Suruhanjaya Komunikasi dan Multimedia Malaysia

Malaysian Communications and Multimedia Commission

PUBLIC CONSULTATION PAPER

PROPOSED WAY FORWARD ON 100% ADOPTION OF AND COMPLETE MIGRATION TO INTERNET PROTOCOL VERSION 6 (IPv6) IN MALAYSIA

2 October 2024

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1. PREFACE

1.1. The objective of this Public Consultation is to seek views and comments from the industry, interested parties, and members of the public on the proposed way forward for 100% Adoption of and Complete Migration to Internet Protocol Version 6 ("IPv6") in Malaysia.

1.2. Confidential treatment may be requested on any part of the submission that is believed to be proprietary, confidential, or commercially sensitive, with supporting justification for the Malaysian Communications and Multimedia Commission ("the Commission") consideration. In such cases, the submission must be provided in a non-confidential form suitable for publication, with any confidential information redacted as necessary and placed instead in a separate annexe clearly marked as "CONFIDENTIAL".

1.3. If the Commission grants confidential treatment, it will consider the information but will not publicly disclose it. However, if the Commission rejects the request, the information will be returned and not considered part of the submission. The Commission will not accept any submission that requests confidential treatment for all or a substantial part of the submission.

1.4. The structure of this Public Consultation will be divided into four (4) different sections as follows:

Section 3: Introduction
Section 4: New Commission Direction
Section 5: International Benchmarking

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Section 6: Consultation

1.5. The Commission invites submissions on all proposals put forward in this document. All submissions should be provided to the Commission in full on or before **31 October 2024 (12:00 noon, Thursday).**

Submissions should be addressed to:

Malaysian Communications and Multimedia Commission
MCMC HQ Tower 1,
Jalan Impact, Cyber 6
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Licensing and Monitoring Division

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2. LEGISLATIVE CONTEXT

3.1. Under subsection 179(1) of the CMA 1998, the Commission is vested with the control, planning, administration, management and assignment of the numbering and electronic addressing of network services and applications services.

3.2. Pursuant to subsection 180(1) of the CMA 1998, the Commission is responsible for developing a Numbering and Electronic Addressing Plan ("NEAP") that sets out rules for numbering and electronic addresses, including Internet Protocol ("IP") addresses.

3.3. In the context of this public consultation process, reference will be made to subsection 11.1.3 of Part B of the NEAP, which mandates all Network Service Provider ("NSP") Individual ("I") licensees to implement the IPv6 protocol by 30 June 2015. This requirement was further enforced through Commission Direction No. 2 of 2015, which obligated all NSPs to ensure IPv6 capability and to assign their customers a unique public IPv4 address and/or a unique public IPv6 address.

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3. INTRODUCTION

IP Addresses

3.1. IP addresses are unique identifiers for devices or networks, allowing them to connect and communicate over the Internet. There are two (2) types of IP addresses currently being used today:

3.1.1. Internet Protocol Version 4 (IPv4)

IPv4 addresses are composed of 32 binary bits (2^{32}), creating approximately 4.3 billion unique network addresses. These addresses are represented using four (4) decimal numbers, each separated by a dot, a format known as "dotted-decimal notation". An example of IPv4 is 192.100.1.1.

3.1.2. Internet Protocol Version 6 (IPv6)

IPv6 addresses use 128 binary bits to create a unique address on the networks and the end-users containing 2^{128} addresses, separated by a colon ':'. An example of IPv6 is 2001:d08::8888.

Exhaustion of IPv4

3.2. IPv4 has been dominant and widely used globally since 1981. This protocol is used across the Internet for all communications. However, due to the exponential growth of the Internet and the proliferation of connected devices worldwide, 4.3 billion unique IPv4 addresses are no longer sufficient.

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3.3. To address the exhaustion, IPv6 was officially launched globally in 2012, offering an address pool of up to 340 undecillion addresses. IPv6 is anticipated to contribute to a larger, faster, and more robust Internet by providing lower latency, easier management, and relatively lower costs for customers compared to IPv4[1].

3.4. Therefore, many countries, including Malaysia, have taken significant steps to adopt and migrate to IPv6 to ensure the continued growth and scalability of the Internet.

Current Adoption of and Migration to IPv6 in Malaysia

3.5. The introduction of Commission Direction No. 2 of 2015 has significantly impacted IPv6 adoption and migration in Malaysia. Additionally, several ongoing initiatives are already in place to ensure a successful transition to a fully IPv6 network in Malaysia, which include:

3.5.1. development and implementation of technical codes through collaborative efforts between industry stakeholders and the Malaysian Technical Standard Forum Berhad (MTSFB), serving as guidelines and best practices for fostering IPv6 adoption in Malaysia;

3.5.2. the IPv6 Equipment Certification Program, initiated by SIRIM QAS International Sdn. Bhd. On 10 July 2019 to ensure that all equipment meets IPv6 standards and compatibility requirements; and

[1] APNIC. APAC IPv6 Council Meeting. June 2024.

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3.5.3. various training and development programs have been carried out in collaboration with APNIC and local organisers to offer IPv6-related training in Malaysia

3.6. According to the statistics provided by APNIC, as shown in **Figure 1** below, a significant increase in the IPv6 capability rate in Malaysia has been observed since 2015, positioning Malaysia as the third in the world with the highest percentage of capability. As of 1 August 2024, Malaysia's IPv6 capability rate stood at 73.32%, with India in the lead at 81.00%[2]. In this context, the capability rate is used to assess the level of IPv6 adoption among the NSPs and IP assignment holders in Malaysia.

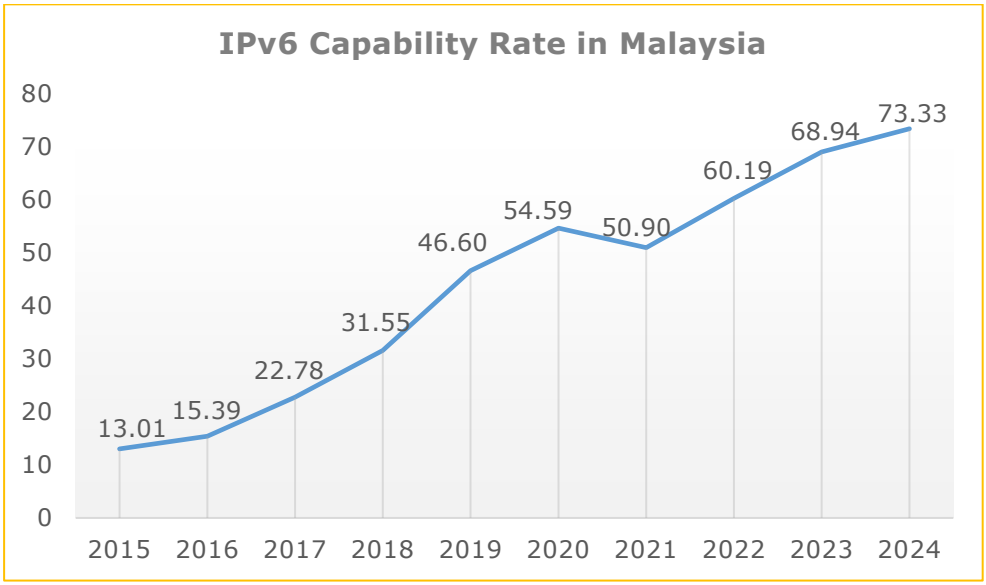

Figure 1: IPv6 Capability Rate in Malaysia (as of 1 August 2024)[3]

3.7. However, it is important to note that while Malaysia has achieved a high rate of IPv6 capability, this is not yet reflected in terms of its adoption among end-users. Therefore, establishing a clear and

[2] APNIC IPv6 Measurement Maps.
[3] APNIC IPv6 Measurement Maps

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complete migration timeframe from IPv4 to IPv6 is essential to achieve 100% IPv6 adoption in Malaysia by 2028.

4. PROPOSED WAY FORWARD AND IMPLEMENTATION PLAN

4.1. With the exhaustion of IPv4, the end goal is always to achieve an IPv6-only state where IPv6 connectivity is made possible without any tunnelling or translation, and networks can finally remove any dependency on IPv4.

4.2. Therefore, the Commission is of the view that it is necessary to ascertain the defined timeframe to accelerate 100% adoption of and complete migration to IPv6. A gradual implementation plan with several phases for achieving this will be incorporated into a new Commission Direction and/or NEAP based on a four-year timeframe from 2025 to 2028 as follows:

4.2.1. By 31 December 2026, each NSP shall:

(i) ensure that all its services are IPv6 capable;
(ii) ensure all new customers shall be assigned with a unique public IPv6 address only; and
(iii) ensure commencement of migration from IPv4 to IPv6 for existing customers.

4.2.2. By 31 December 2028, each NSP shall:

(i) ensure that all services are provided and operated in a single stack IPv6 network;
(ii) ensure all customers shall be assigned with a unique public IPv6 address only – achieving 100% migration to IPv6;

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(iii) adopt IPv6 in full, eliminating any reliance on IPv4 in existing equipment, infrastructure, and related dependencies such as email, web and Domain Name System ("**DNS**") servers; and

(iv) foster and support 100% adoption of and complete migration to IPv6 in Malaysia.

For clarity, **100% adoption of and complete migration to IPv6** in the context of this Direction is indicated through the following:

a) 100% IPv6 operation in a single-stack network within Malaysia;
b) 100% IPv6 deployment within the Network Service Providers' network infrastructure;
c) 100% IPv6 within the Network Service Providers' Internet ecosystem, including but not limited to email, web and DNS servers; and
d) full decommissioning of IPv4-based transition mechanisms within the Network Service Provider's network.

4.3. To ensure compliance, the legal instrument will also highlight relevant processes governing the IPv6 inspection and audit exercise. This includes an annual self-declaration for all NSPs, requiring them to report various details including but not limited to the types of services offered, any changes in company management and operations, IPv6 adoption statistics among customers, the company's readiness for transitioning to 100% IPv6, and the results of required tests for single-stack IPv6 networks.

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4.4. Based on the self-declaration, the Commission will conduct periodic inspections and audits to ensure continuous compliance.

5. INTERNATIONAL BENCHMARKING

5.1. In ensuring a comprehensive overview of the international IPv6 adoption landscape, a benchmarking exercise was conducted between Malaysia and several other Asian countries, namely India, Vietnam, and China.

5.2. In addition to being the frontrunners in global IPv6 adoption, these countries were selected based on their demographic similarities to Malaysia. This allows for comparable opportunities and challenges, such as skills and language limitations or limited exposure, which may be prevalent in other parts of the world.

5.3. The benchmarking exercise aimed to evaluate each country's current state of IPv6 adoption and capability and identify successful strategies adopted. This exercise will assist the Commission in developing an effective plan to achieve full adoption and complete migration to IPv6.

5.4. The findings of the international benchmarking exercise is summarised per Table 1 as follows:

Country/ IPv6 Capability Rate	Target	Strategies/ Phases Implemented	Current Adoption
India 81%[4]	No specific timeline, but sector-wise target	1) National IPv6 Adoption Roadmap (2010) [5].	India's proactive updates to its policies and

[4] APNIC Lab, As of 31 Aug 2024
[5] National IPv6 Deployment Roadmap ver 1.0. (2010)

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Country/ IPv6 Capability Rate	Target	Strategies/ Phases Implemented	Current Adoption
		2021 Update: 2) Government organizations to transition by June 2022. 3) New retail connections to support IPv6 by December 2022. 4) Customer Premises Equipment (CPEs) upgraded by December 2022[6].	timelines have established it as a global leader in IPv6 adoption
Vietnam 63%[7]	1) Phase 1 (2011-2019): 40% utilisation of IPv6. 2) Phase 2 (2021-2025): 100% of government websites IPv6-ready by 2025[8].	1) Gradual IPv6 enablement of government websites: 50% by 2022, 100% by 2025. 2) Key policies: Decision No. 749/QD-TTg (2020) and Directive No. 2/CT-TTg (2022) to prioritize IPv6. 3) Decree 42/2022/ND-CP on the usage of .vn for web portals and public service portals that are Ipv6 ready[9].	Vietnam has risen to the top 8[10] globally for IPv6 adoption, driven by strategic planning and training.
China 38%[11]	Full IPv6 single-stack by 2030. [12]	1) Action Plan (2017) for large-scale IPv6 deployment[13]. 2) Special De-NAT Work to phase out NAT44[14]. 3) Government websites to transition by 2025.	China's significant pace of large-scale IPv6 adoption, supsported by a robust policy framework, suggests the target of a 2030 IPv6-only network is achievable.

Table 1: Summary of Benchmarked Countries

6 Revision of 1Pv6 Transition Timelines- reg. (2021)
7 APNIC Lab. As of 31 Aug 2024
8 Vietnam Internet Network Information Center (2023). APNIC 55 Conference
9 Vietnam Internet Network Information Center (2023). APNIC 55 Conference.
10 Vietnam+. (2024). Vietnam Targets Top 8 Globally for IPv6 Usage in 2024. Vietnam+ (VietnamPlus).
11 APNIC Lab, As of 31 Aug 2024
12 Notice on Accelerating the Large-scale Deployment and Application of IPv6 (2021).
13 Action Plan for Promoting Large-scale Deployment of Internet Protocol Version 6 (2017).
14 Notice by the General Office of the Ministry of Industry and Information Technology and the Secretary Bureau of the Office of the Central Cyberspace Affairs Commission of Carrying Out the "Special De-NAT Work for Network" to Further Deepen the Deployment and Application of IPv6 (2024).

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5.5. Based on the above, it was found that several efforts are essential in supporting the acceleration of 100% adoption of and complete migration to IPv6 in a country. The efforts are:

5.5.1. The existence of clear policies and targets from the government;

5.5.2. Adequate capacity development programs to produce a skilled workforce;

5.5.3. Cooperation of all stakeholders, whether in the form of policy development and implementation or promoting awareness; and

5.5.4. Continuous monitoring of the execution of policies developed to achieve the targets set.

6. CONSULTATION

6.1. Based on the above, the Commission hereby seeks comments and views on the Commission's proposed way forward for the 100% Adoption of and Complete Migration to IPv6 in Malaysia as outlined in this paper. The feedback may include, but is not limited to, the following:

(a) The proposed timeframe for the 100% adoption and complete migration to IPv6;
(b) The practical effort and approach in achieving the complete migration to IPv6 by the end of 2028; and
(c) Any other matters related to, feedback on, or concerns about the matter that are not specifically outlined in this paper.

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ANNEX

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Template For Response

Please provide comments/responses as per below:

Question

Based on the above, the Commission hereby seeks comments and views on the Commission's proposed way forward for the 100% Adoption of and Complete Migration to IPv6 in Malaysia as outlined in this paper.

Response

Components	Feedback
1. The proposed timeframe for the 100% adoption and complete migration to IPv6	
2. The practical effort and approach in achieving the complete migration to IPv6 by the end of 2028	
3. Any other matters related to, feedback on, or concerns about the matter that are not specifically outlined in this paper	

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