
CONSULTATION ON SPECTRUM FRAMEWORK FOR FOURTH GENERATION (4G) MOBILE COMMUNICATION SYSTEMS IN SINGAPORE

**Submission by StarHub Mobile Pte Ltd to the Info-
communications Development Authority of Singapore**

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1. General

StarHub Mobile Pte Ltd (“StarHub”) welcomes the opportunity to provide feedback to IDA’s consultation on the spectrum framework for fourth generation (“4G”) mobile communication systems in Singapore.

StarHub is seeing significant growth in mobile data. The increasing availability of smart phones, as well as mobile applications and mobile entertainment (e.g. video) that provide end users with an enriched mobile broadband experience, will continue to drive end users’ demand for mobile broadband. These developments increase demand for spectrum to support the growth of mobile broadband services.

StarHub believes that LTE is more likely to be the widely-adopted technology for 4G mobile communication systems, given that it is widely seen as the next evolutionally step from 3G/WCDMA & HSPA for many GSM operators (and CDMA operators too).

StarHub is also of the view that LTE deployment is likely to come earlier than 2015. LTE is likely to be deployed in the 2.5 GHz frequency first, and we therefore believe that IDA should consider allocating that frequency band sooner. StarHub favours IDA’s proposed Option A channeling plan, given that it will be in line with the ECC/DEC/(05)05 Decision, and that it would provide more spectrum for allocation in Singapore in the future.

Finally, StarHub does not see the need to impose a service provisioning and service coverage obligation on existing operators for the LTE deployment. Such obligations would be only be relevant if the spectrum is awarded to a new mobile operator to ensure that it meets its rollout commitments.

StarHub provides its specific comments to the consultation in the following section.

2. Specific Responses

Question 1

IDA invites views and comments on the projected spectrum requirements to meet end users' demand for mobile broadband beyond 2015. To what extent can the existing wireless and mobile networks support the anticipated increase in mobile traffic?

IDA also invites views and comments on the likely technologies for the deployment of 4G mobile communication system that will meet end users' mobile communication needs beyond 2015.

StarHub is seeing a significant increase in mobile data traffic, driven by the increasing availability of smart phones and mobile applications. By way of an example, StarHub's mobile data traffic grew by 430% in 2009, to 7243 terabytes. As noted in IDA's recent consultation on allocation of 3G spectrum in the 1900/2100 MHz frequency band, to meet the growing mobile data consumption by end users, existing mobile operators are already asking for more 3G spectrum to be allocated to increase the capacity of their 3G networks.

Globally, studies suggest that mobile data traffic could double every year through 2014, increasing 39 times between 2009 and 2014¹. StarHub Mobile believes that the increasing availability of smart phones, as well as mobile applications and mobile entertainment (e.g. video) that provide end users with an enriched mobile broadband experience, will continue to drive end users' demand for mobile broadband. These developments increase demand for greater use of bandwidth and hence spectrum requirements to support the growth of mobile broadband services.

With regard to the likely technologies for the deployment of 4G mobile communication system, StarHub believes that LTE is more likely to be the widely-adopted technology for 4G mobile communication systems. LTE is already seen as the next step from 3G/WCDMA & HSPA for many GSM operators but also for others too, such as CDMA operators. Several major mobile operators, including some running CDMA networks today, have indicated they will adopt LTE. For example, NTT DoCoMo and Verizon Wireless have targeted to launch their LTE services in 2010. Major vendors are also supporting the development of LTE. Compared to WIMAX, LTE has the advantage of being backwards compatible with existing GSM and HSPA networks, enabling mobile operators deploying LTE to continue to provide a seamless service across LTE and existing deployed networks. LTE would also provide better roaming experience than mobile WIMAX.

¹ Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2009-2014.

Question 2

IDA invites views and comments on the possible radio-frequency spectrum bands, besides the 700/800 MHz, 2.3 GHz and 2.5 GHz bands that would be suitable for 4G mobile communication systems and the likely timeframe for deployment. To what extent are the 900 MHz, 1800 MHz and 2.1 GHz alternative bands for 4G deployment? Are there other frequency bands that are currently not allocated but could be potential candidates for 4G system deployment?

StarHub notes that there is considerable global interest in re-farming the existing GSM 1800 MHz frequency band for the deployment of LTE. We believe that this is a strong and viable proposition for the Singapore market as the propagation characteristics will be much better than the 2.5 GHz frequency band.

Question 3

IDA invites views and comments on the demand for the 2.5 GHz band after 2015 in Singapore, and the technologies that are currently being developed for use in the 2.5 GHz band. Are these likely to complement or substitute existing networks? Please also comment on the availability of the network equipment.

As noted above, StarHub is of the view that LTE is likely to be deployed in the 2.5 GHz frequency band. In addition, LTE is likely to complement the existing deployed networks in the initial period as mobile operators seek to provide end users with higher mobile broadband access speeds. Given that LTE is an evolution from the existing 3G/WCDMA & HSPA networks, end users could fall back on these existing networks for mobile broadband access in areas where LTE coverage is not yet available, thus ensuring a stable and seamless end user experience.

Question 4

IDA invites views and comments on the paired and unpaired spectrum arrangements in the 2.5 GHz band after 2015.

StarHub agrees with IDA's view that the ECC/DEC/(05)05 Decision strikes a good balance between enabling the coexistence of FDD and TDD systems while minimizing undue guard bands needed in the 2.5 GHz frequency band. StarHub therefore supports IDA's proposed Option A spectrum channeling plan, which is in line with the ECC/DEC/(05)05 Decision.

Question 5

IDA invites views and comments on whether the size of 5 MHz guard block at the frequency boundaries between paired and unpaired spectrum is sufficient to safeguard the adjacent band. IDA also invites views on our proposal not to specify guard block requirement between licensees using the TDD or FDD band.

StarHub agrees with IDA's assessment that the size of 5 MHz guard block at the frequency boundaries between paired and unpaired spectrum is sufficient to safeguard the adjacent band. StarHub also supports IDA's proposal not to specify guard block requirement between licensees using the TDD or FDD frequency bands. StarHub believes that operators would be able to coordinate among themselves to manage any interference issues.

Question 6

IDA invites views and comments on whether allocating 5 MHz spectrum lot size is appropriate for the current technologies in the 2.5 GHz band. IDA also invites views on our proposal to allocate spectrum in individual blocks of 5 MHz and let operators who need a larger carrier size to combine multiple blocks together. Alternatively, should IDA allocate in larger blocks based on multiples of 5 MHz?

StarHub is of the view that the allocation of 5 MHz spectrum lot size is appropriate in the 2.5 GHz frequency band. StarHub also supports IDA's proposal to allocate spectrum in individual blocks of 5 MHz, letting operators who need a larger carrier size to combine multiple blocks together. However, we also believe that IDA should allow the grouping of the individual 5 MHz spectrum lots in a contiguous manner, to facilitate more efficient use of the spectrum.

Question 7

IDA invites views and comments on our proposal for an interleaved band plan with combinations of 15 MHz and 20 MHz paired spectrum blocks as well as 25 MHz of unpaired spectrum blocks available for assignment in contiguous block of 15 MHz, 20 MHz and 25 MHz respectively by IDA and whether this would be appropriate. IDA also invites views and comments on the practical measures that operators would implement to allow coexistence of BSS and mobile services in the same band in the border areas so that more spectrum blocks can be made available.

StarHub notes that the spectrum allocation in the 2.5 GHz frequency band in Singapore is subject to coordination with neighbouring countries on the adoption of a harmonised

band-plan to reduce interference issues in border areas. This band is already allocated for Broadcast Satellite Services (“BSS”) in Indonesia, and we note that different countries may have different needs. Therefore, IDA has proposed an interleaved band plan (Option B) and that the spectrum would be allocated in 15 MHz, 20 MHz and 25 MHz contiguous blocks rather than in smaller block sizes of 5 MHz.

StarHub is of the view that IDA’s proposed Option A channeling plan would be a better approach, given that it will be in line with the ECC/DEC/(05)05 Decision and that it would provide more spectrum for allocation in Singapore in the future. StarHub suggests that Singapore continue to work closely with the neighbouring countries towards the adoption of a harmonised band-plan. In addition, while LTE supports various spectrum block sizes, StarHub is of the view that it may be more appropriate for mobile operators to acquire the 2.5 GHz frequency band in the smaller block size of 5 MHz as they rollout their LTE services over time.

With the existence of BSS in Indonesia in the 2.5 GHz frequency band, StarHub notes that such BSS are typically high-power but narrow beam transmission. StarHub Mobile believes that coexistence with BSS can be managed by setting out industry guidelines governing areas such as antenna installation for LTE and the acceptable spillage.

Question 8

IDA invites views and comments on the likely technologies for the 2.3 GHz band and the availability of network equipments for use in the band. IDA also invites views on our proposal to retain the existing channeling plan for the 2.3 GHz band and to allocate the spectrum in blocks of 5 MHz when the band is re-allocated after 2015. Please also comment on whether the current amount of 50 MHz spectrum available in the 2.3 GHz band is sufficient to meet industry demands after 2015.

StarHub is of the view that there is also likely to be interest in deploying the TDD LTE networks in the 2.3 GHz frequency band. For example, in China, we understand that China Mobile is already pushing for the deployment of TDD LTE networks. TDD LTE is likely to be China Mobile's technology choice, given that it is an evolution of their homegrown 3G standard, TD-SCDMA. In Japan, Softbank is also considering the deployment of TDD LTE network.

Nonetheless, StarHub supports IDA’s proposal to retain the existing channeling plan for the 2.3 GHz frequency band with no further restrictions on the underlying technologies for 4G deployment in the frequency band, and to allocate the spectrum in blocks of 5 MHz. However, StarHub is of the view that the current amount of 50 MHz spectrum available in the 2.3 GHz band may not be sufficient to meet industry demand after 2015.

Question 9:

IDA invites views and comments on what is an appropriate timeframe for IDA to allocate the 2.3 GHz and 2.5 GHz bands. Should the allocation of the 2.3 GHz band proceed separately from that of the 2.5 GHz band, given the greater uncertainty over the timeframe in which the 2.5 GHz band would be available? If so, when would be an appropriate timeframe for IDA to allocate the 2.3 GHz band?

StarHub is of the view that LTE deployment is likely to come earlier than 2015. StarHub Mobile does not have any concerns if the 2.3 GHz frequency band and the 2.5 GHz frequency band are to be allocated separately. For the 2.5 GHz frequency band, StarHub submits that the allocation of spectrum by IDA for LTE deployment will have to be much sooner. If this spectrum can only be used to deploy LTE after 2015, existing operators may have to re-farm their existing frequencies. Depending on the progress of the analogue TV switch off, IDA could also explore the allocation of 700 MHz frequency band for LTE if this becomes available before 2015.

For the 2.3 GHz frequency band, StarHub is of the view that the spectrum can be used to deploy LTE after 2015.

Question 10:

IDA invites views and comments on what would be a fair and efficient allocation mechanism for the 2.5 GHz band. In the case where there are existing deployments in the band, should IDA grant first rights of refusal for the current right-holders?

StarHub notes IDA's belief that a market-based approach of allocating spectrum via auction is a fair and transparent way to value spectrum, which is a scarce and finite resource. However, StarHub is concerned that allocating spectrum by way of a highest-bid auction would further increase the cost of supplying mobile data services and hence undermine the adoption of these services. StarHub would propose that IDA should first assess whether the demand for the spectrum would indeed outstrip supply for the deployment of LTE. If the spectrum is available to meet the demand, then IDA and existing mobile operators could take a collegial approach towards the allocation of the spectrum that will best meet the interest of the industry and consumers.

In view of the need for earlier LTE deployment, StarHub also proposes that IDA may want to consider recovering and reallocate the spectrum earlier. StarHub submits that there it is not necessary to grant the first rights of refusal for the current spectrum right holders, given that existing right holders will already benefit from the reallocation, and it could facilitate more efficient usage of frequency spectrum.

Question 11:

IDA invites views and comments on the proposal to impose both service provisioning and coverage obligations on the operators awarded the 2.3 GHz and 2.5 GHz spectrum after 2015. In particular, what would be an appropriate service provisioning obligation and the timeframe for deployment bearing in mind that the spectrum assignment is likely to take effect only from 1 July 2015? Similarly, what would be an appropriate measure for service coverage obligation and the timeframe for deployment?

As noted above, LTE is a natural evolution from the 3G/WCDMA & HSPA technologies. This will enable mobile operators who deploy LTE networks to continue to provide a seamless service across LTE and existing deployed mobile networks. End users could fall back on these networks for mobile broadband access in areas where LTE coverage is not yet available. In addition, with the increasing demand for mobile broadband, mobile operators will have the commercial incentive to roll-out the service to meet the demand and to encourage take up. Therefore, StarHub does not see the need to impose a service provisioning and service coverage obligation on existing operators. StarHub is of the view that such obligations would only be relevant if the spectrum is awarded to a new mobile operator to ensure that it meets its rollout commitments.

3. Conclusion

StarHub welcomes the opportunity to provide feedback on IDA's consultation on the spectrum framework for 4G mobile communication systems in Singapore.

StarHub is seeing significant growth in mobile data. The increasing availability of smart phones, as well as mobile applications and mobile entertainment (e.g. video) that provide end users with an enriched mobile broadband experience, will continue to drive end users' demand for mobile broadband. These developments increase demand for spectrum to support the growth of mobile broadband services.

StarHub believes that LTE is more likely to be the widely-adopted technology for 4G mobile communication systems, given that it is seen as the next evolutionally step from 3G/WCDMA & HSPA for many GSM operators (and CDMA operators too).

StarHub is also of the view that LTE deployment is likely to come earlier than 2015. LTE is likely to be deployed in the 2.5 GHz frequency first and we believe IDA should consider allocating that frequency band sooner. StarHub favours IDA's proposed Option A channeling plan given that it will be in line with the ECC/DEC/(05)05 Decision and that it would provide more spectrum for allocation in Singapore in the future.

Finally, StarHub does not see the need to impose a service provisioning and service coverage obligation on existing operators for the LTE deployment. Such obligations

would be only be relevant if the spectrum is awarded to a new mobile operator to ensure that it meets its roll-out commitments.

StarHub is grateful for the opportunity to comment on this matter. We would also welcome the opportunity to discuss the spectrum framework for 4G mobile communication systems in Singapore with IDA in greater detail.

StarHub Mobile Pte Ltd
7 June 2010