Hong Kong
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Ms. Aileen Chia
Deputy Director General (Telecoms and Post)
Infocomm Development Authority of Singapore
10 Pasir Panjang Road
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Singapore 117438

Subject: Consultation paper issued by the Info-Communications Development Authority of Singapore entitled: *Proposed Allocation of Spectrum for International Mobile Telecommunications ("IMT") and IMT-Advanced Services and Options to enhance mobile competition -- 22 April 2014*

Dear Aileen:

I write to you today with CASBAA's submission in response to IDA's above mentioned Consultation paper.

As you know, CASBAA ("Cable and Satellite Broadcasting Association of Asia") is an industry-based advocacy group dedicated to the promotion of multi-channel television via cable, satellite, broadband and wireless video networks across the Asia-Pacific region. Founded in 1991, CASBAA currently represents some 120 member companies, located in 17 Asian and Australasian countries and regions, which provide television programming to nearly 500 million homes in Asia and Australasia. In addition to multinational television networks and programmers, member corporations also comprise leading satellite operators, suppliers and manufacturers of cable and satellite technology, related business service providers, telecom companies, and new media service providers.[1]

Singapore has sought to make itself an Asian hub for the knowledge and technology-based industries that are at the center of CASBAA members' businesses; as a result many companies in the international television industry maintain regional offices and transmission facilities in Singapore, bringing substantial employment and economic benefits to the country, as well as stimulus to the creative industries. The regional broadcasting industry, and CASBAA's member companies, rely on Singapore's well-managed and secure (from interference) satellite transmission networks to maintain their businesses.

CASBAA wishes to make a submission only on issues in connection with the possible use of the 3.5 GHz band for IMT services. In reply to **Question 8** of the Consultation paper, CASBAA would like to offer the following comments:

Question 8: IDA seeks:
(a) indications of industry interest in the allocation of long term rights in the 3.5 GHz band, as well as planned services and target market segments for the use of these bands;

CASBAA and its member companies believe strongly that the main use of this frequency band should continue to be for the fixed-satellite service ("FSS") for the following reasons:

[1] For more information on CASBAA, please visit www.casbaa.com.

1) There are at least 169 C-band satellites in geostationary orbit today, providing a range of communication services. This represents about $42-51 billion of in-orbit investment, not including the investments in ground infrastructure. C-band satellites tend to have region-wide coverage areas, and provide essential connectivity to hundreds of millions of end users worldwide. C-band frequencies are used by the satellite industry to complement widespread access and increased digital capacity throughout the world, and in many cases provide a backbone role for future terrestrial mobile developments. C-band frequencies are also used by the FSS to support other important services, such as feeder links for the mobile satellite service ("MSS").

2) A considerable amount of this investment is tied to Singapore. The Singapore government is itself a major investor in satellite companies Thaicom (through Temasek and InTouch PLC) and Singtel, that provide C- band services. In addition, MediaCorp relies heavily on C-band for distribution of its Singapore programming on Channel News Asia throughout the Asian region, and particularly in Indonesia where MediaCorp's channel is transmitted unencrypted on the Telkom-1 satellite and is widely received by members of the public via C-band TVRO dishes.

3) For many countries in Asia located in areas with high rain rates, the C-band is often the only means of reliable communication. Satellite-based services using C-band frequencies in many countries are often regarded as "lifeline" services, as they may be the only service available in a remote environment. Disruption of these services means it would be impossible to provide critical communications, as C-band satellite beams cannot be satisfactorily replaced by Ku- or Ka-band systems for economic, technical and logistical reasons. Moreover, loss of C-band services in these areas would harm economic development, and prevent essential services such as program content, data distribution, and emergency services that are provided to sparsely populated areas over large distances.

4) C-band satellites have been extensively employed for disaster relief operations. In case of major disasters, such as tsunamis, earthquakes, hurricanes, etc., when "wired" telecommunication infrastructure is significantly or completely destroyed by a disaster, only radiocommunication services and, especially C-band FSS networks, can be employed for disaster relief operations providing the vital links between on-the-ground aid teams, governments, and health care facilities. C-band frequencies are vital to communications for disaster mitigation and relief, as well as economic existence and for social quality of life.

5) The expansion of the satellite telecommunications infrastructure operating in the C-band continues, and is expected to increase over the next 5 years.

(b) views on whether the use of the 3.5 GHz bands solely for the deployment of in-building mobile systems is feasible, and the underlying considerations thereof;

CASBAA does not believe that the deployment of in-building mobile systems in this frequency band is feasible. This has been demonstrated by compatibility studies that have been conducted within the ITU-R, which have studied the impact from multiple interference mechanisms on an FSS receiving Earth station from single and multiple IMT transmitters (*see* pages 18-19 of Annex 3 of JTG Document 584, 13 March 2014 (attached)).

Resolution 233 from the 2012 World Radiocommunication Conference ("WRC-12") called for an evaluation of candidate bands for future IMT systems and sharing studies associated with bands nominated. As a consequence, the Conference Preparatory Meeting ("CPM 1") set up Joint Task Group 4-5-6-7 ("JTG") in ITU-R tasked with sharing studies, including C-band frequencies.

The JTG has considered several sharing scenarios between potential future terrestrial IMT services and the FSS in C-band. The outcome of the C-band scenarios is contained in Draft New Reports ITU-

R (C-BAND DOWNLINK)[2] and ITU-R (C-BAND UPLINK)[3], and in Draft CPM text. These reports are due to be forwarded from the JTG at its final meeting in July 2014, to the parent study Groups for adoption, whilst the draft CPM Report will go directly to the CPM.
In particular, the results of the compatibility studies conducted within the JTG derived protection distances for an indoor small cell deployment considering some degree of building attenuation, as well as lower base station e.i.r.p and antenna height.

For the long-term interference criterion, the JTG compatibility studies found required separation distances that varied from about 5 kilometres to tens of kilometres. For the short-term interference criterion, the required separation distances varied from about 5 kilometres to tens of kilometres, and in some instances up to 120 kilometres. These studies concluded that both the long-term and short-term interference criteria would have to be met in order to adequately protect FSS operations.

The wide range of distances is a consequence of Earth stations in a variety of terrain conditions, assumed clutter loss, and different assumptions for the building penetration loss (0 to 20 dB). However, in a small and densely-populated country such as Singapore, even a 5-kilometre separation is manifestly impossible.

Additionally, it will be very difficult (if not impossible) for any administration to ensure that mobile IMT type systems are confined to only "in-building" operations. Some level of accidental "outdoor" use must be assumed for any mobile system. (How many of us have inadvertently left mobile devices switched on, when traveling by air?) For these cases, the outdoor protection distances as studied within the JTG must be considered. These protection distances are in the tens of kilometres for the long-term interference criterion, and for the short-term interference criterion, the required separation distances are in the tens of kilometres to distances that exceed 100 kilometres. The differences in separation distances were based on the IMT deployment (single versus aggregate interferers) and type of interference mode modeled.

We wish to offer one other bit of evidence for IDA's consideration: There is sometimes a mistaken belief that low power indoor devices operating in the FSS C-band do not cause interference into FSS C-band applications. At the request of Hong Kong's OFCA, APT and AsiaSat performed tests with UWB devices operating in the FSS C-band which have similar transmitter power densities as indoor IMT and found that there was in fact substantial harmful interference into FSS applications. (Copy of report available on request.) This study offers further support for the ITU studies that indoor IMT causes interference into FSS C-band applications.

(c) views on possible impact to end users of FSS and TVRO, if (i) the end users do not have to be migrated; or (ii) the end users have to be migrated; and

CASBAA is of the view that migration of FSS C-band end users (including TVROs) would have a very negative impact since it would be very costly but, more importantly, the use of higher frequencies would not give the availability required for many of the existing C-band applications that end users demand.

[2] *See* JTG 4-5-6-7 Chairman's Report from the February 2014 Meeting: Document 584, Annex 11, Attachment 3.

[3] *See* JTG 4-5-6-7 Chairman's Report from the February 2014 Meeting: Document 584, Annex 11, Attachment 4.

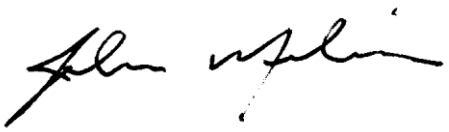
d) views on possible co-existence issues between TDD systems, and FSS and/or TVRO systems.

1) As mentioned in the IDA consultation paper, "potential cross-border interference issues with FSS will have to be addressed" when dealing with the deployment of mobile systems in the 3.5 GHz band. The existing pfd limits in the footnotes to the ITU Table of Frequency Allocations for the band 3.4 – 3.6 GHz are very strict and require large separation distances.[4] Given Singapore's location and proximity to other countries, application of these limits would eliminate virtually all outdoor IMT deployments in Singapore.

2) In addition, as detailed in the reply to question b) above, even in the case of indoor deployment of terrestrial mobile systems using the C-band there will be interference from these systems into FSS applications. Therefore, co-existence between mobile and FSS systems in the 3.5 GHz band is not feasible.

CASBAA would like to thank the IDA for the opportunity to comment on this Consultation paper and for its continuing openness to dialogue with industry sectors affected by spectrum policies.

Sincerely yours,



John Medeiros
Chief Policy Officer
CASBAA

Attachment -- Annex 3 of JTG Document 584, 13 March 2014

[4] At WRC-07, a global allocation for IMT in the C-band downlink spectrum was rejected. However, a total of 392 MHz of new spectrum were identified during the Conference for IMT systems, including a limited range of frequencies within the satellite C-band downlink band in particular countries ("opt-in countries") named in a number of footnotes to the ITU Table of Frequency Allocations. The footnotes identify the band 3400-3600 MHz (or portions thereof) for IMT, but only within those opt-in countries. The operation of IMT systems in opt-in countries is allowed on a co-primary basis, but only pursuant to stringent restrictions that establish additional protections from interference for C-band FSS earth stations in neighboring countries. Singapore is an "opt-in" country for the 3400-3600 MHz band; neighboring countries are not.