Accordingly, CelcomDigi submitted that the Access List description of Layer 2 and Layer 3 HSBB should be defined in a manner that generally recognises TR069 and its subsequent developments, without prescribing a specific protocol. The service description may therefore, be drafted on principle basis and non-prescriptive as proposed below:

"The Access Provider shall support industry-recognised customer premises equipment (CPE) management protocols, including but not limited to TR069 and its subsequent evolutions, to enable remote provisioning, monitoring, and service quality management."

14.65. This approach enables effective service quality monitoring, remote management and performance assurance, while ensuring for Access Providers to adopt more advanced solutions as technology evolve.

14.66. Maxis submitted that consistent with the argument for network availability and QoS parameters, key technical characteristics relied upon by Access Providers in the normal provision, assurance and maintenance of HSBB services should form part of the standard HSBB service framework. In this instance, TR069 is widely considered to be the default approach for managing networks and CPE equipment, being used by operators across the world to manage billions of devices.

14.67. Where Access Providers rely on such management systems for their own downstream operations, but retain exclusive control over them, regulators need to ensure that equivalent operational outcomes are available to all Access Seekers. Otherwise, there is a risk that the Access Provider's retail arm can differentiate its customer service or

fault management performance in a manner that cannot be effectively replicated by Access Seekers.

14.68. Maxis notes MCMC's concern that explicit references to specific protocols may risk making the service description overly rigid, particularly given anticipated technological evolution (e.g. from TR069 to TR369).

14.69. However, this concern can be addressed through technology-neutral drafting in 13(d)(iii) and 14(d)(iii) as shown below in red:

"(13) Layer 2 HSBB Network Service

d. The Layer 2 HSBB Network Service shall be supplied to the Access Seeker as follows:

iii. any other technical parameters or standards (including any network availability parameters between 99.90% and 99.992% and network and CPE management systems, such as TR069 and subsequent evolutions) specified, utilised or agreed by the Access Provider from time to time.

(14) Layer 3 HSBB Network Service

d. The Layer 3 HSBB Network Service shall be supplied to the Access Seeker as follows:

iii. any other technical parameters or standards (including any network availability parameters between 99.90% and 99.992%, and network and CPE. management systems, such as TR069 and subsequent evolutions) specified, utilised or agreed by the Access Provider from time to time.

14.70. CTS, TM and U Mobile do not consider it necessary to amend the HSBB service descriptions to explicitly capture TR069 or its evolutions, including TR-369.

14.71. CTS find the description is adequate for now whilst TM stated that these protocols relate to the remote management and configuration of customer premises equipment. The protocol implementation is typically determined as part of a customised solution based on the access seeker's requirements, the access provider's operational readiness, and technical feasibility.

14.72. TM submitted that this approach is consistent with, and underpinned by, the principle of technology neutrality. By allowing parties to determine the appropriate management protocols on a case-by-case basis, the current framework preserves flexibility and supports the adoption of evolving technologies.

14.73. U Mobile disagrees with additions of TR069 or TR369 protocol references hard-coded in the service description as such specific references risk making the Access List obsolete over the five-year determination cycle.

14.74. U Mobile recommends a generic reference to industry-standard device management protocols, with TR069 and TR369 cited only as examples if a reference is considered necessary, without being mandated and subject to being replaced with future evolutions (similar to the way the instrument mentions "support for 3GPP Release 15

and any updates to that standard from time to time" for the 4G MOCN service, for instance).

14.75. Wang Kian Tjun is agreeable to MCMC's proposal to make further changes to the service description of the HSBB Services to capture the TR069 protocol and any evolutions to it (such as TR369).

15. MVNO Access

Submissions Received

Question 43:	Do you agree with MCMC's proposal to keep MVNO Access on the Access List? If you disagree, please provide reasons.
Question 44:	Is the market now competitive enough to operate without regulation of MVNO Access? Provide evidence on whether current market dynamics are sufficient to ensure long-term competition.
Question 45:	Do you consider that further amendments are required to the service descriptions of 5G Standalone Access and 4G EPC with RAN Access to clarify that these two services do not include access to the Access Provider's core network? If an Access Seeker needs to acquire access to the Access Provider's core network, do you agree that it will fall under MVNO Access instead of 5G Standalone Access and 4G EPC with RAN Access?
Question 46:	Do you have any comments on the proposed minor amendments to the description of MVNO Access to clarify that the facilities and services sought by Access Seekers are those owned and/or operated by the Access Provider? If not, please provide reasons.

15.1. Maxis maintains that MVNO Access should be removed from the Access List, arguing that continued ex-ante regulation is no longer justified given current competitive market conditions, lacks support from international regulatory practices in comparable jurisdictions, and may foster unnecessary reliance on regulatory intervention despite effective commercial negotiations between parties. In response to MCMC's position, Maxis addresses five key issues:

15.2. MCMC's application of a "workable competition" test and the way it frames host numbers and consolidation;

15.2.1. MCMC's reliance on observed MVNO outcomes as proof that regulation remains necessary;

15.2.2. the dynamic costs of retaining ex-ante regulation in a mature wholesale environment;

15.2.3. to the extent vertical integration is raised as a basis for continued regulation, the relevant analytical framework and assessment threshold; and

15.2.4. claims of bargaining power asymmetry and related rebuttals.

15.3. U Mobile does not have a strong position on whether MVNO Access should remain on the Access List. However, it notes that the current mobile market is characterised by effective competition, with wholesale 4G and 5G services available on regulated terms from multiple licensees. As a result, the bottleneck conditions that originally justified MVNO Access regulation may have weakened. U Mobile therefore suggests that a lighter-touch regulatory approach may be sufficient to maintain retail competition while reducing the regulatory burden on Access Providers.

15.4. CelcomDigi acknowledges that MVNO Access has played an important role in promoting retail competition, facilitating market entry, encouraging innovation, and expanding consumer choice in Malaysia's mobile market. However, it considers that the market has since matured and evolved significantly, warranting a reassessment of the continued need for blanket MVNO Access regulation and greater consideration of market maturity and consolidation dynamics in future regulatory oversight. While CelcomDigi does not oppose the retention of MVNO Access on the Access List, it submits that, if retained, the regulatory framework should be updated to ensure that it remains fair, proportionate, and sustainable, and does not create unintended distortions in a competitive and commercially driven wholesale market.

15.5. TM agrees with MCMC's proposal to retain MVNO Access on the Access List. TM considers that MVNO Access remains an important wholesale input for retail mobile competition, innovation and consumer choice. Its retention is consistent with MCMC's LTBE framework, particularly the objectives of promoting competition and supporting efficient use of mobile infrastructure. MCMC has itself recognised that RAN and spectrum remain essential inputs controlled by a limited number of MNOs, and that the wholesale MVNO market is more concentrated following the Celcom-Digi merger. In addition, TM submits that the Access List should clearly distinguish between MVNO Access and MOCN Access, as they are technically distinct services with different levels of network control and operational responsibility. MVNO Access involves reliance on the Access Provider's network, including its core network elements and spectrum, whereas MOCN Access allows an Access Seeker to utilise its own spectrum and core network while sharing the Access Provider's RAN, thereby retaining greater control over traffic management, service configuration, and customer experience. TM further argues that there should be no restrictions on Access Seekers using 4G or 5G MOCN services to provide MVNO Access downstream. According to TM, such resale restrictions would undermine the purpose of MVNO Access, reduce wholesale market dynamism, limit opportunities for innovation and service-based competition, and constrain operators' ability to monetise network capacity. TM therefore advocates for an explicit prohibition on MVNO resale restrictions by MOCN Access Providers, consistent with MCMC's preliminary view that such restrictions negatively affect competition and are not in the long-term benefit of end users (LTBE).

15.6. Maxis is of the opinion that the Malaysian mobile market exhibits the structural and behavioural characteristics of a workably competitive market. MVNO access is being concluded on commercial terms, market shares are shifting in favour of smaller players and MVNOs, and forecast growth is sustained. Continued ex-ante MVNO access regulation is no longer justified on the established regulatory test of structural market failure, non-replicability of inputs, or persistently sub-optimal outcomes.

15.7. CelcomDigi submits that the MVNO segment has matured and demonstrated commercial sustainability, with increased participation and interest from multiple Access Providers in MVNO partnerships. Given these developments, CelcomDigi considers that there is no clear evidence that continued MVNO Access regulation remains strictly necessary under current market conditions. Nevertheless, it acknowledges the importance of regulatory stability and continuity and is willing to support the retention of regulation, provided that it remains proportionate, balanced, and appropriately calibrated to current market dynamics.

15.8. U Mobile does not hold a strong view on this question. As noted in response to Question #43, the competitive environment in 4G and the regulated access to 4G and 5G services means that the wholesale inputs necessary to serve end users are now accessible from multiple licensees on regulated terms. Whether these upstream inputs are sufficient to sustain long-term retail competition without a dedicated MVNO Access obligation is not something that U Mobile feels in a strong enough position to contribute to a decision on.

15.9. TM agrees with MCMC's preliminary view that the mobile market in Malaysia is not yet competitive enough to operate without regulation of MVNO Access, and that MVNO Access should remain on the Access List. The MVNO segment shows positive signs of growth, including an increase in active MVNOs from 8 in 2019 to 20 in 2024. However, these indicators do not, on their own, establish that the wholesale MVNO Access market is sufficiently workably competitive to operate without regulation, given the continued reliance on host network inputs and competition concerns identified in the PI paper.

15.10. Furthermore, TM supports the continued regulation of MVNO Access on the basis that MVNOs remain dependent on essential mobile network inputs that cannot be practically replicated, including spectrum, network infrastructure and related capabilities, while the number of wholesale suppliers remains limited. TM submits that the success of the MVNO segment does not demonstrate that regulation is no longer necessary, as commercial agreements are supported by the regulatory safeguards provided by the Access List, including rights to non-discriminatory access and regulatory recourse. TM also contends that regulation is needed to ensure MVNOs can access the full range of current and future service bearers, such as voice, broadband, IoT and advanced 5G services, thereby enabling them to compete effectively. Accordingly, TM submits that MVNO Access should remain on the Access List, with targeted amendments to clarify its scope and application in relation to 5G, MVNO models, technical requirements and future technologies. While supporting continued regulation, TM also advocates for a structured review mechanism based on objective market indicators to assess whether future deregulation may be warranted.

15.11. In terms of an updated definition of MVNO access, TM recommends MCMC to adopt the following:

"MVNO access includes the provision of all RAN facilities including spectrum and some or all of the core network. This differs from MOCN access where the Access Seeker brings their own spectrum. MVNO access can make full use of the Access Provider's core ("thin" access) or the Access Seeker can provide some of the elements of the core themselves such as billing ("thick" access)."

15.12. Edotco broadly supports the proposed inclusion of end-to-end transmission services within the MSA framework. The provision of managed transmission services — including microwave backhaul, carrier Ethernet, and IP transit — is a natural complement to Edotco's passive infrastructure portfolio. The regulatory framework for transmission services should reflect the operational complexity involved and provide proportionate SLA regimes reflecting the technical complexity of transmission service delivery; clear liability allocation between Edotco and underlying third-party infrastructure providers; and flexibility to provision services using a combination of owned and leased infrastructure.

15.13. Maxis is of the opinion that core network services should not be listed in 5G Standalone Access service and 4G EPC with 5G RAN Access. If an Access Seeker is seeking Access Provider's core network services in place of its own, then that Access Seeker is seeking MVNO Access service and not 5G Standalone Access service and 4G EPC with 5G RAN Access. Consequently, Maxis proposes to remove (18) (c) (iv) to (x) as UDM, UDR, NEF, MEC, NFV, SEAF, AUSF and VAS platforms are core network services. In addition, customer billing and CRM are typically managed by Access Seeker itself and not by the Access Provider. *See Maxis' proposal in page 99 of Maxis' submission.*

15.14. CelcomDigi does not consider that further amendments are required to the service descriptions of 5G Standalone Access and 4G EPC with 5G RAN Access to clarify the exclusion of access to the Access Provider's core network. CelcomDigi is of the view that current regulatory framework already provides sufficient clarity through the separate and distinct treatment of MVNO Access, which is intended to be technology neutral.

15.15. TM is proposing clarifications to ensure that 5G Standalone Access and 4G EPC with RAN Access are strictly limited to RAN access only, and do not include access to the core network (EPC/5GC), due to security and operational concerns. TM further submits that any services involving the Access Seeker's own core network or customer systems should not be included under 5G/4G MOCN access and should be clearly excluded or clarified. If core network access is required, TM says it should instead be provided under MVNO Access, not under 5G Standalone or 4G EPC with RAN Access.

15.16. U Mobile agrees with MCMC's proposal on both points. The 5G service descriptions should expressly exclude access to the Access Provider's core network, and access to the core should be acquired under MVNO Access. U Mobile suggests adding the following to clauses 18 and 19.

Proposed drafting: For the avoidance of doubt, this service does not include access to the Access Provider's core network. Where an Access Seeker requires access to the Access Provider's core network, it shall acquire MVNO Access.

This would assist MCMC in maintaining a clear boundary between RAN-level and core-level access, simplifying the assessment of access requests.

15.17. Edotco broadly supports the proposed inclusion of end-to-end transmission services within the MSA framework. The provision of managed transmission services — including microwave backhaul, carrier Ethernet, and IP transit — is a natural complement to Edotco's passive infrastructure portfolio. The regulatory framework for transmission services should reflect the operational complexity involved and provide proportionate SLA regimes reflecting the technical complexity of transmission service delivery; clear liability allocation between Edotco and underlying third-party infrastructure providers; and flexibility to provision services using a combination of owned and leased infrastructure.

15.18. Maxis suggests that the existing service description is retained, i.e. only for the facilities/services owned by the AP only as it is within the Access Provider's control. Maxis disagrees with the proposed insertion "operated by the AP" by MCMC because there could be limitations set by the owner of the facilities/services that are operated by the Access Provider. (Refer to page 85 to 102 of Maxis' submission for elaboration)

15.19. TM agrees MVNO Access should be limited to facilities/services owned or controlled by the Access Provider, but objects to using an examples list to define this, as it may be misunderstood as granting bundled rights to internal components. Instead, TM proposes a clearer approach where Access Seekers must explicitly specify the exact facilities or services they want under the MVNO Access, and the Access Provider's obligations should be strictly limited to what is expressly requested and agreed in the access agreement.

15.20. U Mobile and CelcomDigi agree with the minor proposed amendment.

15.21. Edotco broadly supports the proposed inclusion of end-to-end transmission services within the MSA framework. The provision of managed transmission services — including microwave backhaul, carrier Ethernet, and IP transit — is a natural complement to Edotco's passive infrastructure portfolio. The regulatory framework for transmission services should reflect the operational complexity involved and provide proportionate SLA regimes reflecting the technical complexity of transmission service delivery; clear liability allocation between Edotco and underlying third-party infrastructure providers; and flexibility to provision services using a combination of owned and leased infrastructure.

16. Domestic Inter-Operator Roaming Service

Submissions Received

Question 47:	Do you have any comments on MCMC's proposal to retain the Domestic Inter-Operator Roaming Service on the Access List without any changes to the service description?
Question 48:	Do you agree that the Domestic Inter-Operator Roaming Service should remain on the Access List even though MCMC is proposing listing 4G MOCN Access on the Access List?

16.1. CelcomDigi agrees with the retention of the Domestic Inter-Operator Roaming Service on the Access List without modification, as the current service description provides an appropriate and proportionate framework to support coverage and LTBE objectives while preserving investment incentives. CelcomDigi further notes that Domestic Inter-Operator Roaming and 4G MOCN serve different functions and address different market circumstances, with domestic roaming remaining an important coverage and continuity safeguard that is not substituted by 4G MOCN access.

16.2. Maxis agrees with the retention of Domestic Roaming on the Access List but submits that 4G MOCN/MORAN should not be included. Domestic Roaming is a more practical solution and entails lower investment costs for smaller operators to address coverage gaps in rural and remote areas. While Domestic Roaming and 4G MOCN/MORAN may be considered functionally substitutable means of addressing coverage gaps, Domestic Roaming is more appropriate in circumstances where smaller operators have chosen not to deploy their own networks in rural and remote areas, despite having been allocated valuable spectrum by MCMC.

16.3. U Mobile agrees for the service to be retain on Access List without modification. The service remains essential for nationwide coverage continuity, particularly for legacy 2G users. Domestic roaming and 4G MOCN are complementary and serve different purposes as roaming provides simpler, technology-neutral nationwide coverage extension, while MOCN enables more advanced site-level network sharing. Keeping both services ensures continuity of coverage and preserves access options for operators.

16.4. TM agrees that the Domestic Inter-Operator Roaming Service should remain a regulated service even if 4G MOCN Access is listed on the Access List for the following reasons:-

16.4.1. Domestic roaming remains an essential fallback mechanism for nationwide coverage, providing an immediate and technology-agnostic solution to address coverage gaps where MOCN access is unavailable or has not been enabled. It continues to support seamless connectivity, fair competition and consumer affordability.

16.4.2. MOCN may not be available or fully implementable at all base stations, therefore, domestic roaming remains necessary to ensure coverage continuity.

16.4.3. Domestic roaming remains important in rural, underserved and USP areas, where it enables Access Seekers to maintain services and address coverage gaps without inefficient duplication of infrastructure.

16.4.4. Continued regulation of domestic roaming helps prevent coverage from being used as a competitive barrier. As domestic roaming and MOCN/MORAN are complementary rather than substitutable services, regulation remains necessary to address potential incentives for Access Providers that compete in downstream retail markets to delay or constrain wholesale access improvements, which may place TM at a structural disadvantage in achieving nationwide coverage.

16.4.5. Domestic roaming remains important for MVNOs and industry diversity, as it enables MVNOs and smaller MNOs to provide nationwide connectivity through wholesale mobile inputs, particularly where they lack their own RAN infrastructure or legacy spectrum.

17. Other Services and Facilities

Submissions Received

Question 49:	Do you agree with MCMC's preliminary view that LEO satellite services should not be listed on the Access List during the current review cycle? If you disagree, please provide detailed reasons supported by market evidence to justify why regulation is necessary at this stage.
Question 50:	Do you agree with MCMC's preliminary view that A2P messaging should not be listed on the Access List during the current review cycle? If you disagree, please provide detailed reasons supported by market evidence to justify why regulation is necessary at this stage.

LEO satellite services

17.1. CelcomDigi agreed that current market dynamics and technical characteristics of LEO satellite service, remain at an early stage of technological and commercial development, do not, at this stage, satisfy the criteria for mandatory access regulation. However, CelcomDigi strongly recommended that MCMC put in place sufficient guardrails at an early stage to ensure that satellite Direct-to-Device ("D2D") services are implemented within the existing Communications and Multimedia Act 1998 ("CMA") framework, particularly with respect to spectrum assignment, licensing obligations, and universal service contributions.

17.2. CelcomDigi commented that MCMC should require that any D2D services utilising IMT spectrum to be anchored to licensed Mobile Network Operators ("MNOs"), ensuring that spectrum rights, regulatory accountability, and market responsibilities remain with authorised licensees, consistent with international best practices. This approach would help safeguard fair competition, uphold consumer protection obligations, preserve national spectrum sovereignty and ensure continued investment in Malaysia's terrestrial network infrastructure, while enabling satellite technologies to complement broader national connectivity objectives.

17.3. CelcomDigi also considered that Starlink being the sole provider of LEO satellite services in Malaysia may give rise to potential market power concerns particularly considering the limited availability of immediate substitutes and reliance on a single provider for certain connectivity use cases.

17.4. CelcomDigi noted that although LEO satellite services are primarily viewed as a complementary solution to terrestrial networks, supporting hard to reach locations and are unlikely to function as a general substitute for connectivity needs of the end-users. LEO satellite is nevertheless constituting an essential element for coverage extension in rural and remote areas, maritime and offshore connectivity and to a limited extent for network resilience during disasters or major outages.

17.5. CelcomDigi recommended that while LEO satellite services are, as a rule, not subject to sector-wide wholesale access obligations, MCMC should consider adopting a proportionate regulatory framework under which access or capacity availability

obligations may apply, indirectly, conditionally or on a case-by-case basis particularly where public funding or licence-based interventions are involved. Such framework, single or dominant LEO satellite provider could be required to meet minimum transparency and non-discrimination standards, namely:

17.5.1. Publishing relevant service terms and conditions and service level parameters, such as capacity availability and prioritisation policies;

17.5.2. Where justified, applying limited and targeted access type obligations particularly for rural, maritime/offshore connectivity and network resilience use cases; and

17.5.3. Adopt an ex-post price monitoring approach, permitting regulatory intervention where:

17.5.3.1. pricing is excessive in light of prevailing market; or

17.5.3.2. anti-competitive conduct is observed.

17.6. CelcomDigi further expressed that with the increasing reliance on LEO satellite services for national connectivity objectives, MCMC may consider adapting elements of the U.S. Broadband Equity, Access and Deployment (BEAD) programme as part of the Universal Service Provision (USP) framework. Among the BEAD programme concepts that may be particularly relevant are:

17.6.1. Capacity reservation - Securing sufficient satellite network capacity to enable delivery of broadband services meeting the prescribed requirements to identified underserved locations;

17.6.2. Transparency and non-discrimination – Apply an objective and non-discriminatory criteria when providing services or capacity in respect of USP supported deployments, including making publicly available information regarding:

17.6.2.1. service terms applicable to funded use cases; and

17.6.2.2. service levels and capacity management principles when providing services or capacity to similarly situated access seekers; and

17.6.3. Pricing Autonomy and Monitoring – Preserving commercial flexibility, while granting regulatory authority the ability to review pricing outcomes on an ex-post basis where there is evidence of:

17.6.3.1. excessive pricing relative to prevailing market or cost conditions; or

17.6.3.2. anticompetitive conduct.

17.7. CTS was of the view that LEO satellite services should be included on the Access List to support connectivity in remote and underserved areas. As the use of LEO services continue to grow, including and especially in government initiatives, and appropriate regulatory framework would support greater standardisation and service accessibility.

17.8. DNB suggested maintaining a cautious approach and intervene especially where there is clear evidence of market bottlenecks or anti-competitive behaviour even though LEO may play a role in backhaul for remote areas and last mile connectivity to support 5G deployment.

17.9. DNB proposed two possible deployment models on how LEO services including Direct-to-Devices (D2D) could be provided, as follows:

17.9.1. Satellite operators operate and sell retail services directly in Malaysia to the end users. This model is adopted by entity such as Starlink; and

17.9.2. Satellite operators provide wholesale satellite services to MNOs which will then sell to the end users. This business model is adopted by entity such AST Space Mobile for its D2D services in other international markets.

17.10. DNB highlighted that depending on the deployment model and ecosystem development, there are several regulatory areas to be addressed, such as:

17.10.1. Access Regime on the need to assess whether wholesale satellite services should be regulated especially if there is any bottleneck due to its barrier to entry;

17.10.2. Clarity on licensing models for D2D whether it would fall under MNO and/or satellite operator;

17.10.3. Spectrum authorization pertaining to the use of IMT spectrum and/or MSS bands for D2D, subject to WRC Recommendation/ITU Radio Regulation, spectrum harmonization, ecosystem/device development and satellite deployment;

17.10.4. Interference protection to ensure terrestrial IMT networks (2G,4G and 5G) are protected from harmful satellite interference; and

17.10.5. Other areas such as QoS, cybersecurity, lawful interception etc.

17.11. Maxis deemed that LEO satellite services are necessary to be included on the Access List. Maxis believes that the emergence of LEO satellite services, while offering potential benefits, necessitates careful regulatory consideration to ensure fair competition, spectrum integrity, national security, and consumer protection within Malaysia's communications ecosystem.

17.12. Maxis highlighted key concerns and recommended that LEO satellite services be regulated under the Access List and MSA to monitor market conduct, address anti-competitive behaviour, ensure technical compatibility with IMT bands, preserve investment certainty, and require local gateways, PoPs, and PoIs to safeguard national security, data sovereignty, and service quality, as follows:

17.12.1. Commercial considerations – Maxis noted the market is characterised by a limited number of providers, with some holding dominant positions. Without regulatory oversight, providers may impose restrictive commercial terms (e.g., high minimum orders, inflexible wholesale arrangements), distorting competition and disadvantaging end-users;

17.12.2. Technical considerations – Maxis recognised fewer interference risks to existing terrestrial mobile networks in L-Band/S-Band, but stressed that use of IMT bands requires stringent oversight. However, materially different considerations arise where LEO satellite services seek to operate using International Mobile Telecommunications (IMT) bands. IMT is a critical national resource underpinning long-term MNO investments, and LEO operations must not cause harmful interference or undermine integrity, utility, or commercial value of spectrum assignments granted to MNOs;

17.12.3. Security and regulatory oversight – Maxis highlighted risks where gateways, PoPs or POIs are located outside Malaysia, raising concerns on data sovereignty, lawful interception, and national security. Offshore routing may negatively affect QoS, particularly for latency-sensitive and critical applications. More broadly, the lack of a clear local regulatory footprint may limit MCMC's ability to monitor compliance, enforce licence conditions, and take timely regulatory action where required; and

17.12.4. Competition assessment – Maxis noted that LEO satellite services remain at an early and evolving stage. At present, relevant market definitions are not clearly established, including whether LEO satellite services should be assessed within existing mobile broadband markets, treated as part of a broader satellite data services market, considered within emerging D2D satellite services, or assessed across a combination of these segments. International benchmarks, such as BEREC, show substitutability depends on national circumstances and specific use cases, reinforcing the need for regulatory safeguards while the market develops.

17.13. MEASAT agreed that LEO satellite services should not be listed on the Access List at this stage, noting that the market remains nascent and rapidly evolving, with currently only one established infrastructure provider, non-standardised technologies, and cost structures that differ significantly from traditional telecommunication infrastructure such as fibre.

17.14. MEASAT viewed that the current structure of the LEO satellite service ecosystem does not indicate sustained market dominance or bottlenecks at this stage. Instead, the market remains dynamic, with ongoing network deployment, capacity expansion, and technological development, which suggests that competitive conditions are still evolving.

17.15. MEASAT further added while reseller and partnership arrangements are beginning to emerge within the LEO satellite service ecosystem, the market remains at an early stage of development with evolving commercial models and limited interoperability across providers. In MEASAT's view, the current market structure has not yet developed sufficiently mature wholesale access arrangements to justify ex-ante regulation under the Access List framework.

17.16. MEASAT concurred that with the views raised by other operators that certain targeted regulatory safeguards may be appropriate to address cybersecurity, resilience, and data sovereignty concerns arising from LEO satellite services. However, MEASAT is of the view that such measures are more appropriately implemented through licensing

conditions, technical standards, and security obligations, rather than through inclusion on the Access List.

17.17. Starlink supported MCMC's preliminary view that LEO satellite services should not be listed. The inclusion of LEO satellite services on the Access List at this stage would be unjustified on competition grounds, undermining the LTBE in Malaysia contrary to the objectives of the CMA 1998.

17.18. Starlink submitted that LEO satellite services do not exhibit bottleneck characteristics. The Access List regime is intended to address market failures arising from bottleneck facilities or services where an operator holds significant market power, and the absence of regulated access would impede competition. LEO satellite services in Malaysia remain at an early stage of market development, with uptake fastest in Sarawak and Sabah, underscoring their complementary and gap-filling nature rather than any competitive dominance in the broader broadband market. Subscriber numbers are modest compared to the established terrestrial broadband base.

17.19. Starlink highlighted that LEO satellite services are complementary to existing broadband infrastructure. They are not essential inputs into the supply of downstream communications services in Malaysia and should not be treated as equivalent to terrestrial fixed broadband or mobile services for the purposes of the Access List. While capable of delivering broadband connectivity, their principal value proposition lies in extending coverage to underserved or unserved areas, particularly rural and remote regions. Customer uptake patterns show that LEO services primarily bridge connectivity gaps rather than displace or compete head-to-head with terrestrial broadband, and there is therefore no commercial justification for their inclusion.

17.20. Starlink further noted that stakeholder concerns conflate technical capability with market dynamics. The relevant question is not whether LEO satellite services can deliver broadband, but whether the absence of mandatory access materially impedes competition. Starlink submits there is no evidence of this, as operators have not identified any instance where lack of regulated access to LEO infrastructure has disadvantaged them.

17.21. Starlink emphasised that calls to protect local infrastructure investment reverse the logic of the Access List regime. The Access List exists to address bottlenecks, not to shield incumbents from new competition. Imposing access obligations on LEO satellite operators to protect terrestrial investments would be a misapplication of regulation.

17.22. Starlink pointed out that land-based network services remain the backbone of broadband in Malaysia. Fiber and other terrestrial broadband services can achieve cost-efficiency in dense areas, while LEO costs do not vary by geography, making it unlikely to overtake terrestrial broadband in urban markets. Terrestrial operators therefore continue to enjoy substantial advantages and are not reliant on access to LEO satellite infrastructure to compete effectively.

17.23. Starlink added that international experience supports this position. Regulatory authorities in other jurisdictions have refrained from imposing mandatory access or wholesale supply obligations on LEO satellite operators. If Malaysia were to regulate, it would become the only jurisdiction globally to do so, creating an unprecedented burden and disincentivizing new market entry at a critical juncture.

17.24. Starlink included that premature access regulation would deter investment and undermine commercial viability. One of the national policy objectives under the CMA, the LTBE, is to encourage the economically efficient use of, and investment in communications infrastructure. Imposing mandatory access obligations on LEO satellite services at this early stage would run counter to this objective.

17.25. Starlink highlights that LEO satellite services require substantial and constant capital investment. Deploying satellite constellations, ground infrastructure, and user terminals involves significantly higher average deployment costs than fiber, with continuous launches needed to keep up with replacement cycles. Mandatory access obligations and pricing at this stage would undermine the commercial sustainability of next-generation satellite systems.

17.26. Starlink observed that concerns raised by other stakeholders do not provide a sound basis for listing LEO satellite services on the Access List. Issues such as reseller licensing or calls for regulatory certainty are either unrelated to the question of inclusion or do not otherwise justify such listing.

17.27. Starlink noted that reseller licensing concerns should be addressed through MCMC's existing licensing and enforcement functions under the CMA. These matters are distinct from access obligations and conflating them undermines the integrity of the Access List framework.

17.28. Starlink further emphasised that "regulatory certainty" is not a relevant basis for inclusion. The Access List is aimed at addressing bottleneck facilities or services, and as previously submitted, there is no question of bottleneck in the case of LEO satellite services. Obligations under the Access List are significant and should only be imposed where there is clear and evidence-based justification. A generalised desire for certainty does not meet this threshold and cannot justify the regulatory burden that such inclusion would entail.

17.29. TIME agreed with the MCMC's preliminary view that LEO satellite services should not be listed on the Access List during the current review cycle.

17.30. TM supported MCMC's preliminary view that LEO satellite services should not be included on the Access List at this stage. Premature access regulation risks disincentivising investment and market entry in what remains a nascent and rapidly evolving segment. At present, Starlink is the only LEO satellite service provider in Malaysia, and LEO services currently operate as a complementary technology, particularly for remote, underserved, and resilience-driven use cases, rather than as a substitute for terrestrial networks. Demand in Peninsular Malaysia remains limited, with greater relevance observed in East Malaysia.

17.31. TM highlighted several matters for MCMC's ongoing consideration. TM currently obtains LEO satellite services at retail prices, which remain relatively high due to the absence of downstream competition. TM also noted that the existing provider is not subject to KPIs or service assurance obligations, leaving users with limited recourse on service quality, fault rectification, and performance outcomes. TM recognises these issues may be addressed through market maturation and entry of additional providers, rather than immediate regulation.

17.32. TM preferred MCMC to adopt a monitoring approach at this stage, accompanied by active oversight. TM emphasised that close monitoring of pricing trends, service quality, and the evolution of commercial arrangements is necessary to ensure market power does not become entrenched as LEO services scale. Structural characteristics such as high sunk costs, economies of scale, vertical integration, and a limited number of global providers may constrain effective competition, meaning future entry alone may not discipline pricing or service outcomes in the near to medium term.

17.33. TM further included that public policy considerations may become increasingly relevant as LEO services expand. Issues relating to data sovereignty, lawful interception, network security, and overall network resilience warrant closer scrutiny. TM recommended that MCMC consider localisation requirements, such as mandating that primary gateways or hubs serving Malaysian traffic be located within Malaysia. TM recognised, however, that such matters may be more appropriately addressed within licensing frameworks rather than through the Access List.

17.34. U Mobile was of the view that satellite backhaul services should be listed on the Access List during the current review cycle, subject to a proportionate, light-touch regulatory framework. As satellite backhaul services develop in Malaysia, there is a risk that exclusive or preferential arrangements between satellite providers and individual licensees could emerge. The Access List should pre-empt this risk by establishing non-discrimination safeguards at this stage, consistent with the approach adopted by MCMC for dark fibre in Exclusive Zones. Addressing the conditions for access before exclusivity becomes established is more effective than seeking to unwind such arrangements retrospectively at the end of a five-year determination cycle.

17.35. U Mobile submitted that such listing would also provide MCMC with a formal framework to monitor satellite backhaul uptake and service quality during this review cycle, while establishing the evidence base for a more detailed assessment in the next review.

A2P messaging services

17.36. CelcomDigi, CTS, Maxis, TIME and U Mobile did not support the inclusion of A2P messaging to be listed on the Access List.

17.37. CelcomDigi submitted that the inclusion of A2P is unwarranted as existing market dynamic do not indicate the presence of bottlenecks or barrier that would necessitate regulatory intervention.

17.38. Maxis believed that the inclusion of A2P messaging would not be in the LTBE due to the increase in consumer risk through potential spam content being transmitted over the service.

17.39. Maxis noted that current A2P messaging relies on Content Aggregators that act as intermediaries between local and international merchants (e.g., banks, airlines, retail shops) and mobile operators, to authenticate brands before messages reach MNO firewalls. Existing POIs are designed only for P2P SMS. Forcing A2P SMS through them would trigger firewall blocking, preventing delivery of critical TAC codes and PINs. Removing firewall filtering from the existing POI would expose networks to potential fraud, scam, spoofing, flooding, and congestion.

17.40. Maxis included that currently the specialised A2P platforms (named ESMS in Maxis) perform compliance to the Mandatory Standard of Content requirements of MCMC, including "RM0" insertion, Whitelisting, Blacklisting, P2A messaging and enforcing format of messages. It also caters for special requirements like Chinese character messages. Conventional P2P SMSCs which is not a sophisticated messaging platform cannot meet these requirements.

17.41. Maxis further added that A2P messaging regulation will not result in any benefit to end users and is not aligned with the LTBE. End users already receive A2P messages at no cost. Regulation would benefit merchants/retailers (e.g., banks, airlines, social media, advertisers). Merchants would be able to work directly with the Access Seeker (e.g., TM, Webe, etc) and send their A2P messages to the Access Provider's end users through the existing POI without having to go through the Content Aggregators. This would result in no benefit to the end users i.e. no retail prices reductions, cost savings, etc, but their risk of receiving the fraud, scam, gambling, unwanted SMS, etc. will be increased significantly.

17.42. Maxis concerned that direct sending of the A2P SMS through the existing POI without going through the Content Aggregators will eliminate the Content Aggregators' business and industry, may cause bankruptcy of Content Aggregators and driving significant unemployment to the people.

17.43. TM was of the view that A2P messaging services should be included on the Access List as there is a strong economic basis for the regulation of these services, with market evidence demonstrating that current commercial arrangements are not delivering efficient outcomes.

17.44. TM pointed out that commercial arrangements are not delivering efficient outcomes. In the absence of regulation, termination monopolies create incentives for mobile operators to set prices and conditions above efficient levels and to impose non-price barriers that distort downstream markets. This is evident in prevailing A2P pricing and

conduct, where operators controlling essential messaging infrastructure or nationwide connectivity may possess both the ability and incentive to influence market dynamics in ways that disadvantage competing service providers and/or third-party platforms, undermining fair market access, constraining pricing flexibility, and weakening effective competition.

17.45. TM highlighted that mobile operators currently differentiate between "domestic" and "international" A2P brands without any standardised or transparent definition, resulting in substantial price differentials. TM had experienced opaque and inconsistent practices, with the same enterprise classified differently across operators. This creates uncertainty, compliance complexity, and discriminatory outcomes, particularly for smaller access seekers and aggregators.

17.46. TM noted that the high degree of heterogeneity and volatility in A2P termination rates provides strong evidence that prevailing commercial outcomes are unlikely to be economically efficient. Technical resources used for A2P SMS termination are broadly similar across Malaysian mobile networks and cost-reflective rates would be expected to converge. Instead, rates vary sharply, change unilaterally without cost justification, and depend on opaque classifications. This pattern is more consistent with the exercise of monopoly power than with underlying cost differences, further evidencing inefficient market outcomes.

17.47. TM submitted that prices materially above cost deter efficient use of A2P SMS for essential purposes such as authentication, transaction security, public alerts and official communications, with elevated and unpredictable termination charges passed through to enterprises and government agencies. Excessive pricing also distorts communication choices, driving traffic to OTT platforms that are often less reliable, secure or suitable for time-critical or mission-critical communications, weakening data sovereignty and resilience. These outcomes reflect inefficient pricing signals that either impose unavoidable costs or drive inefficient substitution misaligned with Malaysia's policy objectives.

17.48. TM observed Ofcom's review of the UK A2P SMS termination market, which found all MNOs held Significant Market Power and observed steep, repeated and short-notice price increases inconsistent with cost-reflective outcomes. While Ofcom did not impose a formal price cap, binding voluntary commitments on pricing, predictability and transparency were secured under regulatory pressure, with Ofcom retaining powers to intervene if outcomes deteriorate.

17.49. TM noted that targeted safeguards are warranted to promote efficient outcomes and support the LTBE. In particular:

17.49.1. expand the scope of the Mobile Network Termination Service (MNTS) to explicitly include A2P SMS termination, recognising A2P messaging as a core termination service exhibiting network-specific bottleneck characteristics;

17.49.2. apply regulated pricing to A2P SMS termination, potentially by reference to existing MNTS pricing benchmarks, to ensure charges are cost-reflective and constrain the exercise of termination market power;

17.49.3. enable a regulated A2P interconnection platform over IP, whether via public or VPN-based connectivity, to provide transparent, standardised and efficient access arrangements for A2P messaging services; and

17.49.4. standardise national definitions for domestic and international A2P SMS, to remove ambiguity, reduce scope for discriminatory treatment, and improve certainty and predictability for access seekers.

17.50. U Mobile had not identified market failures in A2P messaging that would justify its inclusion on the Access List at this stage.