



Maxis Berhad

SUBMISSION ON PUBLIC INQUIRY –
ALLOCATION OF SPECTRUM BANDS FOR
MOBILE BROADBAND SERVICE IN MALAYSIA

29 Aug 2019

For queries, please contact:

Mr Lam Leong Kien

Regulatory Department

Mobile: 012 3000 802 Fax: 03 2330 0513

Executive Summary

Maxis Berhad and its subsidiaries wish to thank MCMC for the opportunity to provide our views in this Public Inquiry. We support this transparent move and any further Public Inquiries on spectrum related matters, including the road map for future spectrum becoming available.

Spectrum is key to Maxis and our ability to serve Malaysians with affordable and high quality broadband services. We support the proposal to assign the 700MHz by means of beauty contest, and request that the full 2x45MHz APT Band Plan be made available. However, emphasis should be made to ensure the award of spectrum to credible operators with a minimum of 2x10MHz per operator being ideal. Timing wise, the start of assignment can be delayed for 6 months to enable a clearer view on the merger proposal that have been announced recently, which may require remedial measures, thus resulting in the use of 700MHz spectrum from 01 Jan 2021 onwards.

The complete reallocation and reassignment of the 2300MHz spectrum is welcome. As the 5G ecosystem for this band is developing, it may be worth to consider having a slightly extended timeline for the award and assignment with an extension of 6 months. Assignment can start 2Q 2020 through means of beauty contest, with availability for use in 2Q 2021. We propose that the tender assessment criteria be strict to avoid ineffective allocation of spectrum to parties who are unable to commit to a nationwide network usage. We believe that an assignment of minimum 1x20MHz per operator as ideal.

Maxis extensively uses the 2600MHz spectrum and we support the direct conversion of 2x20MHz to Maxis, with the existing frequency arrangement. We request for the expedited assignment as there will be no disruption or migration needed. Assignment and completion can be planned for 4Q 2019, and spectrum available for use immediately 01 Jan 2020 (1Q2020).

Our proposal on spectrum pricing is as follows:

	Upfront (RM,m)	Annual (RM,m)
700MHz (2x10MHz)	323.30	27.80
2300MHz (1x20MHz)	19.7	8.3
2600MHz (2x20MHz)	39.4	16.6

**Submission on Public Inquiry – Allocation of Spectrum Bands
for Mobile Broadband Service in Malaysia**

- 700MHz – as there are strict coverage targets and high Capex and Opex investment to be incurred, a 25% discount across the board on upfront and annual price components will support and incentivise rollout.
- We have benchmarked 2600MHz using the recent Malaysian 2100MHz assignment pricing as a base, and applied ratios observed elsewhere to obtain the proposed value.
- The same benchmarking methodology is used for valuing 2300MHz.

In the last section of this document, we have outlined merger recommendations which are confidential in nature for MCMC's consideration.

We thank MCMC once again for the opportunity to present views on this matter of critical importance to the country and telecommunication industry.

3. SPECTRUM ALLOCATION/RE-FARMING

3.1 700MHz Band

3.1.3 Proposed Timeline for Assignment

Question 1

MCMC would like to seek views on the proposed allocation plan for 700MHz band, in particular on:

- i. Award mechanism
- ii. Timeline for assignment

i. Award mechanism

We note that MCMC is making available the 700MHz spectrum from 703-743MHz paired with 758-798MHz. The APT Band plan provides for a wider 2x45MHz and we request MCMC to make available the remaining 2x5 block of 743-748MHz paired with 798-803MHz. This will provide more spectrum for greater industry expansion which will benefit all Malaysians. This band can be applied on top of the 2x10MHz blocks that has been proposed in paragraph 3.1.2.6 of the consultation paper.

We are supportive of a tender or beauty contest approach for the 700MHz band. Key aspects of the AIP No. 1 of 2017 can be adopted and retained, with the following considerations:

- Service rollout and coverage targets have to be adjusted to take into account the 2 year delay in spectrum award, with allowance made for collaboration, sharing and joint rollout plans under NFCP for less dense areas;
- Although the spectrum will be used for 4G at the start, the Spectrum Assignment should be technology neutral catering for 5G and beyond;
- Operators should be given the flexibility to meet service rollout and coverage on a multi-band approach. Operators should also be permitted to perform network sharing for rural areas as per plans discussed under the National Fiberisation and Connectivity Plan.
- We appreciate MCMC's concerns for speeds for consumers. However, commitments on speeds should be revisited for the valid reasons:
 - Traffic grows exponentially and renders commitments based on speed challenging to sustain, more so when clearing spectrum for mobile capacity takes time. There are fewer phones supporting carrier aggregation using 700MHz.
 - 5G will also fundamentally change an operator's approach. Best practice requires fit for purpose regulations and a focus of speed may not cater for Ultra-reliable and Low Latency Communications requirements (which may be lower in speed but require stable connectivity) and Massive Machine Type Communications. This is also a 5G Task Force recommendation for consideration.

**Submission on Public Inquiry – Allocation of Spectrum Bands
for Mobile Broadband Service in Malaysia**

- There are NFCP avenues to achieve such speed objectives, for which key mobile operators have submitted detailed plans. A 15 year spectrum requirement may not be the best method.
- **Operator proven track record and financial capability** is paramount to ensure that this key band is allocated to deserving operators who will commit to a nationwide rollout for the benefit of the nation.

The CMA allows for Spectrum Assignments to be issued for up to 20 years, and we propose this for the tenure of the blocks to be issued.

ii. Timeline for assignment

There is currently a proposed merger between Telenor and Axiata which will include their Malaysian subsidiaries of Celcom Axiata Sdn Bhd and DiGi Telecommunications Sdn Bhd. This is an important event that should be considered in the allocation of existing and new spectrum as the combined entity will have existing spectrum holdings that will be significantly more than that of the nearest competitors. Given that the timeline of the due diligence for the proposed merger is targeted to complete by this year, with the possible outcome of increased market concentration, it would be wise to delay the timeline for 700MHz for a few months with the following proposed timeline:

- Assignment process – 2Q 2020 (beauty contest)
- Process completion – 4Q 2020
- Available for use immediately on 1 Jan 2021 (1Q2021)

Additional merger considerations which are confidential in nature will be outlined in the last section of this document.

Question 2

MCMC would like to seek views on the optimum spectrum block per operator for assignment of the 700MHz band.

Optimum block per operator

We support the minimum allocation of 2x10MHz per successful tenderer in order to facilitate optimal LTE performance for a major operator, as smaller blocks are unable to deliver the desired speeds and capacity. The cost to acquire and maintain the spectrum is high, and therefore its full potential should not be hampered by regulatory decision to limit the block size to 2x5MHz, considering that radio hardware cost for supporting both 2x5MHz and 2x10MHz are the same.

The remaining 2x5MHz (to make up the APT band of 2x45MHz) can be allocated on top of an existing block.

Additional merger considerations which are confidential in nature will be outlined in the last section of this document.

3.2 2300 MHz Band

3.2.3 Proposed Timeline for Assignment

Question 3

MCMC would like to seek views on the proposed allocation plan for the 2300 MHz band, in particular on:

- i. Award mechanism
- ii. Timeline for assignment

i. Award mechanism

The 2300MHz spectrum is currently used for WIMAX services, and this technology has become obsolete. We support MCMC's decision to vacate and reassign the 2300 MHz band in its entirety, as we believe this will ensure efficient use of spectrum paired with the latest and best technology such as 4G/LTE and 5G NR.

The 5G ecosystem for this band is developing and it is anticipated that handsets will be commercially available around end 2020 or early 2021. We propose that this allocation to be technology agnostic (i.e. support 4G, 5G and technologies beyond) so that ecosystem vendors can start preparation and arrange for equipment readiness, in accordance to the timelines of MCMC's award dates.

We propose that the tender assessment criteria be strict to avoid ineffective allocation and utilisation of spectrum. In the track record assessment, the operator to be awarded spectrum should have at the time of award, have met at least 90% mobile broadband coverage. As this spectrum is most suitable for capacity rather coverage it should be made available to an existing large-scale network operator rather than a new or small scale operator, as the latter will limit the spectrum use to selected areas.

ii. Timeline for assignment

As the ecosystem is developing and is expected to be available earliest end 2020, it is possible to allow for a slightly extended timeline for award and assignment with an extension of 6 months:

- Assignment process – 2Q 2020 (beauty contest)
- Process completion – 1Q 2021
- Available for use by 2Q 2021

The CMA allows for Spectrum Assignments to be issued for up to 20 years and we propose this for the tenure of the blocks to be issued.

Question 4

MCMC would like to seek views on the optimum spectrum block per operator for assignment of the 2300 MHz band.

Optimal spectrum block per operator

Maxis supports the complete allocation of the 90MHz. However, optimally a major operator needs to secure a minimum of 1x20MHz contiguous spectrum and should not be restricted from securing 1x30MHz.

Additional merger considerations which are confidential in nature will be outlined in the last section of this document.

3.3 2600MHz Band

3.3.3 Proposed Timeline for Assignment

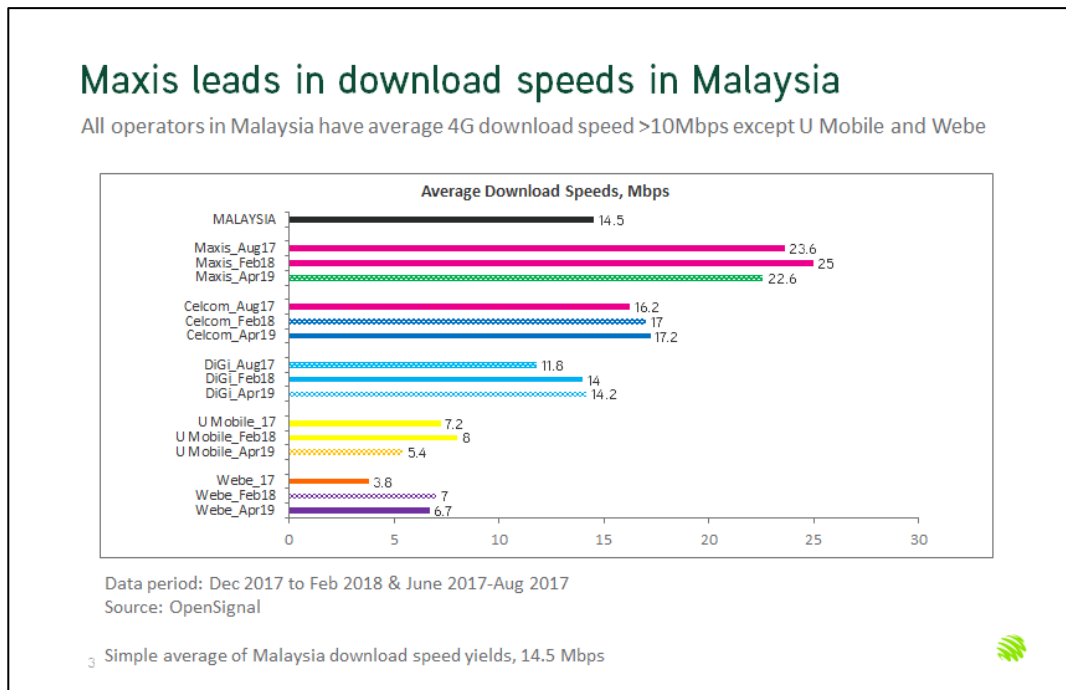
Question 5

MCMC would like to seek views on the proposed allocation plan for the 2600MHz band, in particular on:

- i. Award mechanism
- ii. Timeline for assignment

i. Award mechanism

Maxis have been efficiently using 2x20MHz 2600MHz since the inception of our 4G launch on 01 January 2013. We were the first operator to launch 4G in Malaysia, and have been leading in both coverage and customer experience since. The use of a large channel of 2x20MHz in this band enables significantly higher speeds and it can be seen below that Maxis consistently delivers higher speeds than other operators.



We foresee the use of this band to be 4G in the near future. As 4G rollout commitments have already been met, there should **not be any new commitments imposed for the allocation of this band.**

----- START OF MAXIS CONFIDENTIAL INFORMATION – NOT TO BE DISCLOSED -----



----- END OF MAXIS CONFIDENTIAL INFORMATION – NOT TO BE DISCLOSED -----

Given the importance of this band, Maxis supports the direct conversion and allocation based on actual usage to Maxis Broadband, Celcom, U Mobile, Digi, TM/Webe and YTLC, through Spectrum Assignments (SA). For Maxis Broadband, this would be the issuance of a Spectrum Assignment for the frequency 2500-2520MHz paired with 2620-2640MHz, and for Maxis Broadband to be named as the sole spectrum assignment holder. This proposed reassignment ensures that there is no disruption of services to our existing customers as this band is critical to mobile broadband.

The CMA allows for Spectrum Assignments to be issued for up to 20 years and we propose this for the tenure of the blocks to be issued.

ii. Timeline for assignment

We request for an expedited assignment as there will be no disruption or migration needed:

- Assignment process and completion – 4Q 2019
- Available for use immediately by 01 Jan 2020 (1Q 2020)

In the case of Maxis, the actual network and spectrum usage is entirely in the Maxis network. There will be no network disruption as there is no network change, since the conversion only involves assignment types and the assignees. The expedited process will ensure certainty and achieve efficiencies of network spend. The partner’s mobile wholesale MVNO arrangements will not be impacted from this decision.

Additional merger considerations which are confidential in nature will be outlined in the last section of this document.

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.

Mitigating Interference between FDD and TDD blocks

Base station to base station interference can be mitigated if a minimum guard band of 5MHz is assigned, and this best practice has been implemented here. Furthermore, implementation of filters and proper site deployment will address interferences. This is detailed per CEPT report 39 document. We believe that these standard approaches that are commercially available will be able to handle the issues of interference.

On UE to UE interference, performance degradation was reported to be between UEs of TDD and FDD at the downlink portion when these UEs were close to each other. The 3GPP TSG-RAN4 R4-125214 document elaborates that when TDD and FDD UEs are within 3m of each other, the user throughput of the downlink UE is affected. Even though this scenario is probable, we are not aware of any complaints from customers who have experienced this issue. The mobility aspect of the service means that the impacts are temporary in nature.

4. GENERAL PRINCIPLES – SPECTRUM PRICING

Question 7

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:

- i. 700 MHz;
- ii. 2300 MHz; and
- iii. 2600 MHz.

i. 700 MHz

The key operators have already paid significant sums for spectrum. Maxis will be paying RM2.74 billion for the 900MHz, 1800MHz and 2100MHz band over the next 15 years (RM935m already paid), and this will increase to RM3.73 billion taking into the account of 700MHz.

Band	Upfront Fee Price Component (RM m)	Annual Fee Component (RM m)	Total Fees (15 Years) (RM m)
900MHz (2x10)	436.31	37.536	999.35
1800MHz (2x20)	380.34	32.716	871.08
2100MHz* (2x15 FDD, 1x5 TDD)	118.4	50	868.4
Total	935.05	120.252	2,738.83

* For simplicity, a 15-year tenure is used for this band.

700MHz (AIP No.1 of 2017)

Band	Upfront Fee Price Component (RM m)	Annual Fee Component (RM m)	Total Fees (15 Years) (RM m)
700MHz	431.07	37.078	987.24
Total (700, 900, 1800, 2100 MHz)	1,366.12	157.33	3,726.07

The earlier proposed fees for 700MHz are quite significant, amounting to approximately RM1bn for a 15 year tenure. If the 700MHz AIP prices are maintained, a total sum of approximately RM3.73bn will be collected by MCMC. However, it is critical to understand that for 700MHz there are major differences in the Spectrum Assignment conditions compared to the other bands:

**Submission on Public Inquiry – Allocation of Spectrum Bands
for Mobile Broadband Service in Malaysia**

- The 700MHz has a requirement to deliver 98% coverage, through sole usage of this band (i.e. not in combination of other bands). Malaysian operators historically have not expanded coverage past 96%, and thus expansion beyond this requires many more sites that have not been constructed before. Approximately 1,000 **new** yet to be built sites, and upgrades on thousands of existing sites will be required, resulting in an increase of not only Capex but recurring Opex annual in terms of site rentals, local council permit fees, electricity and leased backhaul.
- There are expectations in the AIP and also the NFCP to meet speeds of an average of 30Mbps for LTE technology and beyond, for example, using carrier aggregation to achieve higher speeds:
 - Whilst Maxis speeds are currently good and respectable, Maxis has presented to MCMC that traffic continues to grow exponentially and the Capex required to maintain the high speeds are large. For example, Maxis mobile data core network traffic forecast for 2018 (calculated in 2016 during the spectrum reform exercise) were a significant underestimate of the actual for 2018, which turned out to be **twice higher**.
 - [Maxis has submitted confidential traffic data to MCMC in February, March and April 2019, which can be used as a reference of the historical and projected growth]
- We appreciate that the government wishes to provide Malaysians and the nation high quality mobile broadband services, and should these targets are to be achieved and maintained, it is necessary to reduce the cost of spectrum. An excessive total cost of ownership (including annual spectrum fees) for spectrum will divert funds from network rollout which can be better used to improve the quality of broadband, especially when there are ambitious targets set by MCMC.
- Maxis proposes a **25% discount** on the previous proposed spectrum fee be given for the 700 MHz band, in view of the huge capital expenditure that is required for deployment commitments. We also seek MCMC to consider to permit multi band usage to meet the coverage or forms of joint rollout in zone 3/4. Based on our 15 year cost estimates to rollout to 98%, such reduction is required.

Band	Upfront Fee Price Component (RM m)	Annual Fee Component (RM m)	Total Fees (15 Years) (RM m)
700MHz	431.07	37.078	987.24
Maxis proposal (25% discount)	323.30	27.80	740.43

It is also critical to understand that for IOT services, the revenues are not expected to grow significantly as these are typically low revenue services. There is unlikely to be significant revenue growth, if at all, for premium spectrum pricing in Malaysia.

**Submission on Public Inquiry – Allocation of Spectrum Bands
for Mobile Broadband Service in Malaysia**

ii. and iii. 2300MHz & 2600MHz

2300MHz and 2600MHz are short range spectrum and generally not used for coverage. A good price benchmark would be the 2100MHz Malaysian spectrum band, which is a localized reference point that Malaysian operators have paid for, and investors have recognized and taken note.

Using benchmarks from Policy Tracker, we have derived the ratios of prices paid for 2600/2100MHz:

Country	Ratio (2600/2100MHz)
UK	0.09
Germany	0.006
Hong Kong	0.53
Singapore	0.037
Taiwan	0.58

The price for 2100MHz was RM118.40m upfront and RM50m per annum, normalized to RM 78.9mil and RM 33.3mil per annum for 2x10MHz. Using the ratio for 2600/2100MHz, we arrive at the various 2600MHz benchmark prices for 2x10MHz for each of the country and derived an average price.

Country	Ratio (2600/2100MHz)	2x10 2600MHz Benchmark Price (RM, mil) Upfront Price & Annual Component
UK	0.09	7.4 & 3.1 (per annum)
Germany	0.006	0.51 & 0.22 (per annum)
Hong Kong	0.53	41.8 & 17.6 (per annum)
Singapore	0.037	0.29 & 0.12 (per annum)
Taiwan	0.58	45.8 & 19.3 (per annum)
Average		19.7 & 8.3 (per annum)

There are very few price benchmarks for 2300MHz, excluding the earlier price reference points used for WIMAX, which are not good comparison figures. As the propagation properties of

**Submission on Public Inquiry – Allocation of Spectrum Bands
for Mobile Broadband Service in Malaysia**

2300MHz and 2600MHz are similar, we propose to use the same benchmark for 2300MHz as the 2600MHz.

Band	2600MHz (2x10MHz) (RM, mil)	2300MHz (1x20MHz) (RM, mil)	2300MHz (1x10MHz) (RM, mil)
Price (RM m)	19.7	19.7	9.85
Annual Fees (RM m p.a)	8.3	8.3	4.15

Additional Considerations for Annual Spectrum Fees

There has been a move to convert assignment of mobile cellular spectrum from Apparatus Assignment basis to Spectrum Assignment. This is a welcome move to introduce long term certainty and promote greater investments among the industry.

The split of Capex and Opex for 700MHz rollout is outlined in the chart below, and the total Opex components (Opex + Annual Spectrum) is clearly the largest component of network costs amounting to 61% in the total 15 year costs. The cumulative annual Spectrum fees over 15 years alone contributes to **14% of total costs**:

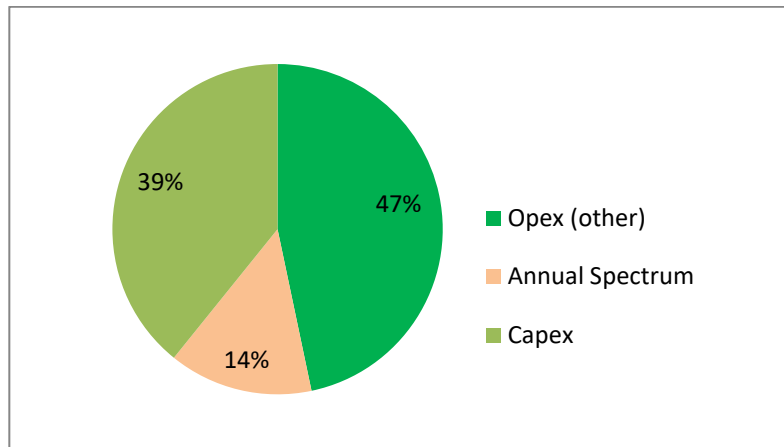


Chart: Total 15 year cost of rollout for 700MHz, Capex and Opex (Maxis estimates)

GSMA alerts that high annual fees can distort the market by discouraging interest in licences and/or raise operator costs to a level that risks creating more expensive, lower quality services. It recommends that annual fees should typically be set at modest levels, for example sufficient to recover spectrum-management costs. (Source: Effective Spectrum Pricing: Supporting better quality and more affordable mobile services. Executive summary and overview, February 2017, GSMA, p.8-9)

In comparison, we have extracted the annual spectrum fees of Hong Kong and Singapore. In situations where operators have paid significant upfront spectrum fees, we notice that the

**Submission on Public Inquiry – Allocation of Spectrum Bands
for Mobile Broadband Service in Malaysia**

subsequent annual spectrum management fees are minimal and are mainly for administrative purposes.

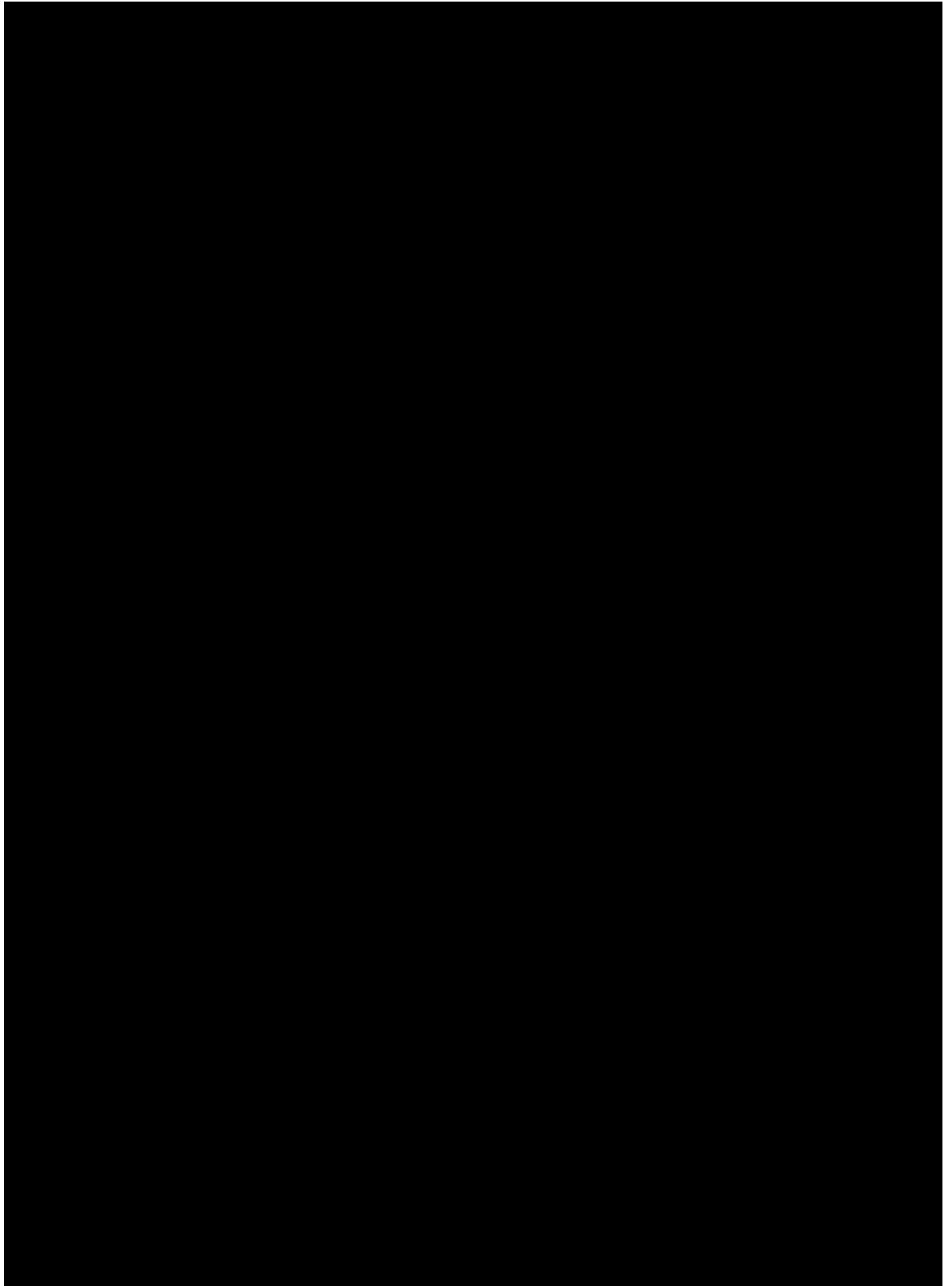
Spectrum Management Fees Paid in RM per annum

	Hong Kong (RM '000)	Singapore (RM '000)	Malaysia (RM '000)
2x10, 900MHz	518	65	37,536
2x20MHz, 1800MHz	953	83	32,716

We thus urge MCMC to consider our request for the waiver of annual spectrum fees for the new bands in this Public Inquiry, as operators are already paying large amounts for existing bands. This can also improve prospects of rollout in marginal areas as more funds are freed for expansion, more so when it is shown that the cumulative annual fees are a high percentage of total costs.

**Submission on Public Inquiry – Allocation of Spectrum Bands
for Mobile Broadband Service in Malaysia**

----- START OF MAXIS CONFIDENTIAL INFORMATION – NOT TO BE DISCLOSED -----



----- END OF MAXIS CONFIDENTIAL INFORMATION – NOT TO BE DISCLOSED -----