SUMMARIZED RESPONSE FOR PUBLIC INQUIRY ON ALLOCATION OF SPECTRUM BANDS FOR MOBILE BROADBAND SERVICE IN MALAYSIA

<table>
<tr><th>Question</th><th>Comments/Responses</th></tr>
<tr><td>1</td><td>

i. <u>Award mechanism for 700MHz</u>

Celcom agrees with MCMC's rationale and the conclusion. **Celcom is in favour of a spectrum assignment by comparative tender ("beauty contest") where the scoring focuses on 700MHz coverage roll-out in rural Malaysia, in support of NFCP objectives, and the credibility to deliver the promised roll-out.** The credibility to deliver the promised coverage roll-out should mainly be scored based on historical track record e.g. network rollout, efficiency, capacity to serve, and financial strength e.g. ability to raise funds for network rollout & maintenance and spectrum fees.

Proposed scoring for 700MHz assignment

Criteria	Weightage
Track record e.g. network rollout, efficiency, capacity to serve	40%
Financial strength e.g. ability to raise funds for network rollout & maintenance and spectrum fees	30%
Roll-out plan	20%
Commitment to network sharing	10%
Total	100%

In order to ensure that a coverage roll-out commitment is delivered, there must be substantial penalties backed by performance bonds.

Please refer to **Chapter 1.1.3 (Page 1 onwards)** of Detailed Response document for the full text on our discussion and evidence to support our views.

ii. <u>Timeline for assignment for 700MHz</u>

Celcom agrees with MCMC that the timely release of the 700MHz band is an important component towards achieving the relevant NFCP targets whereby the assignment process of the 700MHz band is to be completed by the 2nd Quarter of 2020 and the 700MHz band to be made available for use for mobile broadband service in the 3rd Quarter of 2020.

The timeline is governed by the timing of the ASO which, MCMC states, should be completed before the 3rd Quarter of 2020. Celcom seeks MCMC's support to ensure that this date is adhered to.

As regards to the timing of the assignment, in anticipation of potential timeline slips, we would therefore propose for MCMC to issue provisional assignment for the 700MHz by the end of 1st quarter 2020. This would allow operators who have obtained 700MHz spectrum to start building the network ahead of the availability date of the 3rd Quarter of 2020.
In view that there might be few months period during which the spectrum is not usable by mobile operators, we would like to propose the SA payment (Price Component) to be

</td></tr>
</table>

	made one month before the SA effective date. Please refer to **Chapter 1.2.3 (Page 2 onwards)** of Detailed Response document for the full text on our discussion and evidence to support our views.
2	**<u>Assigning the whole 2x45 MHz of the 700MHz band</u>** MCMC rightly recognises the importance of 700MHz in the context of delivering the NFCP. Celcom strongly believes that the more spectrum that is assigned, the better, because it increases the overall capacity, i.e. mobile broadband speed, in this band. MCMC also rightly notes that deploying 700MHz in less than 2x10MHz is inefficient. Nevertheless, MCMC proposes to hold back 2x5MHz from the assignment. Withholding one block of 2x5MHz from the assignment is sub-optimal for the following reasons: • For any operator or other entity to deploy a 700MHz LTE network in only 2x5MHz is highly inefficient. The cost per MHz deployed is almost twice as high compared to deploying in 2x10MHz. • Initially the band would be used for 4G because it is of immediate benefit for most LTE smartphone users in Malaysia. However, globally 5G is already a reality and in Malaysia 5G is expected to be deployed from 2021. To provide a 4G and 5G coverage layer, operators require more than 2x5MHz of 700MHz spectrum. In other words, a 2x5MHz block assignment does not offer a migration path to 5G. • In the 5G specifications for a channel bandwidth of 5MHz the Sub Carrier Spacing (SCS) is limited to 15 kHz. With 10MHz or more the SCS is 30 KHz. 15 kHz SCS will not have as good latency as 30kHz SCS. Low latency is a key requirement for 5G and cannot be delivered in a single 2x5MHz block of 700MHz spectrum. **Celcom recommends assigning the entire 2x45MHz of the 700MHz band to Malaysian mobile operators who have the ability to deploy the spectrum rapidly and widely.** This would maximise the bandwidth available to mobile users, especially those in rural areas. Further it would maximise the economic efficiency because more spectrum would be deployed with a given amount of investment. **<u>Preference for a wide band assignment for 700MHz</u>** **Celcom recommends assigning the 700MHz in three blocks of 2x15MHz each.** This results in higher download speeds and generates cost efficiency compared to a 2x10MHz block assignment. This would allow MCMC to assign the spectrum to three operators, i.e. a sufficient number to maintain a competitive market. Of course, it does not mean that only three players would have access to the 700MHz spectrum. Existing wholesale and national roaming arrangements would continue to allow others to also benefit from 700MHz. All mobile operators would benefit from lower costs which translates into lower prices for the customers of all networks. **A second best option would be to assign the 700MHz band in three blocks of 2x10MHz and one block of 2x15MHz.** This would be less efficient from a download speed and cost perspective but would still allow one operator to deploy efficiently in 2x15MHz and offer wholesale access to operators who did not acquire any 700MHz spectrum.

Celcom does not recommend a 2x20MHz block assignment. A block assignment of 2x20MHz would be even more cost efficient. However, if the spectrum is assigned to two operators with a 2x20MHz block each, there would be insufficient competition in the market. If the spectrum is assigned as one block of 2x20MHz and two blocks of 2x10MHz, the operator with 2x20MHz would have a 100% advantage over the other two operators. This would result in a competitive imbalance.

Please refer to **Chapter 2.3 (Page 5 onwards)** of attached Detailed Response document for the full text on our discussion and evidence to support our views.

3

i. Award mechanism for 2300MHz

Celcom agrees with MCMC's rationale and the conclusion. **Celcom is in favour of a spectrum assignment by comparative tender ("beauty contest") where the scoring focuses on 2300MHz coverage roll-out in Malaysia, in support of NFCP objectives, and the credibility to deliver the promised roll-out.** The credibility to deliver the promised coverage roll-out should mainly be scored based on historical track record e.g. network rollout, efficiency, capacity to serve, and financial strength e.g. ability to raise funds for network rollout & maintenance and spectrum fees.

In order to ensure that commitments are delivered, there must be substantial penalties backed by performance bonds.

Proposed scoring for 2300MHz assignment

Criteria	Weightage
Track record e.g. network rollout, efficiency, capacity to serve	40%
Financial strength e.g. ability to raise funds for network rollout & maintenance and spectrum fees	30%
Roll-out plan	20%
Commitment to network sharing	10%
Total	100%

Please refer to **Chapter 3.1.3 (Page 15)** of Detailed Response document for the full text on our discussion and evidence to support our views.

ii. Timeline for assignment for 2300MHz

Celcom suggests assigning the 2300MHz as soon as possible, ideally bringing forward the completion of the assignment to the end of Q1 2020 and making the spectrum available by the end of Q2 2020.

Please refer to **Chapter 3.2.3 (Page 16)** of Detailed Response document for the full text on our discussion and evidence to support our views.

4

Preference for a wide band assignment for 2300MHz

The 2300MHz has an advantage over other bands used for mobile broadband. The 3GPP 5G specification for this band (n40) allows for a deployment of up to 100 MHz in a single radio which generates excellent cost efficiencies.

	Celcom would like to propose for MCMC to allocate the 2300MHz band in one block of 50MHz and one block of 40 MHz as it provides a good balance of cost efficiency and high download speeds with the advantage of future migration towards 5G. An alternative, though not as efficient from a cost and speed perspective, would be to allocate the band in three blocks of 30 MHz each. Anything less than 30 MHz would fail to take advantage of the benefit of 3GPP specification for 5G in this band. Please refer to **Chapter 4.3 (Page 17 onwards)** of Detailed Response document for the full text on our discussion and evidence to support our views.
5	**i. <u>Award mechanism for 2600MHz</u>** **Celcom supports and applauds MCMC's intention to reassign the 2600MHz band based on current actual utilisation via direct conversion of current Apparatus Assignments (AA) to Spectrum Assignment (SA)** as it is deemed ideal and practical to ensure good customer experience and no service disruption. MCMC's proposal is a practical approach to ensure service continuity and, in time, enables operators to migrate the band to 5G-NR. Please refer to **Chapter 5.1.3 (Page 25 onwards)** of Detailed Response document for the full text on our discussion and evidence to support our views. **ii. <u>Timeline for assignment for 2600MHz</u>** **Celcom seeks an earlier direct conversion and assignment of the SA i.e. conversion process to be completed by December 2019 and the 2600MHz band to be assigned by way of SA with effective/ start date on the 1st of January 2020.** It is of paramount importance for Celcom to secure the spectrum earlier in order to avoid the following expected serious impacts and disruption of services: a) Degradation of customer experience for millions LTE subscribers (Celcom and MVNOs) b) Congestion of LTE sites nationwide Hence, Celcom seeks MCMC's consideration to issue the SA for 2x20MHz to Celcom with effective/ start date of 1st January 2020 based on current actual utilization. The confirmation would also give us more certainty to invest further in the band. Please refer to **Chapter 5.2.3 (Page 27)** of Detailed Response document for the full text on our discussion and evidence to support our views.
6	**<u>Suggestions for 2600MHz FDD and TDD block interference mitigation</u>** Celcom has deployed 2600MHz FDD (3GPP band 7) as its main LTE capacity resource to support the existing LTE coverage layer using 1800MHz and future wide area 700/900MHz LTE coverage bands. The Celcom 2600MHz LTE network has been deployed using best industry practice and international guidelines to ensure any interference issues between 2600MHz FDD and TDD systems are minimised.

	3GPP band 7 FDD and band 38 TDD deployments are now widespread across the world. Industry best practice/guidelines for 2600MHz FDD/TDD implementation and coexistence are now well documented in several ITU/APT/CEPT technical reports. FDD – TDD interference issues can be minimised if the industry follows these best practice guidelines and recommendations. 5MHz guard bands between FDD and TDD spectrum blocks should be maintained to minimise interference issues on adjacent channels. There is the possibility to deploy 5G in 40MHz of TDD using a subset of 3GPP band n41 rather than band n38 which should be considered as this offers a more efficient wider 5G carrier implementation. In order to coexist with band 7/n7, this will require vendors to customise filtering in the band n41 radio units which we understand will be possible. Other suggestions include: • Antenna separation at co-located sites – vertical separation of antennas where required. • International Border area buffer zones – regulatory/industry coordination. Please refer to **Chapter 6.1.3 (Page 28 onwards)** of Detailed Response document for the full text on our discussion and evidence to support our views.
7	**<u>Spectrum pricing and fees</u>** The total cost of spectrum including the price component and the annual fee component must be sustainable in relation to mobile operator service revenue. Therefore, in determining the price component and the annual fee component for each band, MCMC should take account of: • The cost of existing spectrum assignments (SA) for 900, 1800, and 2100MHz spectrum, including the price component and annual fee component paid. • The price component and annual fee component for spectrum on the roadmap for the next few years, including the spectrum considered in this PI (700, 2300, and 2600MHz) • And also, future assignment plans for the next five years, for example the C-Band (3.5GHz) and mm wave spectrum (26GHz). Given Malaysia's digital development policy goals and MCMC's specific objectives, Celcom recommends that the total cost of spectrum, including the annualised cost of the price component and the annual fee component of spectrum, for all mobile operators should not increase materially: • In 2019 the total annualised cost of spectrum of all mobile operators amounted to an estimated 4.5% of mobile service revenue. • If the annualised cost of spectrum were to increase materially this would negatively impact the current economics of mobile broadband service provision in Malaysia. • Setting the price component and annual fee component at an amount so that as a result the annualised cost of spectrum will exceed 5.0% of total market mobile

service revenue will increase the cost of spectrum but to a level where it is likely to remain sustainable. We consider a level of 5.5% as the annualised cost of spectrum as a percentage of revenue as the upper limit of sustainable spectrum pricing.

- If the price component and annual fee component for new spectrum result in the cost of spectrum to increase to level above 5.5% of industry revenue this is likely to have adverse consequence for 4G and 5G mobile broadband roll-out.

Within this overall envelope, the per MHz price component for the 700, 2300, and 2600MHz band should reflect the relative scarcity of sub-1GHz spectrum and the fact that the 2600MHz is already in use under AA.

i. **700MHz**

Price component = RM6.5mil/MHz
Annual fee component = RM0.3mil/MHz to RM0.7mil/MHz

Celcom recommends that on a per MHz basis, the price component is set at 30% of the price component for 900MHz spectrum and the annual fee component at 5% to 10% of the price component. This makes the 700MHz cheaper than the 900MHz spectrum. This is consistent with the fact that revenue per MHz is declining and hence the spectrum license fee per MHz must decline. A lower license fee compared to 900MHz is also consistent with ambitious coverage roll-out objectives to bring mobile broadband to 98% of Malaysian population.

ii. **2300MHz**

Price component = RM3.5mil/MHz
Annual fee component = RM0.2mil/MHz to RM0.4mil/MHz

The proposed fees for 2300MHz is proposed because Celcom believes it is useful as the capacity band for 4G and eventually for 5G services. As a 4G layer, this new spectrum will be used for additional capacity and is able to cater for higher traffic densities and deliver a download speed consistent with the target of the NFCP. The license fee is therefore proposed to be set to reflect the above uses. This can be achieved by setting the per MHz price component at 90% of what was paid for 2100MHz spectrum and the annual fee component at 5% to 10% of that.

iii. **2600MHz**

Price component = RM0.7mil/MHz to RM1.1mil/MHz
Annual fee component = RM0.7mil/MHz to RM1.1mil/MHz

The 2600MHz FDD spectrum is already in use. Celcom recommends setting the annual fee component at 50% to 100% of the current cost for operators who has deployed the 2600MHz FDD spectrum. The PC would be equivalent to a one year AFC. If the fees are set comparable to the current annual AA cost, the transition from AA to SA would be cost neutral for operators. This is reasonable because making the transition from AA to SA does not change mobile operator's revenues or costs.

Celcom proposes to have the same per MHz price for 2600MHz TDD spectrum as for 2600MHz FDD spectrum. In the short term the eco-system is not as good as for 2600MHz FDD spectrum which would indicate that a lower price may be appropriate. However, an

	equivalent amount for FDD spectrum does not have the same data capacity. Around 2/3rds of data traffic is in the downlink. Therefore 30 MHz of TDD spectrum produces the equivalent downlink capacity as 2x20MHz (i.e. 40 MHz in total) of 2600MHz FDD spectrum. Please refer to **Chapter 7 (Page 30 onwards)** of Detailed Response document for the full text on our response towards the spectrum pricing and fees.