



# **Public Inquiry on allocation of spectrum bands for mobile broadband service in Malaysia**

**(Non-Confidential Submission)**

Submitted by: Digi Telecommunications Sdn Bhd



## 0 Introduction

Firstly, we would like to thank the Malaysian Communications and Multimedia Commission (“MCMC”) for undertaking a public inquiry on allocation of spectrum bands for mobile broadband service in Malaysia (“the PI”). We, Digi Telecommunications Sdn Bhd (“Digi”), are pleased to submit our response to the said public inquiry. Over the years, we have demonstrated strong capabilities to deliver in the mobile industry and we are confident that we can continue to play an active role in the growth of mobile telecommunications in Malaysia. We will gladly provide additional information or clarification to MCMC on any related concerns or questions arising from this document.

## 1 Outline of response to MCMC

Our response on the PI is structured in accordance to Table 1.

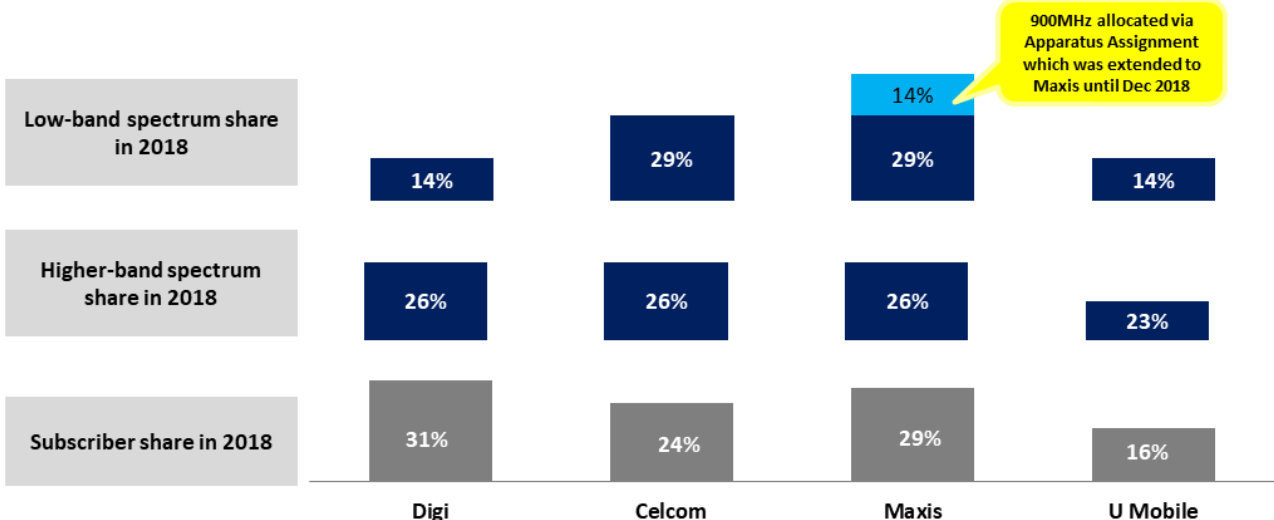
**Table 1:** List of questions by MCMC in the said public inquiry

Spectrum	Questions
<b>General</b>	Key principles on spectrum allocation, covering:- i) Fair access to spectrum to support data demand and enhance QoS ii) Reasonable terms of award to continue incentivising investments and allowing financially sustainable operations iii) Efficient, economic, rational and optimal spectrum award
<b>700MHz</b>	<b>Question 1:</b> MCMC would like to seek views on the proposed allocation plan for the 700 MHz band, in particular on:- i) Award mechanism ii) Timeline for assignment  <b>Question 2:</b> MCMC would like to seek views on the optimum spectrum block per operator for assignment of 700 MHz band.

Spectrum	Questions
<p><b>2300MHz</b></p>	<p><b>Question 3:</b> MCMC would like to seek views on the proposed allocation plan for the 2300 MHz band, in particular on:-</p> <ul style="list-style-type: none"> <li>i) Award mechanism</li> <li>ii) Timeline for assignment</li> </ul> <p><b>Question 4:</b> MCMC would like to seek views on the optimum spectrum block per operator for assignment of 2300 MHz band.</p>
<p><b>2600MHz</b></p>	<p><b>Question 5:</b> MCMC would like to seek views on the proposed allocation plan for the 2600 MHz band, in particular on:-</p> <ul style="list-style-type: none"> <li>i) Award mechanism</li> <li>ii) Timeline for assignment</li> </ul> <p><b>Question 6:</b> MCMC seeks suggestions on approaches to mitigate interference between FDD and TDD blocks to facilitate efficient spectrum utilisation in the 2600 MHz band.</p>
<p><b>Spectrum price</b></p>	<p><b>Question 7:</b> MCMC would like to seek views on the appropriate range (per MHz) for SA fees (price component and annual fee component) and the rationale for the proposed fees, for the following spectrum bands:-</p> <ul style="list-style-type: none"> <li>i) 700 MHz;</li> <li>ii) 2300 MHz; and</li> <li>iii) 2600 MHz.</li> </ul>

## 2 Detailed response

### 2.1 Key principles of spectrum allocation

Section	Questions																				
General	<p><b><u>Digi's general response</u></b></p> <p><b>A. <u>Fair access to spectrum to support data demand and enhance QoS</u></b></p> <ul style="list-style-type: none"> <li>Firstly, we would like to seek a fair access of spectrum which will be critical to support long-term benefits to consumers – with observation on the continued demand on mobile and the need to enhance Quality of Service (“QoS”).</li> <li>Today, Digi has lower share of low-band spectrum relative to our subscriber base in comparison with other key mobile players. We are thankful that MCMC had remedied earlier legacy gap by refarming 900MHz and 1800MHz spectrum bands effective 1 July 2017. In addition, we are pleased that (in the PI) MCMC has considered for future spectrum to be allocated to support improvement of QoS and avoiding disruption of service to customers.</li> </ul>																				
	<p><b>Figure 1: Malaysia's low-band and higher-band spectrum share against subscriber shares, 2018</b></p>  <table border="1"> <thead> <tr> <th>Category</th> <th>Digi</th> <th>Celcom</th> <th>Maxis</th> <th>U Mobile</th> </tr> </thead> <tbody> <tr> <td>Low-band spectrum share in 2018</td> <td>14%</td> <td>29%</td> <td>29% + 14% (900MHz via Apparatus Assignment)</td> <td>14%</td> </tr> <tr> <td>Higher-band spectrum share in 2018</td> <td>26%</td> <td>26%</td> <td>26%</td> <td>23%</td> </tr> <tr> <td>Subscriber share in 2018</td> <td>31%</td> <td>24%</td> <td>29%</td> <td>16%</td> </tr> </tbody> </table>	Category	Digi	Celcom	Maxis	U Mobile	Low-band spectrum share in 2018	14%	29%	29% + 14% (900MHz via Apparatus Assignment)	14%	Higher-band spectrum share in 2018	26%	26%	26%	23%	Subscriber share in 2018	31%	24%	29%	16%
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Section	Questions
	<ul style="list-style-type: none"> <li data-bbox="331 277 2002 395"> <p>In the past 6.5 years, we have observed significant data consumption and traffic growth in our network (refer to <b>Figure 2 and 3</b>). Largely, the growth in mobile data is driven by the evolution of mobile usage to wide-ranging services. We view that the increase in mobile data demand will impact capacity requirements and QoS delivery to our customers.</p> <p><b>[Redaction 1 – Refer to Figure 2 and 3 in the Confidential Submission]</b></p> <div data-bbox="374 472 1393 788" style="border: 1px solid black; text-align: center; padding: 20px;"> <p>Figure 2 and 3</p> </div> </li> <li data-bbox="331 804 1984 879"> <p>Having optimal access to the right amount and type of spectrum will be critical to ensure consistency of experience and quality to the customers. We observed recent improvement in ‘average download speed’ with higher amount of spectrum as indicated in <b>Figure 4</b>.</p> <p><b>[Redaction 2 – Refer to Figure 4 in the Confidential Submission]</b></p> <div data-bbox="383 935 1395 1248" style="border: 1px solid black; text-align: center; padding: 20px;"> <p>Figure 4</p> </div> </li> <li data-bbox="331 1286 1953 1361"> <p>In addition, we are supportive of MCMC’s view towards a continued access on 2600MHz spectrum band (based on actual usage) in order to avoid deterioration of QoS to our customers.</p> </li> </ul>

Section	Questions
	<p><b>B. <u>Reasonable terms of award to continue incentivising investments and allowing financially sustainable operations</u></b></p> <ul style="list-style-type: none"> <li>▪ We are supportive of the Government’s view of not intending to profit from spectrum while supporting long-term customers’ welfare.               <ul style="list-style-type: none"> <li>i) <i>“We do not want to burden the consumers this way. When it is auctioned, the price skyrockets. And, there is a need for the government to look back into the previously awarded spectrum and if it has been optimised” YB Minister, The Malaysian Reserve, 24 April 2019.</i></li> <li>ii) <i>“One important principle is (that) the government does not intend to profit from any spectrum exercise. It is a critical and valuable national resource that must benefit the nation from a variety of facets based on principles of providing pervasive, high-quality and affordable access to industry and society,” MCMC Chairman, 15 April 2019.</i></li> </ul> </li> <li>▪ We view that it will be important to holistically consider reasonable total cost of ownership (“TCO”) to ensure efficient award and sustainable investment over the long-term.</li> <li>▪ In Malaysia, the <b>total cost of spectrum ownership typically covers three key components</b> i.e. upfront fee (or price component fee), annual fee and cost of roll-out obligation. Past spectrum allocations indicated the following level of cost elements (refer to <b>Figure 5</b>).</li> </ul> <p><b>[Redaction 3 – Refer to Figure 5 in Confidential Submission]</b></p> <div style="border: 1px solid black; height: 150px; width: 100%; margin: 10px 0;"></div> <p style="text-align: center;">Figure 5 – Redacted</p>

Section	Questions
	<ul style="list-style-type: none"> <li>▪ Therefore, we would like to recommend that the total cost on spectrum acquisition to consider the below principles:-               <ul style="list-style-type: none"> <li>○ Setting <b>modest spectrum prices for upfront and annual fees</b>, at the level to continue incentivising investments and allowing financially sustainable operations.</li> <li>○ <b>Avoid determining unnecessary license terms and conditions</b> (i.e. excessive roll-out obligation) and take them into account when setting prices.</li> </ul> </li> <li>▪ In addition, international studies shared similar views for efficient spectrum awards in economical manner.</li> <li>▪ GSMA's study<sup>1</sup> indicated, that "If highly prices, it may risk the ability of operators to continue provide affordable services. GSMA said that there's a "link between high spectrum spend with:-               <ul style="list-style-type: none"> <li>- <b>lower quality and reduced take-up of mobile broadband services</b></li> <li>- <b>higher consumer prices for mobile broadband data; and</b></li> <li>- <b>lost consumer welfare with a purchasing power of US\$250bn across a group of countries where spectrum was priced above the global median – equivalent to \$118 per person"</b></li> </ul> </li> <li>▪ NERA's study<sup>2</sup> provided statistical evidence in its report, that "links high spectrum costs to lower network investments and higher consumer prices, suggesting that excessive prices for spectrum licences may have an adverse impact on consumers. NERA estimates a demand function for mobile, which allows them to quantify the lost consumer surplus. Their results suggest that lost consumer surplus far outweighs the gain in auction revenues"</li> </ul>
	<p><b>C. <u>Efficient, economic, rational and optimal spectrum award</u></b></p> <ul style="list-style-type: none"> <li>▪ In summary, we recommend the following key principles in awarding spectrum in Malaysia.               <ul style="list-style-type: none"> <li>- <b>Spectrum to be efficiently and optimally utilized by:-</b> <ul style="list-style-type: none"> <li>○ <i>Maximizing the economic benefits to the country from use of the spectrum resource</i></li> <li>○ <i>Ensuring the users benefit from the use of the spectrum resource, to avoid inefficient hoarding</i></li> <li>○ <i>Balancing spectrum demand-supply equilibrium, to ensure consistency of service</i></li> </ul> </li> </ul> </li> </ul>

<sup>1</sup>GSMA's study on "Effective Spectrum Pricing", February 2017.

<sup>2</sup>NERA's study on "The Impact of High Spectrum Costs on Mobile Network Investment and Consumer Prices", May 2017.

Section	Questions
	<ul style="list-style-type: none"><li>- <b>Consider rational and economical spectrum awards:-</b><ul style="list-style-type: none"><li>o <i>Setting modest spectrum prices for upfront and annual fees, at the level to continue incentivising investments and allowing for financially sustainable operations over the long-term; and</i></li><li>o <i>Avoid determining unnecessary license terms and conditions (i.e. excessive roll-out obligation) and take them into account when setting prices</i></li></ul></li><li>- <b>Transparent process of spectrum allocation by publishing long term spectrum award plans and roadmap to provide guidance on future technologies such as 5G.</b></li></ul>



Spectrum	Questions
700MHz	<p><b>Question 1:</b> MCMC would like to seek views on the proposed allocation plan for the 700 MHz band, in particular on:-</p> <ul style="list-style-type: none"> <li>▪ Award mechanism</li> <li>▪ Timeline for assignment</li> </ul> <p><b><u>Digi's response</u></b></p> <ul style="list-style-type: none"> <li>▪ 700 MHz spectrum is an excellent band for wide area coverage and for in-building coverage. We are supportive with MCMC's view to make available 700MHz to be fully used by mobile operators to support achieving NFCP targets and improvement of QoS.</li> <li>▪ 700MHz will be important to deliver the below socio-economic benefits:- <ul style="list-style-type: none"> <li>✓ Coverage benefits: More extensive and of better quality, with better indoor coverage.</li> <li>✓ Faster speeds: Adding a 700 MHz layer will equate to higher speeds with carrier aggregation hence improving QoS to customers. This will be critical to support MCMC's NFCP ambition.</li> <li>✓ Societal benefits: Improved coverage and service for consumers, rural communities are connected quicker as a result of expanding coverage from 700MHz, lower capital costs of deployment.</li> </ul> </li> <li>▪ We would also like MCMC to consider maximising the license validity period of the said Spectrum Assignment to 20 years as per Spectrum Regulations 2000, Regulation 17.</li> <li>▪ We are supportive of MCMC's proposal to allocate 700MHz in a fair, objective and transparent manner. We seek that the allocation mechanism will meet the objectives below. <ul style="list-style-type: none"> <li>✓ Reduction of spectrum scarcity: All IMT bands should be available on a technology-neutral basis.</li> <li>✓ Effective and sustainable competition: Spectrum must be distributed in such a way that there exist viable spectrum packages that can support the effective operations of mobile operators. Fair and objective assessment on spectrum award conditions and mechanisms, taking into consideration of the market structure.</li> <li>✓ Reduction of investment risk: Spectrum to be provided at long-licence duration with predictable renewal procedures, spectrum is efficiently assigned and used</li> <li>✓ Realistic spectrum pricing expectations: Able to meet wider economic value that supports long-term investment and financial sustainability of the mobile operators; and enhancing adoption and consumption of mobile services.</li> </ul> </li> </ul>

Spectrum	Questions
700MHz	<p><b>Question 2:</b> MCMC would like to seek views on the optimum spectrum block per operator for assignment of 700 MHz band.</p> <p><b><u>Digi's response</u></b></p> <ul style="list-style-type: none"> <li>▪ We are supportive of MCMC's recommendation that <b>"an assignment of less than 2x10MHz spectrum may not be ideal to deliver high data rate and this may affect the ability of operators to achieve the NFCP targets and ensure improvements of QoS"</b>.</li> <li>▪ The proposed 2x10MHz bandwidth allocations across 4 blocks will a good option to ensure a continued efficient and optimal allocation in the current market structure.</li> </ul>
2300MHz	<p><b>Question 3:</b> MCMC would like to seek views on the proposed allocation plan for the 2300 MHz band, in particular on:-</p> <p>iii) Award mechanism</p> <p>iv) Timeline for assignment</p> <p><b>Question 4:</b> MCMC would like to seek views on the optimum spectrum block per operator for assignment of 2300 MHz band.</p> <p><b><u>Digi's response</u></b></p> <ul style="list-style-type: none"> <li>▪ In responding to Question 3 and 4, we view that 2300MHz spectrum will be a useful band as TDD will be more important for future 5G services. Hence, we are supportive for:-             <ul style="list-style-type: none"> <li>- <b><i>2300MHz to be considered for mobile services allocation in Malaysia</i></b></li> <li>- <b><i>The proposed spectrum blocks allocation at 10MHz each for 2300MHz</i></b></li> <li>- <b><i>In terms of its timing, we view that 2300MHz will be useful at later stage for 5G services.</i></b></li> </ul> </li> </ul>

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2600MHz	<p><b>Question 5:</b> MCMC would like to seek views on the proposed allocation plan for the 2600 MHz band, in particular on:-</p> <ul style="list-style-type: none"> <li>iii) Award mechanism</li> <li>iv) Timeline for assignment</li> </ul> <p><b><u>Digi's response</u></b></p> <ul style="list-style-type: none"> <li>▪ 2600MHz is excellent band to support our capacity needs particularly for LTE usage, we are making full use of the 2x20MHz (including the additional 2x10MHz via spectrum sharing arrangement with Altel).</li> <li>▪ As indicated in <b>Figure 5</b>, the enhancement of our QoS is apparent. Similar to our explanation in the “General” section, we echo the need for optimal allocation of spectrum to fulfill the mobile data demand and ensuring consistency of experience to our customers.</li> <li>▪ In summary, we strongly support MCMC’s recommendations to consider reassignment of the 2600MHz band through Spectrum Assignment based on actual utilisation. This will involve direct conversion of current Apparatus Assignments held by Maxis, Celcom, U Mobile, Digi, TM/Webe and YTLC, to Spectrum Assignment as per Table 1.</li> </ul> <p><b>Table 1:</b> Proposed re-assignment in MCMC’s PI</p> <table border="1" data-bbox="436 884 1688 1246"> <thead> <tr> <th>Mobile operator</th> <th>Actual frequency utilisation</th> <th>Bandwidth</th> </tr> </thead> <tbody> <tr> <td><b>Maxis</b> (sharing arrangement with Redtone)</td> <td>2500 – 2520MHz, 2620 – 2640MHz</td> <td>2x20MHz</td> </tr> <tr> <td><b>U Mobile</b></td> <td>2520 – 2530MHz, 2640 – 2650MHz</td> <td>2x10MHz</td> </tr> <tr> <td><b>Celcom</b> (sharing arrangement with Altel)</td> <td>2530 – 2550MHz, 2650 – 2670MHz</td> <td>2x20MHz</td> </tr> <tr> <td><b>Digi</b> (sharing arrangement with Altel)</td> <td>2550 – 2570MHz, 2670 – 2690MHz</td> <td>2x20MHz</td> </tr> <tr> <td><b>TM/webe</b></td> <td>2575 – 2595MHz</td> <td>20MHz</td> </tr> <tr> <td><b>YTLC</b></td> <td>2595 – 2615MHz</td> <td>20MHz</td> </tr> </tbody> </table>	Mobile operator	Actual frequency utilisation	Bandwidth	<b>Maxis</b> (sharing arrangement with Redtone)	2500 – 2520MHz, 2620 – 2640MHz	2x20MHz	<b>U Mobile</b>	2520 – 2530MHz, 2640 – 2650MHz	2x10MHz	<b>Celcom</b> (sharing arrangement with Altel)	2530 – 2550MHz, 2650 – 2670MHz	2x20MHz	<b>Digi</b> (sharing arrangement with Altel)	2550 – 2570MHz, 2670 – 2690MHz	2x20MHz	<b>TM/webe</b>	2575 – 2595MHz	20MHz	<b>YTLC</b>	2595 – 2615MHz	20MHz
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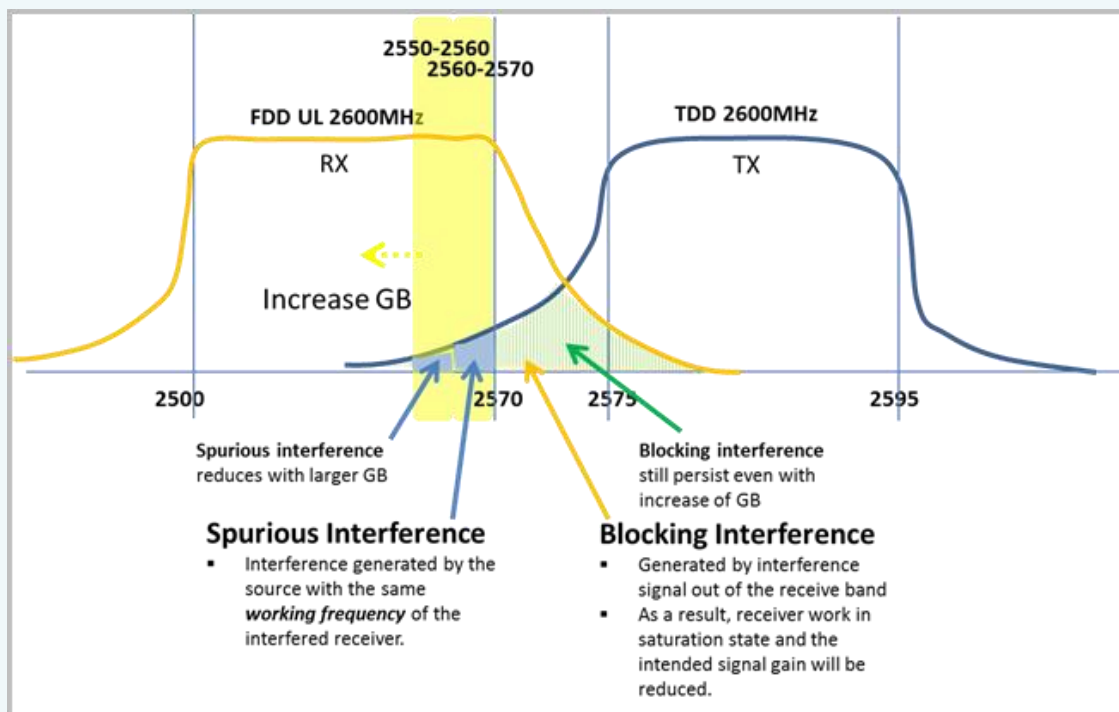
Spectrum	Questions
	<ul style="list-style-type: none"><li>▪ We are supportive of MCMC proposed timeline of assignment, whereby the conversion process of the 2600MHz band is expected to commence in the 4th Quarter of 2019 and targeted to be completed by the 2nd Quarter of 2020. We thanked MCMC for extending the Apparatus Assignment period for current 2x10MHz of allocation until 30 June 2020.</li> <li>▪ We recommend the onward reassignment on timely basis so that 2600MHz can be assigned by way of Spectrum Assignment on 1 July 2020:-<ul style="list-style-type: none"><li>- <b><i>To ensure continuity of service and avoiding any disruption of services with the proposed reassignment</i></b></li><li>- <b><i>To ensure that investments made on the additional 2x10MHz (via spectrum arrangement with Altel) can be productively continued</i></b></li></ul></li> <li>▪ We would also like MCMC to consider maximising the license validity period of the said Spectrum Assignment to 20 years as per Spectrum Regulations 2000, Regulation 17.</li></ul>

**Spectrum**      **Questions**

**Question 6:** MCMC seeks suggestions on approaches to mitigate interference between FDD and TDD blocks to facilitate efficient spectrum utilisation in the 2600 MHz band.

**Digi's response**

- We view that there are two types of interference expected from the near adjacent TDD2600 frequency towards FDD2600 based on the current assignment.



Spectrum	Questions
	<ul style="list-style-type: none"><li>▪ The interference could be mitigated through:-<ul style="list-style-type: none"><li>○ <i>Reduce TDD spurious signal interjecting into FDD receiver</i></li><li>○ <i>Reduce blocking effect with increased receiver efficiency</i></li></ul></li> <li>▪ To achieve the above, the below key principles for cross TDD/FDD coordination are proposed:-<ul style="list-style-type: none"><li>○ <i>Clear governance and support from all parties (among licensees and also with regulator).</i></li><li>○ <i>As coordination for all sites will be tedious, hence selected POC can be considered to establish clear rules for implementation (i.e. avoid line-of-sight, vertical antenna separation at co-sites, necessary level of isolation etc)</i></li><li>○ <i>Among the options to mitigate are:-</i><ul style="list-style-type: none"><li>✓ <i>Increase distance separation between TDD and FDD.</i></li><li>✓ <i>Ensure non-direct antenna facing to each other. Co-site (FDD and TDD) is preferred to manage interference easier (e.g. vertical isolation of antennas likely require much lower separation distance).</i></li><li>✓ <i>Amplifier with better band-pass (for FDD) and band-reject (for TDD) capabilities. However, this option will require much higher cost and to be evaluated thoroughly</i></li></ul></li></ul></li></ul>

Spectrum	Questions
<b>Spectrum price</b>	<p><b>Question 7:</b> MCMC would like to seek views on the appropriate range (per MHz) for SA fees (price component and annual fee component) and the rationale for the proposed fees, for the following spectrum bands:-</p> <ul style="list-style-type: none"><li>i) 700 MHz;</li><li>ii) 2300 MHz; and</li><li>iii) 2600 MHz.</li></ul> <p><b><u>Digi's response</u></b></p> <ul style="list-style-type: none"><li>▪ In Malaysia, the <b>total cost of spectrum ownership commonly covers three key components</b> i.e. upfront fee, annual fee and cost of roll-out obligation. Hence, we recommend that the total cost impact on spectrum acquisition should consider the below principles:-<ul style="list-style-type: none"><li>a. Setting <b>modest spectrum prices for upfront and annual fees</b>, at the level to continue incentivising investments and allowing for financially sustainable operations over the long-term; and</li><li>b. <b>Avoid determining unnecessary license terms and conditions</b> (i.e. excessive roll-out obligation) and take them into account when setting prices.</li></ul></li><li>▪ We recommend that the spectrum prices for 700MHz, 2300MHz and 2600MHz spectrum bands to be considered in reference to the earlier "price precedent" stipulated by MCMC at a "<b>ratio-based calculation</b>" depending on its respective propagation properties, ecosystem readiness etc.</li></ul> <p><b><u>Pricing consideration on 700MHz, 2600MHz and 2300MHz</u></b></p> <p><b>[Redaction 4 – Refer to Confidential submission]</b></p>

END.