



Office of the Communications Authority
29/F, Wu Chung House
213 Queen's Road East
Wan Chai
Hong Kong
Attention: Senior Telecommunications Engineer (Spectrum planning) 1

7 September 2017

RE: Joint Response from GSMA & GSA to the Proposed Change in the Allocation of the 3.4 – 3.7 GHz Band from Fixed Satellite Service to Mobile Service

Dear Sir or Madam:

The GSMA and the GSA would like to thank the Hong Kong Communications Authority (CA) for the opportunity to comment on the Proposed Change in the Allocation of the 3.4 – 3.7 GHz Band from Fixed Satellite Service to Mobile Service.

We welcome the CA's proposal to allocate the 3.4 – 3.7 GHz band for Mobile Service. The consultation paper rightly points out that as the demand rises for mobile broadband of even higher speed, massive connections to enable Internet of Things as well as ultra-reliable and low latency communications, there is a strong need for the CA to make available more spectrum in the coming years to support the development of existing mobile services and the coming 5G. The C-band will be one of the first frequencies to carry 5G traffic, making it a critically important band for mobile operators seeking to offer the power of the next generation mobile services to consumers and businesses, and in the process, give the HK economy a boost.

In response to the questions raised in the consultation paper, we would like to provide the following comments, where appropriate, for your kind consideration.

Question 1: What are your views on the proposed re-allocation?

The GSMA & the GSA strongly support the intent of CA's proposal to allocate additional spectrum to Mobile Service, and in this regard we consider that the proposed 100 MHz guard band between 3.6 – 3.7 GHz is overly pessimistic and conservative.

As part of the ITU process, IMT use of the C-band has already been the subject of significant deliberations. There are ITU-agreed measures designed to ensure coexistence with existing services in country and with neighbouring countries. These measures can give confidence to countries that existing services can continue to operate. Adjacent band compatibility between IMT and FSS has been thoroughly studied by the ITU, and administrations can make use of those studies when deciding the appropriate sharing criteria to adopt in terms of what guard band and power limitations, among other options. In this response, we would like to highlight two studies that are of particular relevance to Hong Kong for evaluating the appropriate size of the guard band.

Study 1:

Report ITU-R S.2368¹ provides sharing and compatibility studies between IMT and FSS in the 3.4-4.2 GHz and 4.5-4.8 GHz frequency bands. Study 9, contained in Annex 9 of this report, specifically considers size of the guard band between IMT stations operating in part of the band adjacent to the band used by FSS.

¹ *Sharing studies between International Mobile Telecommunication-Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands in the WRC study cycle leading to WRC-15, S Series, Fixed satellite service, ITU-R, https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-S.2368-2015-PDF-E.pdf*



The method used in the study represents the unwanted emissions of the interferer by a transmission mask and the out of band sensitivity of the victim also by a mask. The mask used for the IMT base station, taken from a 3GPP standard, is conservative. Little information about FSS receive masks has been found and some conservative assumptions there have been made. The study demonstrated that:

- in the case of small cell outdoor networks, a guard band of less than 4 MHz is required in order to meet the I/N threshold
- in the case of macro networks, a minimum guard band of 26 MHz is sufficient to meet the I/N threshold for all of the cases analysed.

Study 2:

The Brazilian regulator, Anatel, studied² the coexistence conditions of LTE-Advanced in the 3 400-3 600 MHz band with FSS in the 3 625-4 200 MHz band (including TVRO). Although the demarcation point is different to the 3.7 GHz in Hong Kong, the physics and technical characteristics of the systems are the same and the study is still relevant to the case in Hong Kong.

In general, the study finds that both systems can coexist harmoniously depending on the characteristics of the IMT systems and on the FSS receiver specifications. It shows that, in the Brazilian case where a 25 MHz guard band already exists between IMT and FSS, when:

- without a C-band filter, coexistence is possible with robust receiving equipment with urban small cells or some configurations of urban or suburban macrocells
- with an effective C-band filter, coexistence is possible in every scenario
- with an ineffective C-band filter, robust LNB, better antenna and reduction of the e.i.r.p of the base station in question would be able to mitigate the interference potential

This highlights an important point that is raised in the consultation paper, and we fully agree with the CA that the FSS operators should also implement the necessary mitigating measures, such as assessing the quality of the FSS equipment for the new allocation, installing/replacing filters to suit the reduced frequency range, and reconfiguring the system to only operate in the reduced frequency range.

Therefore, we would like to ask the CA to reconsider the guard band between IMT and FSS in Hong Kong and to reduce it to a lower and more appropriate level, taking into account more recent and appropriate studies, in order to maximise the amount of spectrum to be made available for IMT between 3.4-3.7 GHz.

Question 2: Do you agree with the principle of protecting existing SMATV/EFTNS/SPETS systems operating in the adjacent band of 3.7-4.2 GHz with the implementation of the mitigating measures?

We recognise the need to protect licensed services in the adjacent band of 3.7-4.2 GHz. However, standards, regulations and sharing parameters can sometimes lag behind the speed at which modern networks, be it in broadcast, mobile, satellite or any other radio service, are developing. Regulations developed for networks many generations old do not apply to mobile services and modern satellite networks. Furthermore, some ITU protection conditions or criteria being used for satellite networks were based on performance information for analogue networks three decades ago. Modern, robust networks are not comparable to the network architectures of the past and today's sharing parameters must reflect that. The compatibility study from 2006 that the CA quoted is a case in point, and we would encourage the CA to consider more recent studies in this area.

² *Coexistence conditions of LTE-Advanced at 3 400-3 600 MHz with TVRO at 3 625-4 200 MHz in Brazil*, Leandro Carisio Fernandes & Agostinho Linhares, 2017, <https://cloud.anatel.gov.br/index.php/s/pSd3OHocNNj8n1X>



We would recommend that sharing and compatibility studies must:

- Be based on realistic assumptions
- Take into account modern network characteristics
- Treat both radio services equally (the principle of the equality of right to operate is enshrined in the Radio Regulations, e.g. Radio Regulations No. 4.8, 5.36, 5.40)
- Ensure that focus is on sharing, not limiting use of the band
- Encourage development of viable ecosystems for both services

Question 3: For implementation of the Proposed Re-Allocation, please suggest or give your views about any mitigating measures to be implemented for the existing systems and services as well as any precautions to be taken for the operation of the new mobile base stations to be operating in the 3.4 – 3.6 GHz band

Please refer to our comments to Question 1, 2 & 5.

Question 4: What are your views on effecting the Proposed Re-Allocation in the early 2020, giving an advance notice period of two years if the relevant decision of the CA is made in early 2018?

We would encourage the CA to consider an earlier release of the band for IMT prior to 2020, especially as the Mainland plans to launch C-band 5G networks commercially in 2019.

Question 5:

What are your views on the need to protect the TT&C channels of the licensed satellite networks at their specific locations from any harmful interference to be caused by public mobile services?

In addition to using guard band as a mitigation measure as discussed in Question 1. Planning for geographical separation between IMT stations and TT&C stations at known locations will further help reduce the interference potential. We would encourage the CA to consider appropriate studies at ITU-R, such as the ones included in report ITU-R S.2368 related to separation distances under various deployment scenarios. We also agree that no new licences/locations should be granted for TT&C in the band 3.4-3.7 GHz.

Question 6:

Do you have any views on other aspects of or issues relevant to this consultation?

In many leading markets, such as Mainland China, Japan, Korea and many European countries, it is expected that at least 100 MHz of spectrum per operator will be released for 5G from the 3.3-4.2 GHz and 4.4-5.0 GHz bands. 3GPP, the international group that has developed technical specifications for 3G and 4G, is now working on the first version of radio specification for 5G, namely the Release 15 5G NR. It will support a maximum carrier bandwidth of 100 MHz in the frequency bands below 6 GHz.

Considering the mobile market development and future demand for 5G in Hong Kong, we believe that the proposed 3.4-3.7 GHz band will not be sufficient to meet the market demand for 5G, especially for providing at least 100 MHz of spectrum per operator. In addition to our request to reduce the proposed guard band and to increase the spectrum available for mobile service in the 3.6-3.7 GHz band, we would also like to ask the CA to consider the possibility of the 3.3-3.4 GHz and the 4.4-5.0 GHz bands for mobile service.

Furthermore, we would like to point out that the millimetre wave frequency bands are also important for provision of 5G service, in particular to support extremely high user density and high bandwidth demand, which are addressed in the consultation paper. We encourage the CA to consider allocating millimetre wave frequency bands for the mobile service, in particular in the ranges of 24.25-29.5 GHz where there is a strong momentum globally for eco-system development before 2020, and also in the 37-43.5 GHz band which is another priority band in the Mainland. The other bands being considered under WRC-19 agenda item 1.13 are also expected to



play an important role in future mobile networks, and we would encourage the CA to continue to access the potential uses of those bands., taking into account global and regional harmonisation and the trends of 5G development in leading markets.

The GSMA and the GSA are keen to continue the close dialogue with the CA on the above matters, and would be more than happy to answer any questions.

Yours sincerely,

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About the GSMA

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 300 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai, Mobile World Congress Americas and the Mobile 360 Series conferences.

For more information, please visit the GSMA corporate website at www.gsma.com. Follow the GSMA on Twitter: [@GSMA](https://twitter.com/GSMA).

About the GSA

The GSA (Global mobile Suppliers Association, <https://gsacom.com/>) is an international organization of leading mobile communication suppliers. It develops strategies and plans, and contributes studies and technical analysis to international, regional and individual country policy-makers and regulators to facilitate the timely availability of spectrum for use by mobile network operators.