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In Flight Connectivity (IFC) – Consultation Paper 14/2017

Dear Sir,

SES WORLD SKIES Singapore Pte. Ltd., an indirect wholly owned subsidiary of SES S.A. (together “SES”), hereby submits its comments on the Telecom Regulatory Authority of India’s (“TRAI”) public consultation on In Flight Connectivity (“IFC”) (the “Consultation”). SES is a global satellite fleet operator (www.ses.com) that provides satellite capacity to many of the world’s IFC service providers and is thus interested in IFC regulatory developments in India.

SES commends the Department of Telecommunications (“DoT”) and TRAI for initiating this Consultation. It is an important first step in establishing rules that will bring the many benefits of broadband in-flight connectivity (“IFC”) via satellite to the flying public in India. Since Boeing’s introduction of a Ku-band IFC service in early 2000s, demand for IFC services via satellite have grown exponentially in recent years, and many international airlines have adopted and installed the technology on thousands of aircraft around the world.

The time is ripe for India to establish common sense rules to allow IFC services on Indian airlines and in India airspace that are based on the international standards. The Government of India should move quickly to enable the benefits of IFC services to be enjoyed by passengers on Indian airlines around the world, as well as on international airlines flying over India.

SES is pleased to offer the following recommendations and inputs regarding the questions raised by the TRAI in the Consultation.

Q.1 Which of the following IFC services be permitted in India?

- a. Internet services**
- b. Mobile Communication services (MCA service)**
- c. Both, Internet and MCA**

Appropriately authorized service providers should be allowed provide either or both types of IFC services in India. From a regulatory perspective, the provision of Internet access via Wi-Fi hotspots on the plane should be relatively simple given the use of unlicensed Wi-Fi spectrum to provide such services. The provision of MCA services on board aircraft may require additional considerations of the use of mobile spectrum on aircraft and compatibility with terrestrial mobile licensees when the plane is not in-flight. We would recommend, however, that the additional considerations associated with MCA IFC service should not delay the approval of Internet IFC service, which is by far the more commonly available form of IFC service.

India may also want to consider allowing appropriately licensed Indian Direct-to-Home (DTH) and/or teleport operators to make available approved TV channels on-board aircraft in Indian airspace. The implementation of such services could be relatively straightforward for services already licensed in India as the approved signal will already be available over Indian territory and need only be received and decoded by the antenna and associated equipment on the airplane.

Q.2 Should the global standards of AES/ESIM, shown in Table 2.1, be mandated for the provision of AMSS in Indian airspace?

Yes. AES/ESIM-equipped aircraft often fly internationally. As a result, internationally harmonized standards for AES/ESIM operations should be adopted, as far as possible.

That being said, AES/ESIM bands need not be limited to the specific satellite frequency bands mentioned in those standards. Growing passenger demand for IFC services may require the use of additional satellite downlink frequencies, and India should consider allowing the flexible use of such additional bands on a non-protected basis to meet this demand. Satellite downlink transmissions that meet the applicable ITU power flux density (pfd) limits for the protection of terrestrial services, and will therefore pose no risk harmful interference.

India may also want to consider providing additional flexibility on the uplink bands for AESs/ESIMs based on a showing that use of such bands would not cause harmful interference. For example, an AES/ESIM operating at altitude and pointed skyward towards a satellite will not radiate significant power towards the ground and would pose no risk of harmful interference into co-primary terrestrial services.

Q.3 If MCA services are permitted in Indian airspace, what measures should be adopted to prevent an airborne mobile phone from interfering with terrestrial cellular mobile network? Should it be made technology and frequency neutral or restricted to GSM services in the 1800 MHz frequency band, UMTS in the 2100 MHz band and LTE in the 1800 MHz band in line with EU regulations?

We recommend flexibility in terms of technology and frequencies for MCA services, consistent with international standards and provided no harmful interference is caused. Picocells are low power to begin with and are therefore unlikely to cause any interference to terrestrial cell networks. In any event, any outstanding concern about compatibility with India's terrestrial mobile networks could be

addressed with a minimum altitude limitation on the activation of the aircraft's picocells. As noted above, though, these additional considerations associated with MCA IFC services should not delay the introduction of much simpler Internet IFC services in India.

Q.4 Do you foresee any challenges, if the internet services be made available 'gate to gate' i.e. from the boarding gate of the departure airport until the disembarking gate at the arrival airport?

No.

Q.5 Whether the Unified Licensee having authorization for Access Service/Internet Service (Cat-A) be permitted to provide IFC services in Indian airspace in airlines registered in India?

A unified licensee with authorization for Access Service or Internet Service (Cat-A - nationwide) should be permitted to provide IFC services in Indian airspace in airlines registered in India. Access Service licenses are usually limited by service area, and a new service area – e.g. on-board aircraft in India airspace – may need to be defined for IFC services.

However, these should not be the only means by which IFC services can be authorized in India. For example, unified licensees with other kinds of authorizations should also be able to provide appropriate IFC services. These might include, e.g., unified licensees with Global Mobile Personal Communications by Satellite (GMPCS) authorization, Internet service authorization (Cat-B – “onboard aircraft”), or VSAT Closed User Group plus ISP authorization. The conditions of unified licenses may need to be modified to enable IFC services (and only IFC services) to address security concerns differently in view of their unique architecture, as discussed under Questions 13-15 below.

In view of the modifications that may be needed for IFC services under existing Unified Licence service categories, India may want to consider the creation of two distinct categories of IFC service under the Unified License – one for Internet and one for MCA – in order to enable more tailored regulatory obligations to be imposed on IFC services (as contemplated under Q.6). Indian regulation should also provide IFC service providers with the flexibility to find the business models to quickly deliver services to the public. In this regard, we would support the option of IFC service providers partnering with an appropriate Unified Licensee, as contemplated under Q.7.

Q.6 Whether a separate category of IFC Service Provider be created to permit IFC services in Indian airspace in airlines registered in India?

Yes. India may want to consider creating two separate categories of IFC Service Provider – one for Internet services and one for MCA – for the provision of IFC services in Indian airspace in airlines registered in India. Not all of the obligations and regulations that apply to a Unified Licensee authorized to provide Access Service or Internet Access may be necessary or appropriate for a service provider that is focused solely on IFC services. Creating separate categories of IFC service provider will allow more tailored regulatory obligations for such services. For instance, the unique architecture of IFC services would suggest more flexible ways of meeting security concerns, as discussed below under Questions 13-15. Given the international nature of IFC services, India may also want to consider allowing 100% foreign direct investment on the automatic route in such services in order to attract foreign investment and take advantage of the expertise and experience of international IFC providers.

Q.7 Whether an IFC service provider be permitted to provide IFC services, after entering into an agreement with Unified Licensee having appropriate authorization, in Indian airspace in airlines registered in India?

Yes. Flexibility in business models is important. Rather than obtain their own authorization, IFC service providers may find it beneficial to partner with a Unified Licensee having appropriate authorization to deliver IFC services in Indian airspace in airlines registered in India. They may find that they can provide a different or broader mix of services together than they could each have offered as easily or capably on their own. Indian regulation should not inhibit such innovation in business models.

Q.8 If response to Q.7 is YES, is there any need for separate permission to be taken by IFC service providers from DoT to offer IFC service in Indian airspace in Indian registered airlines? Should they be required to register with DoT? In such a scenario, what should be the broad requirements for the fulfillment of registration process?

No. In the scenario under Q.7, the Unified Licensee remains responsible under for its licensed IFC services and associated spectrum licenses (for the satellite backhaul and any MCA services), and the Unified Licensee should have all relevant details of the IFC service provider. Such details can be provided upon request by DoT.

Q.9 If an IFC service provider be permitted to provide IFC services in agreement with Unified Licensee having appropriate authorization in airlines registered in India, which authorization holder can be permitted to tie up with an IFC service provider to offer IFC service in Indian airspace?

As discussed above, we support multiple categories of Unified License authorizations being able to offer IFC services over Indian airspace in airlines registered in India in partnership with an IFC service provider. The appropriate category of Unified Licensee may vary depending on whether Internet or MCA IFC service is being offered. In addition, given that standard license conditions may need to be modified to address the unique characteristics of IFC services, it may be useful to establish separate categories of IFC service provider for Internet and MCA IFC services, with a more tailored set of obligations for each. Holding any of the above authorizations, or partnering with an entity that holds any of the above authorizations, should be sufficient for the provision of IFC services in Indian airspace in airlines registered in India.

Q.10 What other restrictions/regulations should be in place for the provision of IFC in the airlines registered in India.

Any other restrictions or regulations should be limited to those minimally necessary for consumer protection, the avoidance of harmful interference and security considerations (as discussed under Questions 13 to 15 below).

Q.11 What restrictions/regulations should be in place for the provision of IFC in the foreign airlines? Should the regulatory requirements be any different for an IFC service provider to offer IFC services in Indian airspace in airlines registered outside India vis-à-vis those if IFC services are provided in Indian registered airlines?

For foreign airlines operating outside Indian airspace, India has no basis to regulate the IFC services on such aircraft. For foreign aircraft operating in Indian airspace, India has the authority to regulate

but may not need to license IFC Internet services, given the international dimension of such services, because: (1) IFC Internet services on the foreign aircraft is regulated and licensed by the aircraft's country of registration; (2) such regulations will almost certainly be based on the same international IFC standards that India proposes to adopt; (3) any requirement to switch service provider when the plane is over Indian territory could disrupt the seamless IFC service that international travellers expect. Overall, a light regulatory touch is recommended for Internet IFC services on foreign aircraft flying in Indian airspace, subject to the security considerations discussed under Questions 13-15 below. In the case of foreign aircraft that fly over but that do not take-off or land in India, India may even wish to consider a license-exempt approach, given the very limited time that they will spend in Indian airspace. It would be desirable to avoid or limit duplicative licensing and regulatory obligations on AESs as they fly across multiple jurisdictions.

To the extent it uses terrestrial mobile spectrum, the provision of IFC MCA services may require somewhat greater scrutiny to ensure that there is no harmful interference to India's cellular networks, as discussed under Question 2 above. As noted above, any additional complexity associated with IFC MCA services should not hold up the approval of much simpler IFC Internet access services.

Q.12 Do you agree that the permission for the provision of IFC services can be given by making rules under Section 4 of Indian Telegraph Act, 1885?

Yes. The Indian Telegraph Act 1885 gives the Central Government broad authority to make rules relating to wireless and non-wireless telegraphs "within any part of [India]" and on ships and aircraft within or above India or its territorial waters.

Q.13 Which of the options discussed in Para 3.19 to 3.22 should be mandated to ensure control over the usage on IFC when the aircraft is in Indian airspace?

We recognize that it is important for India to address security concerns before allowing IFC. The measures for addressing the security concerns, however, should be practical and directly related to resolving the specified concern. In this case, the security concern articulated in the Consultation relates to the ability of Indian authorities to perform lawful interception of IFC traffic in Indian airspace.

Mandating the use of INSAT system, Indian Satellite System or foreign satellite capacity leased through Department of Space (Paras 3.19 and 3.22) for IFC services in Indian airspace is not necessary for ensuring that Indian authorities have the ability to lawfully intercept IFC traffic. There are other, more direct means of providing Indian authorities with the desired lawful interception capability, regardless of whether the IFC service is on an Indian satellite or a foreign satellite.

A requirement to connect all IFC traffic over India to a ground earth station located in India (Para 3.20) is one method of ensuring that Indian authorities can lawfully intercept IFC traffic, and such an obligation may be imposed regardless of whether the satellite in question is an Indian Satellite System or not. However, this is not the only method by which lawful interception capability can be provided. The same result can be achieved by requiring Indian IFC traffic that is connected to a ground station outside of India to be "mirrored" and transmitted to a secure location in India to enable lawful interception by Indian authorities, or to a node owned and operated by an Indian entity (as suggested in Para 3.21). Again, such a requirement can be imposed regardless of whether the IFC service is on an Indian or non-Indian satellite.

Given the unique architecture of IFC services, IFC service providers and/or their Unified Licensee partners (if any) should be allowed to satisfy legitimate lawful interception requirements using either of the above methods regardless of whether its service is on an Indian or non-Indian satellite.

Q.14 Should the IFC operations in the domestic flights be permitted only through INSAT system (including foreign satellite system leased through DOS)?

No. As discussed under Question 13, mandating the use of the INSAT system or foreign satellite capacity leased through the Department of Space is not necessary to enable Indian authorities to lawfully intercept IFC traffic in Indian airspace. There are other practical means of providing lawful interception capability without mandating technology choices that may not be optimal for Indian airlines or passengers in terms of quality of service or cost.

Q.15 Should the IFC operations in international flights (both Indian registered as well as foreign airlines) flying over multiple jurisdictions be permitted to use either INSAT System or foreign satellite system in Indian airspace?

IFC operations on international flights flying over multiple jurisdictions should be permitted to use either INSAT System or foreign satellite capacity while in Indian airspace. It is not necessary to limit the choice of satellite for IFC services to the INSAT System, Indian Satellites or foreign satellites leased through the Department of Space in order to address India's legitimate security concerns. The choice of satellite should ideally be determined by the optimal technical solution for the IFC service, rather than by regulatory requirements that are not necessary to meet the security concern in question. As noted under Question 13, there are several means of ensuring lawful interception for Indian authorities that can be implemented regardless of the satellite in question. Having choices in satellite capacity is particularly important for Indian and international airlines seeking to provide seamless, cost-effective IFC service to their passengers when flying across multiple jurisdictions. In addition, India should exempt international aircraft overflying India (i.e., those not taking off or landing in India) from having to use INSAT, Indian Satellite System or foreign satellite capacity leased through the Department of Space, given their limited time in Indian airspace.

**Q.16 Please suggest how the IFC service providers be charged in the following cases?
(a) Foreign registered airlines.
(b) Indian registered airlines.**

As discussed in Para 3.23 of the Consultation, an appropriately Unified Licensee that provides IFC services (whether as an expansion of existing services, as a newly categorized IFC service provider, or in partnership with an IFC service provider) will have its IFC revenues reflected in its Adjusted Gross Revenue for purposes of calculating its Licence Fee and Spectrum Usage Charge.

The Consultation makes no proposals regarding one-time entry fees. For MCA IFC providers, the one-time entry fee would likely need to be based on the fee for Access Services. As discussed above, since Access Services are limited by service area, India may need to define a new service area "onboard aircraft in Indian airspace) to facilitate deployment of MCA IFC services. The one-time entry fee for Internet IFC service providers should be easier to derive. It should be no greater than the either (1) the Internet service (Cat-A – nationwide) fee, or (2) if India were to create a new "onboard aircraft in India airspace" service area, the Internet service (Cat-B – "onboard aircraft" service area).

The Consultation also presents the option of an additional “flat annual Licence Fee of some token amount, say Rs. 1, for [the IFC provider’s] in-cabin operations, to be amended at a later stage, if need be, in public interest and for conduct of telegraph services.” However, since other categories of services under the Unified Licence are not subject to an additional flat annual licence fee, there would seem to be no basis for singling out IFC services for this additional fee (which may be a token amount today, but more substantial in the future).

In addition, as discussed above, India should consider a license-exempt approach for international aircraft overflying India (i.e., those not taking off or landing in India), given their limited time in Indian airspace. The use of the service and revenues from such flights when they are over India are likely to be very limited and impractical to breakout and collect. Besides, if multiple jurisdictions were to impose fees on overflights, IFC services on such flights would quickly become uneconomic and unaffordable.

Q.17 Should satellite frequency spectrum bands be specified for the provisioning of the IFC services or spectrum neutral approach be adopted?

As discussed under Q.2 above, we support AES/ESIM operations in the bands identified in the international standards, as set out in Para 2.4 of the Consultation. In addition, India should consider allowing the use of additional satellite downlink frequencies on a non-protected basis in order to meet IFC capacity demands. For example, AES/ESIMs are unlikely to experience interference from terrestrial fixed service, especially when operating at altitude, and so the use of such bands should be of no concern. India should also consider providing additional flexibility on the uplink bands for AESs/ESIMs based on a showing that use of such bands would not cause harmful interference. For example, an AES/ESIM operating at altitude and pointed skyward towards a satellite will not radiate significant power towards the ground and would pose no risk of harmful interference into co-primary terrestrial services.

Q.18 If stakeholders are of the view that IFC services be permitted only in specified satellite frequency bands, which frequency spectrum bands should be specified for this purpose?

As discussed under Q.2 and Q.17 above, we support AES/ESIM operations in the bands identified in the international standards, as set out in Para 2.4 of the Consultation:

Ku-band

- 14.00-14.5 GHz (Earth-to-space)
- 10.70-11.70 GHz (space-to-Earth)
- 12.50-12.75 GHz (space to Earth)

Ka-band

- 19.7-20.2 GHz (space-to-Earth)
- 29.5-30.0 GHz (Earth-to-space)

In addition, as also discussed under Q.2 and Q.17, India should consider allowing the use of additional downlink bands on a non-protected basis, especially when the AES/ESIM is at altitude and terrestrial interference is a non-issue. Additional uplink bands should also be considered based on a showing that such use would not cause harmful interference to co-primary terrestrial services.

SES thanks the TRAI for the opportunity to comment on this consultation. Please do not hesitate to contact the undersigned if you have any questions related to the above submission.

Yours Sincerely,



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