



Telecom Regulatory Authority of India



सत्यमेव जयते

Recommendations
on
In-Flight Connectivity (IFC)

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CHAPTER I: INTRODUCTION

- 1.1 The Department of Telecommunications (DoT), through its reference dated 10th August 2017 (**Annexure**) communicated that there is a proposal to introduce In-Flight Connectivity (IFC) for voice, data and video services over Indian airspace for domestic, international and overflying flights in Indian airspace and sought the recommendations of TRAI on licensing terms and conditions for provision of In-Flight connectivity (IFC) for voice, data and video services and associated issues such as entry fee, licence fee, spectrum related issues including usage charges & method of allocation and other conditions as per clause 1(1) (a) of TRAI Act 1997 as amended.
- 1.2 A consultation paper was issued on 29th September 2017 and specific issues regarding framework for IFC in India were discussed. The last date for submission of the comments was 27th October 2017 and for counter-comments it was 3rd November 2017. However, on request from the stakeholders, the last date for submission of comments and counter-comments were extended to 3rd November 2017 and 10th November 2017 respectively. The Authority received comments from 33 stakeholders and counter-comments were received from 3 stakeholders. These are available on TRAI's website www.trai.gov.in. Open House Discussion was conducted on 27th November 2017 in New Delhi.
- 1.3 Based on the inputs received from various stakeholders and its internal analysis, the Authority has finalized these recommendations. The recommendations comprise of three chapters. Chapter-I gives an introduction of the subject. In Chapter-II, the Authority analysed comments received from various stakeholders and finalized its recommendations on the framework for IFC in Indian airspace and allied issues. Chapter-III lists the recommendations.

CHAPTER- II: FRAMEWORK FOR IFC IN INDIA

A. In-Flight Connectivity (IFC) Service

2.1 In a world more connected and tech-driven than ever before, the aircraft was, not too long ago, one of the very few places on earth where we couldn't access the internet. However, today's people are increasingly accustomed to stay connected anywhere, 24/7 – driven by the need to stay in touch with family, enjoy entertainment and maintain critical business communications. Even when they fly, they want broadband connectivity equal to that they've experienced from terrestrial network and Wi-Fi hotspots on ground. These expectations are pushing up the demand for fast, seamless aircraft connectivity.

2.2 In-flight internet access is getting popular day by day. Its demand is being driven by millions of smart phones, tablets and laptop computers. In Inmarsat's annual In-flight Connectivity Survey 2016¹, it was found that 83% of passengers would prefer to fly with an airline offering in-flight connectivity and over half (55%) of all in-flight connectivity users have connected more than one device to in-flight Wi-Fi. One of the findings of that survey was that, for passengers who have experienced quality in-flight connectivity before, Wi-Fi has evolved into a clear decision-making factor when choosing an airline, ranked ahead of loyalty programmes and in-flight entertainment. The flexibility offered by connectivity allows passengers the freedom to multitask onboard, behaving as they would do at home or in the office. The evolution of passenger attitude towards onboard Wi-Fi means that where it was once seen as a novelty or luxury, it is now considered a necessity.

2.3 With the advancement in the technology, Mobile Communication on Aircraft (MCA) has also become possible. There is increasing interest in

¹ <https://www.inmarsat.com/aviation/commercial-aviation/in-flight-connectivity-survey/>

the passengers to use their mobile phones on aircraft. There are over 30 airlines already allowing mobile phone use on aircraft including: AirAsia, Air France, British Airways, Egypt Air, Emirates, Air New Zealand, Malaysia Airlines, Qatar Airways and Virgin Atlantic. Internationally, more than forty jurisdictions, including the European Union (EU), Asia, and Australia, have authorized the use of mobile communications services on aircraft².

B. IFC Services through Satellite

2.4 IFC services are generally provided through the use of mobile satellite service and are referred to as aeronautical mobile-satellite service (AMSS). A mobile earth station is installed in the Aircraft to establish backhaul link with the ground. When combined with on-board access technology (Wi-Fi or mobile networks), AMSS allows passengers to have telecom connectivity. AMSS networks are composed of three segments (Figure 1):

(a) Space Segment (SS)- It consists the satellite system that provides wide coverage;

(b) Aircraft Earth Station (AES) segment- This segment comprises of the equipment hosted on the aircraft like antenna, VSAT equipment, Wi-Fi APs etc; AES are installed on board aircraft. These are intended to provide non-safety related broadband data communication services (e.g. internet and other type of data services) to users on board.

(c) Ground Earth Segment (GES)- It consists of the Hub/ Earth station for the network at ground which controls the remote mobile earth stations and also hosts the network operation center (NOC).

² Federal Communications Commission (FCC), FCC 13-157, Notice Of Proposed Rulemaking, Released: December 13, 2013

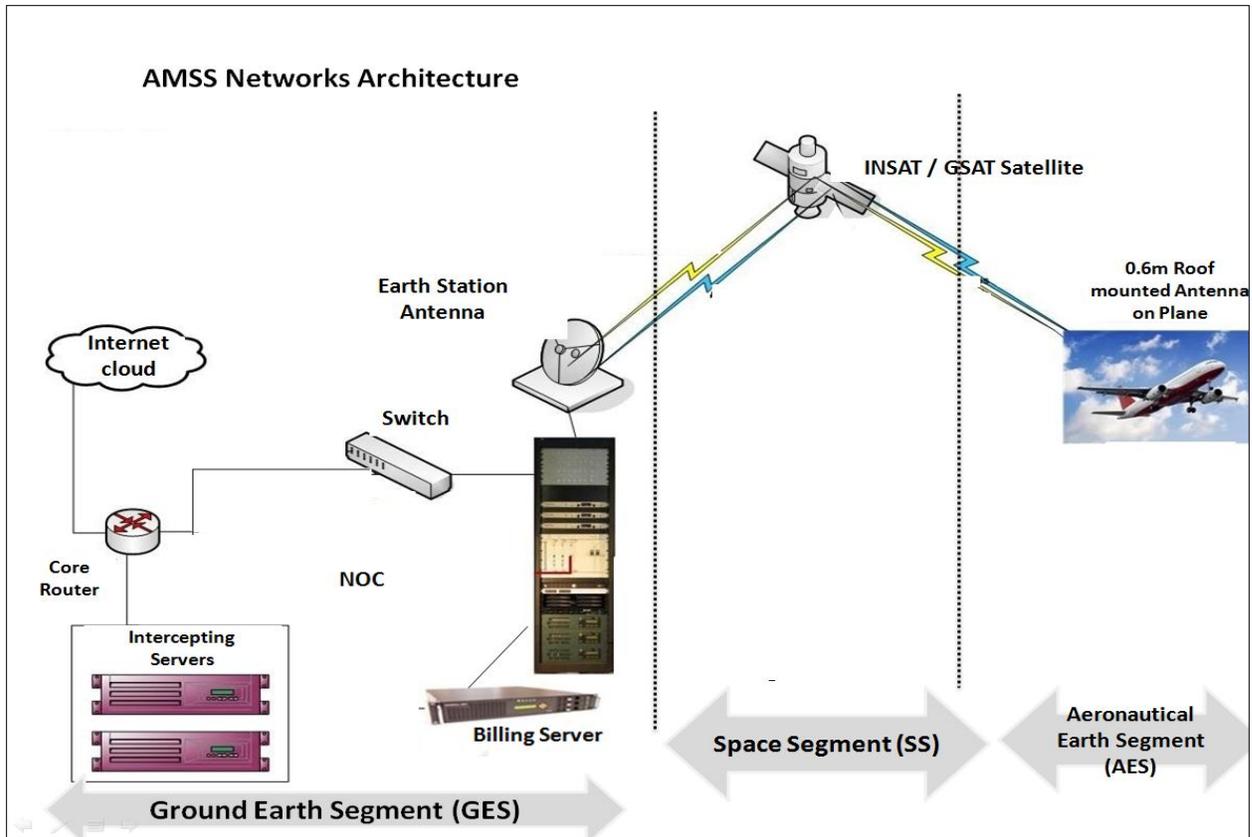


Fig 2.1: AMSS Network Architecture

C. IFC Services through Direct-Air-to-Ground Communications (DA2GC) systems

2.5 Direct-Air-to-Ground Communications (DA2GC) systems utilizes ground-based mobile broadband network for providing a cellular based backhaul to the aircraft. The onboard aircraft equipment includes one or two small antennas mounted below the fuselage, along with a compact and low-weight DA2GC Onboard Unit (OBU) with a transceiver, acting as a hub and ground interface. Ground based mobile broadband network send signals up to an aircraft's antennas. As in terrestrial telecom networks, the aircraft connects to the nearest ground based tower as it travels through different sections of airspace, with no theoretical interruptions except when the aircraft is passing over large

bodies of water. This mode therefore may provide a solution for IFC on domestic routes as there are unlikely to be large bodies of water and the mobile broadband network may be reasonably ubiquitous. DA2GC cannot be seen as a substitute technology of satellite broadband, but may complement it while providing in-flight connectivity.

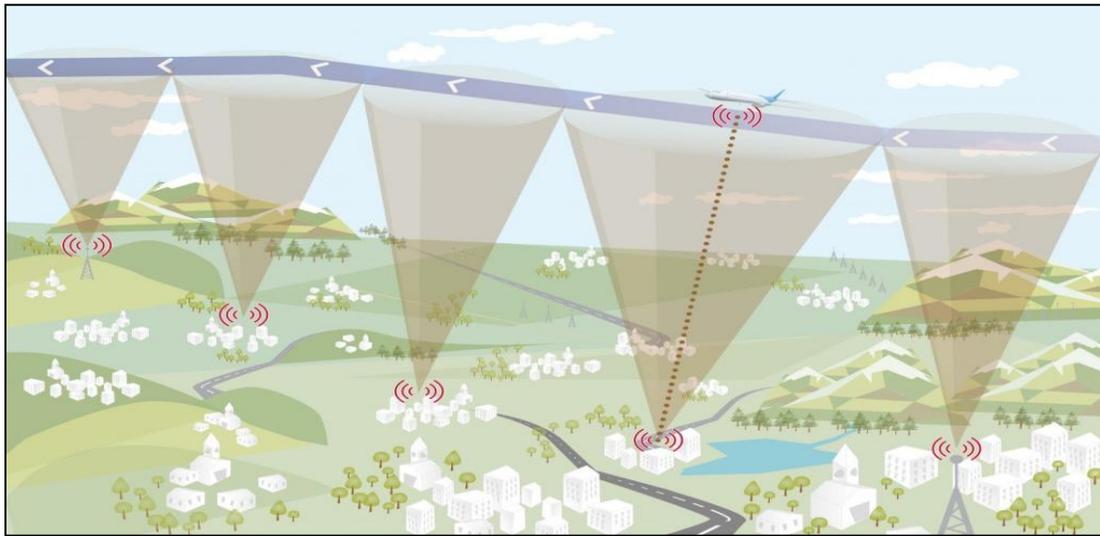


Figure 2.2: Depiction of Direct-Air-to-Ground Communications System

D. Scope of IFC services

2.6 The on-board access technology, when combined with AMSS, allows passengers to have telecom connectivity. The on-board access technology can be Wi-Fi to access Internet, e-mail, internal corporate networks etc onboard aircraft. The access technology can also be mobile network which will allow voice and text communications. Internationally, internet services onboard are provided by all the IFC service providers. However, there is a demand for Mobile Communication on Aircraft (MCA) services also. In this context, the Authority raised the issue in the CP to seek stakeholders' view as to whether only Internet services or only MCA services or both should be permitted as IFC services in India.

Comments received from the stakeholders

- 2.7 A number of stakeholders suggested that both, Internet services as well as MCA services should be allowed. Some of them submitted that MCA services should be at least permitted for foreign airlines when traversing the Indian airspace. One stakeholder commented that the advantage of MCA services is that users can use their existing mobile devices/dongles for the purpose of availing in-flight connectivity services. Another stakeholder submitted that as India is an extremely important origin/destination for international travelers and also lies along the key Europe-Asia flight path, it is critical that both these services are permitted in Indian airspace.
- 2.8 One stakeholder submitted that TRAI should consider allowing both Internet and MCA services in India. However, introduction of MCA services impacts a smaller number of passengers and the regulatory framework for MCA is currently less developed and involves more stakeholders. Therefore, as per the stakeholder, the introduction of much simpler Internet IFC services in the country should not be delayed while contemplating MCA services.
- 2.9 Many stakeholders were of the view that at present only Internet service should be considered because its demand is more than MCA service and its regulatory framework in other markets is relatively mature. Some of these stakeholders submitted that the regulatory framework for MCA is more complex and issues such as interference, roaming, single or multiple spectrum, QoS, SLA, etc. need to be addressed. Therefore, according to these stakeholders, a re-assessment could be made for MCA, once the regulatory framework for Internet services is implemented. Some of them suggested that additional considerations associated with MCA service should not delay the approval of Internet service, which is by far the more commonly available form of IFC

service. One stakeholder suggested that airlines are no longer installing MCA and Pico cell technologies; as Internet data services, messaging applications and Voice over IP is replacing most of the in-flight MCA requirements.

- 2.10 Some stakeholders submitted that Direct Air-to-Ground (A2G) communication system should also be considered for provision of IFC services. They are of the opinion that the user experience in terms of billing and 'ease of use' is better. Further, A2G based IFC services would be quicker to deploy and also more cost efficient.
- 2.11 Some stakeholders pointed out that apart from commercial airline usage of IFC, private business aircraft are also served by IFC systems. These stakeholders proposed that the rules eventually adopted by the TRAI pursuant to this consultation should also allow IFC services on board business jets and executive transport aircraft.

Analysis

- 2.12 The Authority examined the comments of all the stakeholders and noted that most of the stakeholders are in favour of permitting both, Internet services as well as MCA services. However, some stakeholders were apprehensive that since the regulatory framework of MCA services is complex, its implementation is expensive and demand is relatively low, it may delay the introduction of onboard Internet services, which is a more popular service having a relatively simpler and well established regulatory framework.
- 2.13 It would be business call of the airline whether it wants to offer internet services or MCA services or both. However, the Authority is of the view, that as long as provision of the service is technically feasible and security concerns can be addressed, there should be no regulatory barrier in the provisioning of any of these services. Therefore, both,

Internet and MCA service should be permitted as In-Flight Connectivity (IFC) services in the Indian airspace.

2.14 In view of the above, **the Authority recommends that both, Internet and Mobile Communication on Aircraft (MCA) service should be permitted as In-Flight Connectivity (IFC) in the Indian airspace.**

E. IFC Standards

2.15 Aircraft Earth Station (AES) operates on national and international airlines around the world. Therefore, it is essential that AES of aeronautical mobile-satellite service (AMSS) is in conformance with global technical standard and operational requirements. The consultation paper discussed various global standards from ITU, European Telecommunications Standards Institute (ETSI) and Electronic Communications Committee (ECC), pertaining to AES/ESIM³. Considering the importance of harmonized standards, the Authority raised the issue in the CP for comments of stakeholders on whether the global standards of AES/ESIM, shown in Table 2.1 be mandated for the provision of AMSS in Indian airspace.

Table 2.1: Global standards of AES/ESIM

Sl. No.	Organization	Standards
1.	ITU	<ul style="list-style-type: none"> • ITU-R M.1643 (06/2003) (For Ku band) • ITU-R S.2357 (06/2015) (For Ka band) • Resolution 156 (WRC-15) (For Ka band)
2.	ETSI	<ul style="list-style-type: none"> • EN 302 186 (For Ku band) • EN 303 978 (For Ka band)
3.	ECC	<ul style="list-style-type: none"> • ECC Decision (05)11For Ku band) • ECC Decision (13)01 (For Ka band)

³ ESIM (Earth Station in Motion) are functionally same as AES; however they operate in Ka Band.

Comments received from the stakeholders

- 2.16 A number of the stakeholders were of the view that the global standards of AES/ESIM, as given in the consultation paper, be mandated for the provision of AMSS in Indian airspace. Some stakeholders suggested that ITU-R M.1643 is a universally accepted standard and should be adopted. Few stakeholders commented that for the purpose of Ku-band satellites, the cited documents have provided a well-established framework for the regulation and operation of AMSS for more than a decade and have been adopted by many regulatory authorities.
- 2.17 Some stakeholders commented that the mentioned standards are widely used for the provision of IFC services. Nevertheless, some airlines' customers, registered in foreign countries, use the services operating in the L-band. According to these stakeholders, there are widely recognized standards such as ECC Decision (12)01, ITU RESOLUTION 222 (Rev .WRC 12), ETSI EN 301 473 in relation to L-band systems also, which should be permitted in Indian airspace.
- 2.18 One stakeholder supported mandating the standards in Table 2.1 for the provision of IFC services in India, with one qualification. According to the stakeholder, ECC Decisions (esp. ECC/DEC(05)11 and ECC/DEC(13)01) is likely to be amended in 2018 to reflect the new maximum EIRP and gate to gate operational rules contained in draft new ECC Report 272.
- 2.19 Some stakeholders suggested that global standards of AES/ESIM in the Consultation Paper should provide guidance on this matter. The frequency bands for AES, however, should not be limited to the specific satellite frequency bands mentioned in those standards. These stakeholders further stated that increasing 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. There were few stakeholders holding the view that the standards mentioned in Table 2.1 should not be mandated because it is not an exclusive list of IFC standards. The applicants should be allowed to demonstrate compliance with accepted international standards or equivalent operational characteristics in their IFC proposals.

- 2.20 Some stakeholders were of the opinion that In-Flight connectivity can be provided either by using satellite communications or through terrestrial A2G communications. For solutions based on satellite communications, global standards of AES/ESIM should be mandated for the provisions of Aeronautical Mobile Satellite Service (AMSS) in Indian airspace. However, these standards would not be applicable to the IFC solutions based on A2G communication system since it is based on the 3GPP standards that are used in terrestrial mobile communications.

Analysis

- 2.21 Due to the cross-border nature of air transport and related IFC services, it is a fundamental requirement that internationally recognized and harmonized standards for AES/ESIM are adopted. Therefore, it is essential that IFC services are in conformance to global technical standards and operational requirements. The consultation paper discussed various global standards from ITU, ETSI and ECC, pertaining to earth station installed on aircraft (AES/ESIM).
- 2.22 As pointed out by some stakeholders, these standards are most widely used in many countries; however, it is not an exclusive list of global standards. The list provides the current ITU and EU standards in Ku and Ka bands. AES/ESIM bands need not be limited to the specific satellite frequency bands mentioned in those standards. For instance,

IFC services are offered in L- band. In future also, there may be new bands which may be used for this purpose. A few stakeholders have also submitted that ECC Decisions (ECC/DEC (05)11 and ECC/DEC(13)01) are likely to be amended in 2018. Further, Direct A2G Communication System (DA2GC), which is based on terrestrial mobile communication, that follows the 3GPP standards.

2.23 The Authority is of the opinion that instead of specifying some specific standards, it would be prudent to permit the use of AES/ESIM which is in conformance with any relevant standards set by International standardization bodies, such as, ITU, ETSI, etc.; or set by International fora, such as 3GPP, 3GPP-2 etc. which is recognized by TEC. Further, the prescribed standards should be subject to modifications/adaptation, if any, as may be prescribed by Licensor/TEC from time to time. The Authority is also of the view that other IFC communication systems such Direct-Air-to-Ground Communications (DA2GC) systems should also be permitted provided they are in compliance of standards set by above mentioned international bodies.

2.24 In view of the above, **the Authority recommends that**

(i) The AES/ESIM should be in conformance with the relevant standards set by International standardization bodies, such as, ITU, ETSI, etc.; or set by International fora such as 3GPP, 3GPP-2 etc. as recognized by TEC and subject to modifications/adaptation, if any, as may be prescribed by Licensor/TEC from time to time.

(ii) IFC communication systems using Direct-Air-to-Ground Communications (DA2GC) should also be permitted, provided they are in compliance of standards set by international bodies mentioned in point (i) above, as

recognized by TEC and subject to modifications/adaptation, if any, as may be prescribed by Licensor/TEC from time to time.

F. Restrictions on the operations of IFC services

- 2.25 Earlier, use of mobile phone on aircraft was prohibited because of the concern about potential interference to safety-critical aircraft systems and terrestrial wireless networks. However, nowadays the use of mobile phones is permitted onboard. MCA systems are used to minimize the potential for airborne wireless devices interfering with terrestrial networks.
- 2.26 As brought out in the Consultation Paper, CEPT Report 16 dated 12th June 2007 defined the conditions under which GSM based MCA can be operated without causing harmful interference to ground-based mobile networks in the 1800 MHz band with a minimum height of at least 3000 meters above ground level. CEPT Report 48 dated 8th March 2013 defined the technical conditions under which UMTS based MCA in the 2100 MHz band or LTE based MCA system in the 1800 MHz band can be operated at height of at least 3000 meter above ground. Subsequent to CEPT Report 16 and 48, the EC allowed usage of GSM (2G) services in the 1800 MHz band, UMTS (3G) in the 2.1 GHz band and LTE (4G) in the 1800 MHz band for MCA service provisioning.
- 2.27 In this context, the Authority raised the issue in the CP to seek stakeholders' opinion on the measures that should be adopted to prevent an airborne mobile phone from interfering with terrestrial cellular mobile network if MCA services are permitted in Indian airspace. The Authority further sought stakeholders' view on whether MCA services should be permitted on technology and frequency neutral basis 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.

- 2.28 To avoid causing harmful interference to ground-based mobile networks, MCA systems are operated with a minimum height of at least 3000 meters above ground level. However, there is no such concern for the use of onboard internet services. In light of the growth of ‘gate to gate connectivity’ worldwide, as a consequence of the removal of altitude restrictions on the use of personal electronic devices (smart phones, laptop etc), stakeholders’ view were solicited through the Consultation Paper whether internet services be made available from the boarding gate of the departure airport until the disembarking gate at the arrival airport.

Comments received from the stakeholders

- 2.29 Some stakeholders submitted that technical guidance in EC Decision 2008/294/EC⁴, Commission Implementing Decision 2013/654/EU⁵ (as amended by Decision 2016/2317/EU⁶) and ECC/DEC(06)07⁷ should be considered. The technical conditions contained therein have been successfully implemented and accordingly operated over a number of years, without any emerging reason for concern about such interference. Some stakeholders suggested that if MCA is allowed then the frequency bands should be in line with EU regulations. One of these stakeholders proposed that India should adopt the measures that are currently used in UK and Europe.
- 2.30 Some stakeholders submitted that it should be made technology and frequency neutral. Further, operations may be restricted only in those frequency bands which are operational in Indian terrestrial networks.

⁴ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008D0294&from=EN>

⁵ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013D0654&from=EN>

⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016D2317&from=EN>

⁷ <http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC0607.PDF>

One stakeholder emphasized that besides airborne mobile phone not interfering with terrestrial cellular network, it should be ensured that aeronautical spectrum is protected and is not infringed upon.

- 2.31 One stakeholder submitted that compliance with accepted international standards (e.g., use of a picocell, a Network Control Unit i.e. NCU) should be sufficient. Another stakeholder suggested that applicants should be permitted to demonstrate that operation in an alternative band would not cause interference. One stakeholder was of the view that to avoid interference, a dedicated LTE band for A2G LTE backhaul may be considered.
- 2.32 Some stakeholders commented that, in the initial phase, MCA services are not desirable and is not a need of the airlines or their passengers. Mobile phones can access content and messaging services through Wi-Fi Internet services and do not need to connect with terrestrial cellular network services during flight. One of these stakeholders proposed that these considerations be studied when the matter for introduction of MCA is assessed after introduction of a regulatory framework for in-flight Wi-Fi/Internet has been well established.
- 2.33 On the issue of possible challenges if the internet services be made available 'gate to gate', a number of stakeholders submitted that they do not foresee any challenge arising from this proposal. Some of these stakeholders stated that airlines are now routinely requesting gate-to-gate operation as an integral part of the onboard internet service provision requirement. One stakeholder commented that 'gate to gate' internet operation is now permitted in countries as the United States, Japan, Australia, United Kingdom, Spain, Germany, Brazil, and many others. The stakeholder further submitted that other countries are in the process of approving "gate to gate" operations and the latest version of ECC Decision (05)11 as amended in March 2015, which includes

provisions for “gate to gate” operations, is being implemented by regulatory bodies across Europe.

- 2.34 One stakeholder suggested that this is clearly in the Civil Aviation domain and the ministry’s opinion should be sought on the same while another stakeholder was of the view that once on the ground (for mobile service) and at the gate (for Wi-Fi service), all users should access Indian communications providers only.
- 2.35 One stakeholder proposed that altitude limitations (3000 m) should be imposed, and the control of switching ON/OFF the unit should be available with crew. One view expressed was that the provision of gate-to-gate service will infringe on the rights of the PLMN/mobile network providers. Some stakeholders submitted that connectivity is already available till the time an aircraft is leaving the ground. After that IFC services can takeover. Hence, as per these stakeholders, IFC services may be made available from takeoff to landing phase. One stakeholder suggested that during the initial phase, IFC services should be restricted to a minimum altitude to protect terrestrial mobile communication services.

Analysis

- 2.36 The Authority examined the comments received from all the stakeholders. The Authority noted that, at present, EU regulations permit the use of GSM services in the 1800 MHz frequency band, UMTS in the 2100 MHz band and LTE in the 1800 MHz band. These regulations define the technical conditions under which GSM/UMTS/LTE based MCA can be operated at height of at least 3000 meter above ground. Adhering to EU regulations will help in providing interference free operations in Indian airspace.

2.37 The Authority is of the view that, in line with EU regulations, the minimum height restriction of 3000 meters can be retained for the compatibility of MCA services with terrestrial mobile networks in Indian airspace. However, there should be flexibility in terms of use of technology and frequencies for MCA services; consistent with international standards, provided no harmful interference is caused.

2.38 With regard to internet services be made available ‘gate to gate’, the Authority noted that telecom connectivity is already available through licensed service providers when the aircraft is stationary on the ground. After the closing of aircraft gates, when the aircraft is about to taxi, the passengers are asked to switch the operations of all the Portable Electronic Devices (PEDs) including cellphones to flight mode. After switching to flight mode, it is not possible to use the terrestrial network. Therefore, from this point onward, Internet Services through Wi-Fi onboard may be made available. It would ensure that there is no encroachment on the scope of terrestrial internet service provided by TSPs as well as practically there won’t be any appreciable discontinuity in the provisioning of Internet services to the fliers.

2.39 In view of the above, **the Authority recommends that:**

For MCA Services

- (i) **For MCA services, there should be flexibility to IFC service providers in terms of use of technology and frequencies inside the aircraft cabin; consistent with international standards, provided no harmful interference is caused.**
- (ii) **The operation of MCA services should be permitted with minimum height restriction of 3000 meters in Indian airspace for its compatibility with terrestrial mobile networks.**

For Internet Services

(iii) Internet Services through Wi-Fi onboard should be made available when electronic devices are permitted to be used only in flight/airplane mode. Such announcement is made after boarding is completed and the aircraft is about to taxi. It would ensure that there is no encroachment on the scope of terrestrial internet service provided by TSPs as well as practically there won't be any appreciable discontinuity in the provisioning of Internet services to the fliers.

G. Authorization for the provisioning of IFC service in Indian airspace in airlines registered in India:

2.40 There are more than one entities involved in the provisioning of IFC services, as discussed below:

(a) IFC service providers: IFC service providers operate Internet and/or MCA services in aircraft. For this purpose, they are required to associate with Satellite bandwidth providers as well as terrestrial Telecom Service Providers. Airlines/private companies/organizations owning aircraft generally tie-up with the IFC service providers for the installation, operation and/or provisioning of IFC services to their passengers.



Figure 2.3: Entities involved in the provisioning of IFC services

(b) Backhaul link providers: provide a backhaul link to transmit data between aircraft to terrestrial networks generally through satellites.

(c) Terrestrial mobile or internet service providers: The traffic at ground is handled by the terrestrial mobile service or internet service providers.

2.41 How these various functions for the provisioning of IFC services can be authorized under the licensing mechanism is the issue that has been discussed in the following section. A number of associated issues were raised in the CP which have been clubbed into four separate sub-sections.

(a) Service Provisioning inside the cabin

2.42 Satellite backhaul link providers and terrestrial mobile/internet service providers are licensed entities in the country. However, IFC service provisioning so far is prohibited in Indian airspace. There are different possible ways to authorize the provisioning of IFC services in Indian airspace. As one option, the Unified Licensee having authorization for Access Service/Internet Service (Category 'A') may be permitted to provide IFC services in Indian airspace in airlines registered in India. Another option could be that a separate category of IFC Service Provider may be created to permit IFC services. In this context, stakeholders were asked to comment whether the Unified Licensee having authorization for Access Service/ Internet Service (Category 'A') be permitted to provide IFC services in Indian airspace in airlines registered in India. Stakeholders were also requested to suggest whether a separate category of IFC Service Provider be created to permit IFC services in Indian airspace in airlines registered in India.

Comments received from the stakeholders

- 2.43 Some stakeholders commented that the existing Indian regulatory framework, including the Unified License structure and provisions, be leveraged to effectively authorize the provision of IFC services on airlines/aircraft registered in India. Some stakeholders suggested that while duly licensed operators in India may be permitted to offer IFC services; Unified licence should not be considered as a necessary condition to offer IFC, as a number of regulatory requirements of UL are not desirable for IFC services. It is important that India introduces an authorization process that is simple and not cumbersome, as in the overwhelming majority of countries that have adopted IFC services.
- 2.44 Some stakeholders submitted that for Indian airlines and Indian-registered aircraft, consideration of a separate IFC Service Provider licence approach is warranted which may enter into agreement with an existing licensee with appropriate authorization. One stakeholder opined that it is unnecessary to extend the Unified Licensing regime to IFC operations as this licensing regime was adopted for a different set of services and requiring the participation of a Unified Licensee could potentially put Indian airlines at a competitive disadvantage.
- 2.45 A number of stakeholders suggested that a separate category of IFC service provider may be created to permit IFC services in Indian airspace for aircraft registered in India. Some of them submitted that this would permit the adoption of regulatory requirements that are relevant and adapted to the nature of IFC services and ecosystem. One stakeholder proposed that 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. It will allow more tailored regulatory obligations for such services. Another stakeholder opined that while it would be most

efficient to leverage existing regulatory resources and the expertise of existing VSAT operators and CAT-A ISPs, there may be merits in considering creation of a separate “IFC Service Provider” category in due course.

- 2.46 Some stakeholders were of the view that IFC services come under the ambit of services provided under Unified Licence with Access Service/Internet Service authorization. Hence, there is no need to create a separate category of IFC Service Providers. Some of them suggested that only Unified licensees having authorization for Access Service should be permitted to provide IFC services. One stakeholder submitted that it may not be necessary to create a separate service provider; instead, existing telecom operators with unified licence can leverage the existing LTE network infrastructure to offer IFC.

Analysis

- 2.47 The Authority examined the comments of all the stakeholders. On an international flight, the aircraft flies over a number of countries. Each country may have its own rules and regulations for the provisioning of IFC services. Therefore, to provide IFC services, there should be an entity which would be a single point of contact for the airlines and which would interact with different jurisdictions to ensure that the provisioning of IFC services are in compliance with the regulations of the country over which the aircraft is flying. It would also deal with the one or more satellite operators and Internet and/or access service providers to provide telecom services to the passengers onboard. This is certainly beyond the scope of a licensed telecom entity of a particular country. Therefore, the Authority is of the view that a separate category of “IFC Service Provider” may be created to permit IFC services in Indian airspace for airlines registered in India.

2.48 In view of the above, **the Authority recommends that a separate category of “IFC Service Provider” should be created to permit IFC services in Indian airspace for airlines registered in India.**

(b) Provisioning of IFC Services by IFC Service Providers in arrangement with Unified Licensees

2.49 To provide mobile services or internet services, the service provider is required to take a Unified Licence with appropriate authorization. Therefore, if a separate category of IFC service providers is created, it may be required to take a Unified Licence. Alternatively, it may be explored whether IFC service provider be permitted to enter into agreement with a Unified Licensee (UL) having appropriate authorization for the provision of Internet as well as MCA service. In this background, the stakeholders were requested to comment upon whether an IFC service provider be permitted to provide IFC services, after entering into an agreement with Unified Licensee having appropriate authorization. The stakeholders were also requested to suggest which authorization holder can be permitted to tie up with an IFC service provider to offer IFC service in Indian airspace.

Comments received from the stakeholders

2.50 Some stakeholders submitted that it would be more appropriate if an IFC service provider is permitted to enter into agreement, with an existing licensee with appropriate authorization. One of these stakeholders submitted that flexibility in business models is important. Rather than acquiring 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. One such stakeholder suggested that with such agreements, the roles of IFC service provider and Unified Licensee

would be complementary and it would also guarantee a local presence in the provisioning of IFC services in Indian airspace.

2.51 A few stakeholders proposed that the IFC provider can be treated at par with a cyber-café. The same rules and regulations can apply. The IFC service provider should register under the “Other Service Provider” category. Once this is done, the UL can automatically provide connectivity under the existing norms.

2.52 One stakeholder submitted that, in many countries (for instance Singapore, Philippines, UAE, Oman as well as in Europe etc), IFC provider is directly authorized to provide MCA/Internet services in the aircraft registered in that country without having the need for a partnership with a local entity. However, a Unified Licensee has to be an Indian registered company. Therefore, as per the stakeholder, the alternative of permitting IFC through a partnership with a licensee holding appropriate authorizations would be a simple and efficient way of authorizing IFC services in Indian registered aircraft. Another stakeholder suggested that such an arrangement should be left to the discretion of the parties involved based on their commercial considerations rather than made a mandatory requirement to provide IFC service. In other words, an IFC service provider shall be allowed to operate independent of a Unified Licensee as well.

2.53 One stakeholder proposed that the international IFC service providers should be permitted to enter into commercial arrangements with telecom service providers having Access Service authorization for carrying their voice and data traffic. According to the stakeholder, this solution will address the associated issues related to Interconnection and other mandatory regulatory obligations like customer traceability, lawful interception and monitoring in Indian airspace and CDRs etc. However, another stakeholder emphasised that the role of IFC service

provider should be limited to installation and provision of other specialised works inside the aircraft.

- 2.54 On the issue of which authorization holder can be permitted to tie up with an IFC service provider to offer IFC service in Indian airspace, some stakeholders submitted that the appropriate category of Unified Licensee may vary depending on whether Internet or MCA service is being offered. Some of these stakeholders suggested that, for the case of onboard Internet, a duly licensed operator with the equivalent of an Internet Service authorization could be permitted to tie up with an IFC Service Provider. One stakeholder proposed that UL with Access Service or Internet Service authorization, VSAT, or GMPCS authorization should be allowed to tie up with an IFC service provider, while another stakeholder submitted that all Unified Licensee/UASL/CMSP having mobile access service permission be permitted to do so.
- 2.55 Some stakeholders were of the view that only VSAT service providers, in affiliation with IFC service providers, should be permitted to provide IFC services because the primary responsibility of providing the backhaul connectivity to the aircraft and complying with all the security guidelines rests with the VSAT service provider. One of these stakeholders submitted that providing VSAT connectivity for IFC services is no different than the existing scope of VSAT providers. Another stakeholder suggested that the VSAT service providers are well versed with the regulations of operating a Teleport. Therefore, according to the stakeholder, only the existing VSAT service providers should be permitted to provide IFC Service either by themselves or in Joint venture with a Global IFC service provider. Some stakeholders proposed that VSAT with ISP (Cat-A) authorization should be allowed to tie up with IFC service providers.

Analysis

- 2.56 The Authority examined the comments of all the stakeholders. Right authorisation under Unified Licence is required to provide any telecom service in the Indian Territory. As the international flight overflies over a number of countries, it would be too onerous if an IFC service provider is forced to take licence in each and every country. Rather than obtaining own authorization, IFC service providers may find it convenient to partner with a Unified Licensee having appropriate authorization to deliver IFC services in Indian airspace in airlines registered in India. In such a scenario, the roles of IFC service provider and Unified Licensee would be complementary and it would also guarantee a local presence in the provisioning of IFC services in Indian airspace. Therefore, the Authority is of the view that an IFC service provider be permitted to provide IFC services, after entering into an arrangement with Unified Licensee having appropriate authorization.
- 2.57 In view of the above, **the Authority recommends that an IFC service provider be permitted to provide IFC services, after entering into an arrangement with Unified Licensee having appropriate authorization.**
- 2.58 The next issue is which authorization holders can be permitted to tie up with an IFC service provider to offer IFC service in Indian airspace. As discussed above, Internet and MCA are the two services that can be provided in the aircraft cabin by the IFC service providers. Therefore, this issue needs to be examined separately for both of these services.

(i) Internet Services

- 2.59 Under the Unified Licensing (UL) regime, Licensees with Access Service or Internet Service authorizations are permitted to provide Internet services in India. Access Service Authorisations are issued Telecom

Circle wise. The location of aircraft in Indian airspace cannot be linked to a particular Telecom Circle. However, if the Earth Station Gateway is in the service area of the Unified Licensee with Access Service Authorisation, the aircraft traffic will land in the jurisdiction of the licensee. Therefore, IFC service provider should be permitted to associate with Access Service Providers to provide Internet services onboard provided the Gateway is located in the service area of the Unified Licensee with Access Service Authorisation.

- 2.60 ISP (Category 'A') authorization has nationwide service area for the provisioning of internet services. Therefore, IFC service provider should be permitted to associate with ISP (Category 'A') without any need to put any restriction on the Earth Station Gateway location as long as it is in the geographical boundaries of India.
- 2.61 The IFC service provider also needs to obtain satellite bandwidth and gateway facility unless it is planning to provide IFC services by using Direct A2G Communication System. For satellite bandwidth and gateway, an IFC service provider will have to have an arrangement with the existing UL holders with appropriate authorization(s). National Long Distance (NLD) service authorization permits the provisioning of backhaul long distance links. Use of satellite media is also permitted within the scope of authorisation. Therefore, IFC service providers should be permitted to collaborate with licensee having NLD authorizations for satellite bandwidth.
- 2.62 Licensee having Commercial VSAT CUG service authorization can also provide data connectivity between various sites scattered within territorial boundary of India using VSATs, provided the users of the service should belong to a Closed User Group (CUG). However, the VSAT licensee, after obtaining ISP licence, may use same Hub station and VSAT (remote station) to provide Internet service directly to the

subscribers, and in this case VSAT (remote station) may be used as a distribution point to provide Internet service to multiple independent subscribers. Therefore, if an IFC service provider associates with a licensee having both VSAT and ISP (Cat-‘A’) authorizations, the same licensee can provide internet services as well as the satellite bandwidth.

2.63 From the above discussion, it can be concluded that for the provisioning of Internet on-board, following UL (Authorizations) would be involved:

Table 2.2: Indian Licensee to be involved in the provisioning of Internet Service in flights in Indian airspace

IFC Service Type	With whom an IFC can partner with to provide IFC services in Indian airspace	Licensees eligible to provide the satellite bandwidth and Gateway
Internet Services	<ul style="list-style-type: none"> • UL having Access Service authorisation. • UL having Internet Service (Category –‘A’) authorization 	<ul style="list-style-type: none"> • UL having NLD Service authorization. • If an IFC service provider associates with a licensee having both VSAT and ISP (Cat-A) authorizations, the same licensee can provide the satellite bandwidth also.

2.64 In view of the above, the **Authority recommends that:**

For Internet Services

- a) **IFC service providers shall partner with a Unified Licensee having authorization for Access Service or Internet Service (category ‘A’) to provide Internet services onboard.**
- b) **If IFC service provider partners with Unified Licensee having Access Service Authorization for the provision of Internet services onboard as part of IFC, the satellite backhaul connectivity can be provided by a Unified Licensee having**

NLD Service authorization having its satellite gateway within the service area of the partnering Access Service provider.

- c) If IFC service provider partners with Unified Licensee having Internet Service (Category 'A') authorization for the provision of Internet services onboard as part of IFC, then (i) If the licensee also has the Commercial VSAT CUG service authorization, it can provide the satellite links also. Alternatively, (ii) Unified Licensee with National Long Distance (NLD) service authorization can provide the satellite links.**
- d) Necessary provisions may need to be created in the Access Service authorization, Internet Service (Category 'A') authorization, Commercial VSAT CUG service authorization and NLD service authorization.**

(ii) MCA Services

2.65 In the terrestrial mobile telephone network, BTS of a TSP is linked to the core network of the TSP. MCA services can be seen as an extension of mobile network of a TSP. The IFC service provider partners with a TSP to install a pico-cell on-board aircraft for providing MCA services. The pico-cell installed inside the aircraft is connected to the core network located in a specific country in which the partnering TSP has a licence to operate as mobile service provider. This link is established through satellite backhaul and/or terrestrial links. A separate dedicated antenna may be installed at the top of aircraft to track the satellite being used for establishing this link. Irrespective of the country over which the aircraft is flying, the traffic originated in the aircraft will need to be routed to the same core network.

- 2.66 In case the IFC service provider makes an arrangement with an Indian access service provider to install a pico-cell on-board aircraft for providing MCA services, the associated core network of the concerned access service provider shall be used. This would ensure the involvement of Indian TSP and the IFC service provider shall use the satellite gateway available in India.
- 2.67 There are several countries where IFC services are already operational and accordingly, their aircrafts are already equipped with pico cell which is connected to the core network of partnering mobile service provider. In such cases, it is practically not possible to shift to another mobile service provider; therefore, MCA over the Indian airspace seems feasible only with the existing arrangements in which partnering mobile service provider would be a foreign entity. It would require the use of foreign satellites and gateway and traffic from aircraft may not be routed through Gateway in Indian soil.
- 2.68 Above discussion implies that, to provide MCA services, there may not be any involvement of any Indian telecom licensee. However, as discussed earlier, if the IFC service provider provides Internet services, it needs to make an arrangement with Unified Licensee having appropriate authorization. Therefore, the Authority is of the view that the IFC service provider should not be permitted to provide standalone MCA services if the partnering mobile service provider is a foreign entity. The IFC service provider, willing to provide MCA services in partnership with a foreign mobile service provider, should necessarily be required to deliver onboard Internet services in arrangement with an Indian Unified Licensee with appropriate authorization.
- 2.69 From the above discussion, it can be concluded that MCA services can be offered in any of the following manner in Indian airspace:

Table 2.3: Indian Licensee to be involved in the provisioning of MCA services in Indian airspace

IFC Service Type	With whom an IFC can partner with to provide IFC services in Indian airspace	Licensees eligible to provide the satellite bandwidth and Gateway
Mobile Services (MCA)	<ul style="list-style-type: none"> • MCA services in partnership with a foreign mobile service provider. This would, however, be permitted only when the same IFC service provider is also delivering the onboard Internet services in association with an Indian Unified Licensee with appropriate authorization) 	<ul style="list-style-type: none"> • Using foreign satellites and gateway.
	<ul style="list-style-type: none"> • UL having Access Service authorisation. 	<ul style="list-style-type: none"> • UL having NLD Service authorization.

2.70 In view of the above, **the Authority recommends that:**

For MCA Services

i. IFC service providers should be permitted to provide MCA services in Indian airspace in either of the following manners:

a. When MCA service is provided in partnership with Indian Unified Licensee- Provision of MCA services by an IFC service provider shall be permitted in partnership with a Unified Licensee having authorization for Access Service. In this case, the satellite backhaul links may be provided by a Unified Licensee having authorization for NLD services having its satellite gateway within the service area of the partnering Access Service provider.

OR

b. When MCA service is provided in partnership with Foreign Mobile Service Provider- Provision of MCA services by an IFC service provider shall be permitted in partnership with a foreign mobile service provider. This would, however, be permitted only when the same IFC service provider is providing the onboard Internet services in partnership with an Indian Unified Licensee with appropriate authorization, as recommended in Para 2.64. Use of foreign satellites and gateway would be permitted for the establishment of satellite backhaul links only for the provisioning of MCA services.

c. Necessary provisions may need to be created in the Access Service authorization, Internet Service (Category 'A') authorization, Commercial VSAT CUG service authorization and NLD service authorization.

(c) Registration of IFC Service Providers

2.71 If the IFC service providers are permitted to provide IFC services in Indian airspace in airlines registered in India after entering into an agreement with Unified Licensee having appropriate authorization, next relevant issues would be (a) whether there is any need for separate permission to be taken by IFC service providers from DoT to offer IFC service and (b) whether IFC service providers be required to register with DoT and, if yes, what should be the broad requirements for the fulfillment of registration process. These issues were raised in the consultation paper and the stakeholders were requested to share their views.

2.72 Section 4 of Indian Telegraph Act 1885, inter alia, states that:

“4. Exclusive privilege in respect of telegraphs, and power to grant licenses — (1) Within [India], the Central Government shall have exclusive privilege of establishing, maintaining and working telegraphs:

Provided that the Central Government may grant a license, on such conditions and in consideration of such payments as it thinks fit, to any person to establish, maintain or work a telegraph within any part of [India]:

[*Provided* further that the Central Government may, by rules made under this Act and published in the Official Gazette, permit, subject to such restrictions and conditions as it thinks fit, the establishment, maintenance and working—

(a) of wireless telegraphs on ships within Indian territorial waters [and on aircraft within or above [India], or Indian territorial waters], and

(b) of telegraphs other than wireless telegraphs within any part of [India].”

2.73 As can be seen from above Section 4(1) (a), one option could be to give permission for the provision of IFC services by making rules under Section 4 of Indian Telegraph Act, 1885. With this background, the stakeholders were asked whether the permission for the provision of IFC services can be given by making rules under Section 4 of Indian Telegraph Act, 1885.

Comments received from the stakeholders

2.74 Some stakeholders stated that they do not find any merit in imposing additional licensing requirements on the IFC service provider. If permission is granted under a partnership with a duly licensed operator, the Unified Licensee remains responsible and should have all relevant details of the IFC service provider. Such details can be provided upon request by DoT. According to these stakeholders, access to spectrum and authorization to provide telecommunications services will be covered under the agreement with the Licensee. Therefore, a simple registration process could be an efficient way to ensure compliance. One stakeholder was of the view that if permission is granted under a

partnership with a duly licensed operator, there is no obvious need for the licensee to provide further notifications of its partner supplier. In case the IFC service provider is independent of any unified licensee, then there could be some simplified rules / processes for registration.

- 2.75 Some stakeholders proposed that the number of requirements and regulatory burdens should be minimal to assure a timely and cost-efficient provision of the services once the rules are in place. One of these stakeholders put forth the suggestion that a filing notice or submission to TRAI could be appropriate and required for the purposes of documenting the IFC service provider. Another stakeholder submitted that there is no need for IFC service provider to take separate/prior permission from DOT as informing the DOT regarding the arrangement should be sufficient.
- 2.76 A few stakeholders suggested that IFC may be permitted through online 'Registration'. Some stakeholders proposed that the IFC provider can be treated at par with a cyber-café. The same guidelines that are applicable to "Other Service Provider" category can be applied. One stakeholder was of the view that the requirements /compliances should be similar to be offered to PDOAs (Public Data Office Aggregator) or M2MSP (Machine to Machine Service Provider) using unlicensed spectrum, recommended by TRAI⁸. One stakeholder suggested that in the case of an IFC provider entering into an agreement with a Unified Licensee to provide services to Indian registered airlines in Indian airspace, separate registration of IFC providers, if required, be done with a light touch using a simple online process. A few stakeholders suggested that a separate permission should be required by way of an authorization under Unified License.

⁸PDOA: TRAI's Recommendations on Proliferation of Broadband Through Public Wi-Fi Networks dated 09.03.2017
M2MSP: Recommendations on "Spectrum, Roaming and QoS related requirements in Machine-to-Machine (M2M) Communications" dated 05.09.2017

According to one of these stakeholders, the company has to be registered in India.

- 2.77 On the issue of whether the permission for the provision of IFC services can be given by making rules under Section 4 of Indian Telegraph Act, 1885, most stakeholders were in favour of it.

Analysis

- 2.78 The Authority examined the comments of all the stakeholders. In the previous section, the Authority came to the conclusion that since the international flight overflies over a number of countries, it would be too onerous if an IFC service provider is forced to take licence in each and every country. Accordingly, the Authority recommended that an IFC service provider be permitted to provide IFC services, after entering into an agreement with Unified Licensee having appropriate authorization. As the proposed scheme mandates the involvement of a Unified Licensee, it would help in ensuring the compliance to security conditions and other national regulations. Under such a scenario, IFC service provider may be kept under a light regulation. Therefore, the Authority is of the view that IFC service provider should be required to get itself registered with the DoT and it need not necessarily be an Indian entity. These entities will have to abide by the rules and regulations put in place by the Licensor. After getting registered with DoT, IFC service providers along with the Indian licensees with whom an IFC service provider decides to tie up should make a joint application for the provision of IFC services in Indian airspace.

- 2.79 On the issue of whether the permission for the provision of IFC services can be given by making rules under Section 4 of Indian Telegraph Act 1885, the Authority noted that most of the stakeholders are in agreement with it. The Authority concurs with the view expressed by

these stakeholders and is of the opinion that permission for the provision of IFC services can be given to the registered IFC service providers by making the rules under Section 4 of Indian Telegraph Act, 1885.

2.80 In view of the above, **the Authority recommends that:**

- i. IFC service provider should be required to get itself registered with the DoT and it need not necessarily be an Indian entity.**
- ii. Permission for the provision of IFC services can be given to the registered IFC service providers by making the rules under Section 4 of Indian Telegraph Act, 1885.**
- iii. After getting registered with DoT, IFC service providers, along with the partnering Unified licensees with authorisation as recommended in Para 2.64 and Para 2.70, should make a joint application for the provision of IFC services in Indian airspace.**

(d) Regulatory Provisions of IFC in the foreign airlines

2.81 IFC services are required, within Indian airspace, not only in Indian airlines but in foreign airlines also. The concept of reciprocity (i.e. “the granting of a right or benefit by a State to a foreign airline when it has no international obligation to do so, on the condition that the same treatment will be accorded to its airline by the home State of that airline”) is used in the aviation sector. This concept stems from the Convention on International Civil Aviation (The Chicago Convention⁹). When offering IFC services, Indian airlines will overfly other countries’

⁹ Under the Chicago Convention, aircraft registered to a member country may use radio transmitter equipment over another country’s territory provided that the transmitter is licensed by the country that registered the aircraft and that said use is in compliance with the regulations of the country over which the aircraft is flying.

airspace and will expect to have the ability to provide continuity of service. The authorisation for IFC provision on foreign aircraft while overflying is already provided on a global basis, with very few exceptions. Foreign airlines, while in Indian airspace, may like to have the same rights to provide IFC services to their passengers. In this background, the stakeholders were asked to comment whether the regulatory requirements be any different for an IFC service provider to offer IFC services in Indian airspace in foreign registered airlines vis-à-vis in Indian registered airlines.

Comments received from the stakeholders

- 2.82 A number of stakeholders were of the view that foreign airlines should be subject to the same IFC operational rules as Indian airlines.
- 2.83 Some stakeholders submitted that when considering IFC provision to foreign based airlines, it is paramount to consider the principle of reciprocity. International aviation depends on the principles of reciprocity. When offering IFC services on International flights, Indian airlines will overfly other countries' airspace and will want to have the ability to provide continuity of service. Foreign airlines, while in Indian airspace, may like to have the same rights to provide IFC services to their passengers. Some stakeholders suggested that the provision of IFC services on foreign aircraft overflying Indian airspace should not be subject to licensing requirements. Such services would of course need to comply with whatever security requirements may exist.
- 2.84 One stakeholder proposed that 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. Overall, a light regulatory touch is recommended for Internet IFC services on foreign aircraft flying in

Indian airspace, subject to the security considerations. Another stakeholder submitted that it is in India's interest to implement "light-touch" regulation of foreign airlines so other countries do not impose heightened regulations on Indian airlines.

- 2.85 One stakeholder submitted that it is important that the authorization regime for foreign airlines reflect the limited amount of time spent in Indian airspace and the regulatory regime adopted by other administrations. Therefore, IFC service providers to airlines registered outside India, when providing service over Indian airspace, should have different regulations appropriate for that segment. The stakeholder recommended that a simple online process whereby IFC providers for airlines can register with the DOT, for providing IFC services in Indian airspace, may be adopted. Some stakeholders argued that airlines transiting Indian airspace should not be required to utilize Indian satellites.

Analysis

- 2.86 As discussed earlier, the international flight overflies a number of countries. Therefore, it would be too onerous if an IFC service provider is forced to take licence in each and every country. Having recommended a very light regulatory requirement for IFC service providers which is limited to getting a registration from DoT, the Authority is of the view that these requirements can easily be fulfilled by a foreign entity also. Moreover, creation of any difference between the Indian registered and foreign registered airlines is likely to disturb level playing field and may put the Indian registered airlines in disadvantageous position. Therefore, all the regulatory requirements should be same for both Indian registered and foreign registered airlines for offering IFC services in Indian Airspace.

2.87 In view of the above, **the Authority recommends that the regulatory requirements should be same for both Indian registered and foreign registered airlines for offering IFC services in Indian airspace.**

H. Lawful Interception

2.88 To ensure that the security concerns are fully addressed before permitting IFC and Lawful Interception of the traffic is possible, many possible approaches were discussed in the Consultation Paper. Various approaches discussed were (a) to mandate the use of Indian satellite system while travelling over Indian airspace, (b) to permit the use of either Indian satellite system or foreign satellite leased through DOS, (c) traffic to and from user terminals in Indian airspace may be sent to a node owned and operated by an Indian entity to address the requirement of lawful interception directly or in mirror mode.

2.89 The stakeholders were requested to comment on which one of these options should be mandated to ensure control over the usage on IFC when the aircraft is in Indian airspace. The stakeholders were also requested to suggest whether the IFC operations in the domestic flights be permitted only through INSAT system (including foreign satellite system leased through DOS) while 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.

Comments received from the stakeholders

2.90 Some stakeholders submitted that the concept of a “mirror copy gateway” to allow foreign teleports to forward Indian jurisdiction traffic to an Indian Cat-A ISP for the purpose of Indian network control and security purposes is the optimal solution to meet security requirements. One of these stakeholders commented that requiring traffic to land in a

ground station in India would be the most onerous and time-consuming solution. The stakeholders further argued that if the costs of building a ground gateway are passed on to IFC service providers, this could raise the price of providing IFC services in India. Another stakeholder submitted that any other solution that mandates the use of an Indian satellite system or foreign satellite leased through DOS, or mandates a connection to Ground Earth Stations in India would be highly restrictive to IFC providers on international flights.

- 2.91 Some stakeholders advocated mirror copy (MC) gateway solution, especially for the purpose of enabling IFC services on foreign airlines. Some of these stakeholders argued that for domestic airlines also, while the deployment of a gateway may provide the stable, long term solution; mirror copy gateway should also be considered, at least on an ad-interim basis, to allow for prompt deployment of IFC.
- 2.92 Some stakeholders were of the view that for both domestic airlines and foreign airlines operating in and out of India, an Indian gateway should be mandated. According to these stakeholders, any aircraft just overflying the Indian airspace should be kept out of the jurisdiction of this service as it is impractical to implement any rules and regulations. One of these stakeholders commented that it is in the national interest to prefer INSAT/GSAT space segment for domestic flights and foreign satellites for foreign airlines operating in and out of India.
- 2.93 Some stakeholders suggested that it should be required to use either Indian Satellite System or foreign satellite leased through DOS while it is in Indian airspace. According to one of these stakeholders, any traffic landing in a Gateway outside India with mirrored traffic for lawful interception will lead to severe security concerns as the mirrored traffic may always be tampered with and compromised leading to breach of data security.

- 2.94 Some stakeholders submitted that it is essential, given the intrinsic international nature of the service, that the option of flexibly using foreign satellites is retained. Some other stakeholders echoed this point of view suggesting that IFC service provision on international flights is across multiple countries and continents and, therefore, foreign satellite systems - especially when providing seamless global coverage - are ideally suited and should be permitted to be used. There were some stakeholders holding the view that IFC service providers should be allowed to satisfy legitimate lawful interception requirements using either of the above methods. One of these stakeholders suggested that there is no need to introduce any difference between domestic and international carriers in this respect.
- 2.95 On the option of permitting IFC operations in the domestic flights only through INSAT system (including foreign satellite system leased through DOS), some stakeholders stated that this distinction would not work efficiently in practice, as, quite often, the same aircraft can be used on both domestic and international routes, depending on airline and operational needs. These stakeholders further submitted that for aircrafts taken on lease, which is the case with most Indian airline operators, lessors would not want equipment on their aircraft that cannot be used in other countries. Some other stakeholders were of the view that requiring Indian Satellite System capacity would add cost and complexity for domestic IFC services that could make the offering non-viable and could impact the provision of seamless, redundant and quality IFC communications. One stakeholder commented that Integration of INSAT with other foreign satellite systems is complex and could cause service disruption as an aircraft switches from one system to the other. Another stakeholder suggested that international satellites should be permitted as long as the security guidelines are complied with and are coordinated with Indian satellite systems.

- 2.96 One stakeholder was of the opinion that there may not be sufficient and adequate available space segment resources in the INSAT system nor sufficient and adequate ground segment (teleport) resources available in India. The stakeholder suggested that allowing for the use of foreign satcoms' resources would help drive innovation, performance and increased supply within the Indian domestic market. Another stakeholder suggested that 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.
- 2.97 Some stakeholders suggested that since ATG technology uses LTE/4G 3GPP Lawful Intercept, there is no need to define new standards if ATG is used to provide IFC services.

Analysis

- 2.98 The Authority examined the comments of all the stakeholders. There are multiple ways in which Lawful Interception could be made to happen. A requirement to connect all IFC traffic over India to a ground earth station located in India is one method of ensuring that Indian authorities can lawfully intercept IFC traffic. 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 (Fig 2.4).
- 2.99 Some stakeholders have favoured the use of mirror mode gateway while some are in support of mandating the use of gateway in India. Some stakeholders have pointed out that building a gateway on Indian soil may be most onerous and time-consuming solution and the costs of

building a ground gateway could raise the price of providing IFC services in India. Some other stakeholders have requested to allow mirror-mode gateway solution at least in the interim period for the prompt deployment of IFC services. However, after the examination of various approaches, the Authority came to the conclusion that the deployment of a gateway in India may provide the most reliable and long-term solution (Fig 2.5). It provides an effective mechanism to lawfully intercept and monitor the in-cabin internet traffic while the aircraft is in Indian airspace. Such an obligation may be imposed regardless of whether the satellite in question is an Indian Satellite System or not.

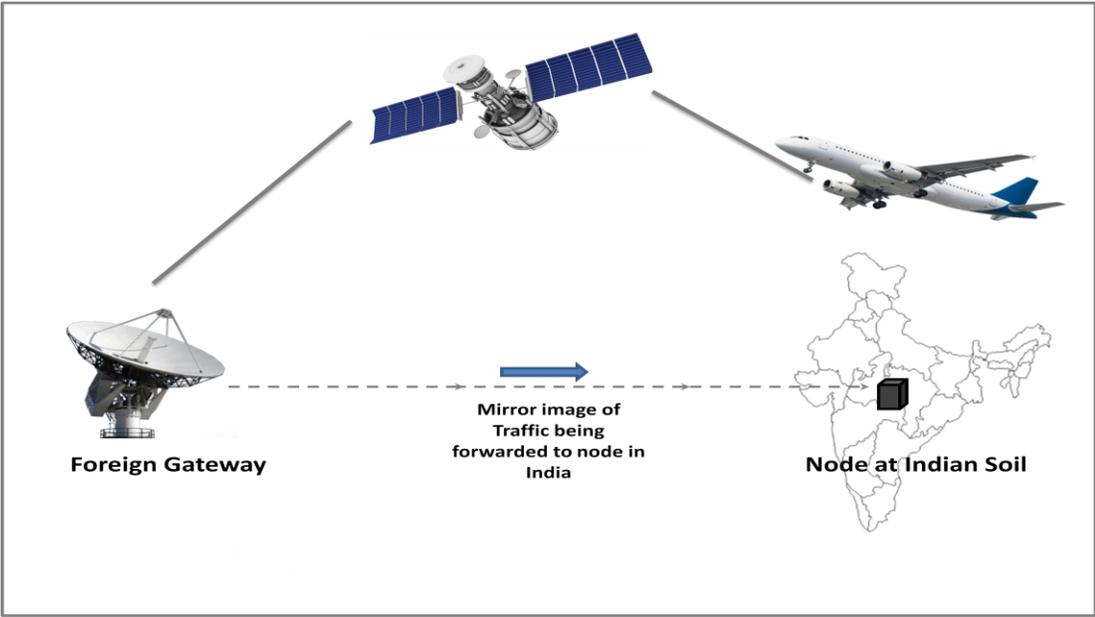


Fig 2.4: Illustration of Mirror Mode Gateway

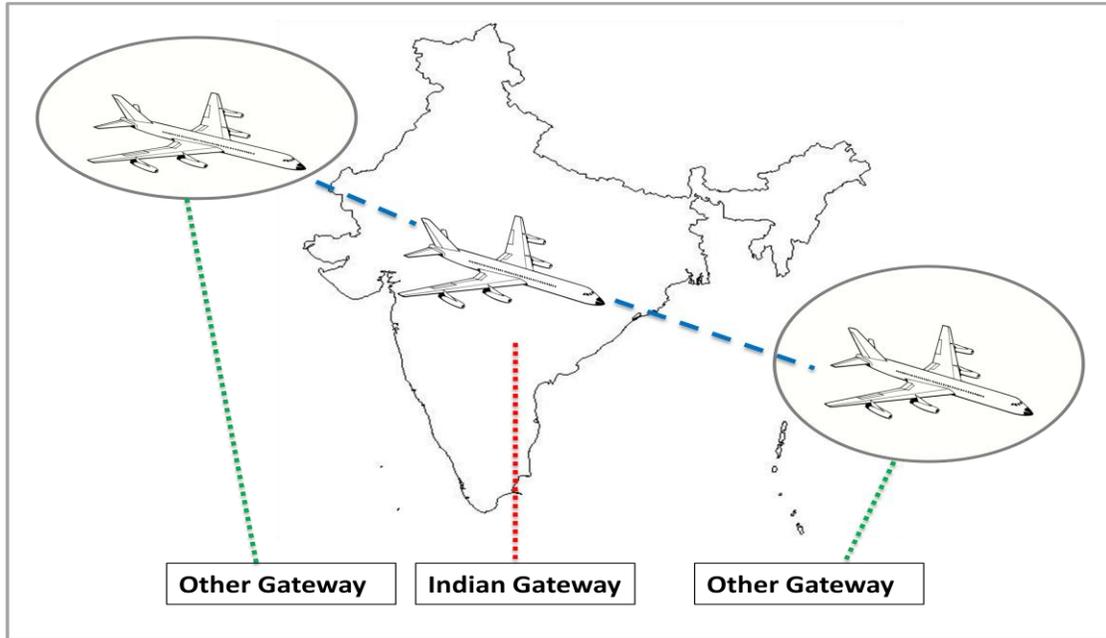


Fig 2.5: Illustration of Use of Indian Gateway while in Indian Airspace

2.100 The operation of MCA services is a bit more complex. A pico cell is installed in the aircraft which effectively extends the terrestrial mobile network of a mobile service provider to the aircraft. The traffic from the pico cell is routed to the core network of the mobile service provider. Irrespective of the location of the aircraft and the satellite system in use, the traffic will be required to be routed to the core mobile network. Its implication is that it is not easy to setup such a node/facility which remains connected to the pico cell stationed in the aircraft all the time irrespective of the location of the aircraft. Because of the complexities involved, there are only a few IFC service providers who are providing MCA services. Even if it is assumed that such a facility is created on Indian soil, aircrafts will need to be fitted with pico cell/equipments which are compatible with one of the Indian TSP's core network. If the pico cell compatible with a foreign mobile network is already installed in the aircraft, airlines certainly won't be willing to carry out any modification due to the downtime and costs involved. In such cases, it is practically not possible to shift to another mobile service provider.

Therefore, the foreign airlines/aircrafts those are already providing MCA services, should naturally be allowed to retain the existing arrangements i.e. in collaboration with a foreign mobile service provider, if they are to be permitted MCA services in Indian airspace.

2.101 As the interception facility is generally available in the core network, the interception in the above discussed arrangement would be possible only through mirror mode gateway as the core network of the foreign mobile service provider is outside India. In the earlier section, the Authority has recommended IFC service providers should be permitted to provide MCA services in partnership with a foreign mobile service provider; provided the same IFC service provider is also delivering onboard Internet services in association with an Indian Unified Licensee with appropriate authorization. The Authority is of the view that mirror image of the traffic from the foreign Gateway should be routed to the Indian Unified Licensee with whom IFC Service provider has partnered with for the purpose of providing onboard internet services. It would be the joint responsibility of IFC service provider and the partnering Indian Unified Licensee to ensure that Lawful Interception requirement as mandated are met through mirror-mode gateway mechanism.

2.102 In case the IFC service provider makes an arrangement with an Indian access service provider to install a pico-cell on-board aircraft for providing MCA services, the associated core network of the concerned access service provider shall be in India. In such scenario, it would be possible to mandate the use of Indian satellite gateway.

2.103 On the issue of whether the use of mandating INSAT satellite systems in Indian airspace is concerned, the Authority noted that INSAT at present does not offer any space segment capacities for the operation of IFC services in L-band and Ka-band. Some IFC service providers are providing IFC services using space segment in L-band and Ka-band.

Such operation would not be possible in Indian airspace if the use of INSAT satellite systems is made mandatory in Indian airspace. Even when the capacity is made available by DoS, it should be left to the service provider to take a call based on technical and commercial considerations. Moreover, the use of INSAT system (Indian Satellite System or foreign satellite capacity leased through DoS) for IFC services in Indian airspace is not necessary for ensuring that Indian authorities have the ability to lawfully intercept IFC traffic. Therefore, the Authority is of the view that use of INSAT systems (Indian Satellite System or foreign satellite capacity leased through DoS) should not be mandatory. Therefore, the IFC service provider should be permitted to use either INSAT systems (Indian Satellite System or foreign satellite capacity leased through DoS) or foreign satellites outside INSAT systems in the Indian airspace.

2.104 In view of the above, **the Authority recommends that:**

For Internet Services

- i. The deployment of a gateway in India provides an effective mechanism to lawfully intercept and monitor the in-cabin internet traffic while the aircraft is in Indian airspace. Therefore, the onboard Internet traffic must be routed to a Satellite Gateway on Indian soil. Such an obligation should be imposed regardless of whether the satellite in question is an Indian Satellite System or not.**

For MCA Services- When MCA service is provided in partnership with Foreign Mobile Service Provider

- ii. For the interception and monitoring of MCA traffic, if the partnering mobile service provider is a foreign licensee, mirror copy (MC) gateway solution should be permitted. As**

recommended in Para 2.70 (i)(b), the IFC service provider can provide MCA services in partnership with Foreign Mobile Service Provider, only when the same IFC service provider is providing the onboard Internet services in partnership with an Indian Unified Licensee with appropriate authorization. Mirror image of the MCA traffic in the Indian airspace from the foreign Gateway should be routed to the Indian Unified Licensee with whom IFC Service provider has partnered with for the purpose of providing onboard internet services. It would be the joint responsibility of IFC service provider and the partnering Indian Unified Licensee to ensure that the mandated Lawful Interception requirements are met through mirror-mode gateway mechanism.

For MCA Services- When MCA service is provided in partnership with Indian Unified Licensee

- iii. For the interception and monitoring of MCA traffic, if the partnering mobile service provider is an Indian Unified licensee with Access Service authorization, the onboard MCA traffic must be routed to a Satellite Gateway on Indian soil. Such an obligation should be imposed regardless of whether the satellite in question is an Indian Satellite System or not.

Use of Satellite Capacity

- iv. Mandating the use of INSAT system (Indian Satellite System or foreign satellite capacity leased through DoS) for IFC services in Indian airspace is not necessary. Therefore, the IFC service provider should be permitted to use either INSAT systems (Indian Satellite System or foreign satellite capacity leased

through DoS) or foreign satellites outside INSAT systems in the Indian airspace.

I. Fee & Charges

2.105 Another issue raised in the Consultation Paper was with regard to the charges to be levied on an IFC service provider. An international flight typically operates over multiple countries; and fliers, subscribing to IFC services, pay for the services once and can make use of its subscription any time during the flight. Apportioning it for use over Indian airspace may not be a workable proposition. Further, if the IFC service provider enters into appropriate commercial agreements with Unified Licensee for the provision of IFC services, the revenue earned by the Unified Licensee will get added to its Adjusted Gross Revenue (AGR) which is subjected to the Licence Fee and SUC. Therefore, one option given in the Consultation Paper was that the IFC service provider may be imposed a flat annual Licence Fee of some token amount, say Rs. 1, for its in-cabin operations, to be amended at a later stage, if need be, in public interest and for conduct of telegraph services.

2.106 In this background, the comments of stakeholders were sought on how to charge IFC service providers for providing IFC services in Indian airspace in case of (a) Foreign registered airlines and (b) Indian registered airlines.

Comments received from the stakeholders

2.107 Many stakeholders submitted that service provisioning for foreign airlines is already charged and duly regulated in the country of registration. Therefore, IFC service provider should not be charged for foreign airlines, in line with the principle of reciprocity. Some of these stakeholders argued that placing such a requirement may invite other countries to impose charges on IFC on-board Indian airlines flying

through their airspace. Some were of the view that IFC-specific government-imposed fees are either negligible or non-existent in most countries, at least for services provided only to foreign air operators. Moreover, both licence fees and Spectrum Usage Charges are levied on the service provider operating the service. One stakeholder commented that for foreign registered airlines, no charges should be enforced against foreign airlines entering Indian airspace for over flight. When foreign aircraft land in India, charges should be agreed between the satellite provider and the teleport provider only.

2.108 With respect to Indian airlines and Indian-registered aircraft, some stakeholders suggested that the small size of the IFC market suggests that no special charging regime should be applied. Rather, applying standard tax and regulatory fee policies will provide the Government of India with adequate revenue from IFC turnover on Indian airlines and Indian-registered aircraft. Some of the stakeholders are of the view that no charges to the IFC service providers should be specified for Indian registered airlines. If IFC service provider is required to provide services in arrangement with a duly authorized domestic service provider, the associated fees will already be paid accordingly by the Unified License, based on the commercial arrangement between the IFC provider and the licensee. Some stakeholders proposed that, in respect of Indian registered airlines, any fees should be set at a level that does not dampen demand. A light touch based on a token amount for the IFC provider is an appropriate one.

2.109 A few stakeholders submitted that apportioning revenues collected from international passengers to various countries is simply not practical and there are no instances anywhere in the world of fee assessments based on the proportion of a given flight that may be in or over a given country.

Analysis

- 2.110 The Authority examined the comments of all the stakeholders. The Authority has already recommended that IFC service providers should be permitted to associate with a Unified Licensee having appropriate authorization to provide Internet services onboard. Due to technical consideration, the Authority has recommended that IFC service providers should be permitted to provide MCA services in partnership with a foreign mobile service provider; provided the same IFC service provider is also delivering the onboard Internet services in association with an Indian Unified Licensee with appropriate authorization. It would be safe to assume that total traffic and the revenue earned by IFC service providers for In-flight internet access would be significantly more than that for MCA services because Internationally, In-flight internet access is getting popular day by day and provided by all the IFC service providers unlike MCA services which are provided by a few IFC service providers only.
- 2.111 The Authority has recommended that IFC service providers be required to get itself registered with the DoT. IFC service providers cannot on its own provide internet services onboard but will have to enter into commercial agreements with Unified Licensee for the provision of In-flight internet access, the revenue earned by the Unified Licensee will get added to its Adjusted Gross Revenue (AGR) which is subjected to the Licence Fee and SUC. Therefore, the Authority is of the view that to promote the adoption of IFC services in Indian airspace, the IFC service provider may be imposed a flat annual Licence Fee of some token amount, say Rs. 1. However, the same may be reviewed and amended at a later stage, if need be.
- 2.112 The Authority has recommended that the regulatory requirements should be same for both Indian registered and foreign registered airlines

for offering IFC services in Indian Airspace. Therefore, the Authority is of the view that there should not be any difference in the charges to be levied for domestic and foreign airlines in Indian Airspace.

2.113 In view of the above, **the Authority recommends that:**

- i. To promote the adoption of IFC services in Indian airspace, the IFC service provider should be imposed a flat annual Licence Fee of token amount of Rs. 1. However, the same may be reviewed and amended at a later stage, if need be.**
- ii. There should not be any difference in the charges to be levied for domestic and foreign airlines in Indian Airspace.**

J. Satellite Bands of Operation

2.114 The predominantly used satellite bands are L-band (1-2 GHz), C-band (4-8 GHz), Ku- band (12-18 GHz) and Ka-band (27-40 GHz). Service providers mostly use Ku and Ka band. As brought out in the Consultation Paper, there are two options for permitting satellite connectivity. It may be permitted in specific bands. Alternatively, it can be provided on spectrum neutral basis and operators should be free to consider which bands are best suited for their needs in order to deliver connectivity services in the most efficient and productive manner. The stakeholders were requested to comment whether the satellite spectrum bands be specified for the provisioning of IFC services or spectrum neutral approach be adopted. The Authority further sought stakeholders' view on the suitable satellite frequency bands that should be specified for the provisioning of IFC services if it is permitted only in specified satellite frequency bands.

Comments received from the stakeholders

- 2.115 A number of stakeholders responded that a spectrum neutral approach should be adopted. Some of these stakeholders have also submitted that the operators should be freely permitted to choose the band, from amongst the ITU Recommendations applicable for India and once the satellite(s) proposed to be used has been coordinated with Indian satellite systems.
- 2.116 One stakeholder suggested that since IFC services are provided over satellite networks that share frequencies with other services, as well as share with other satellite services, they should only operate in frequency bands that have been approved for their use at the ITU level. Within those broad parameters defined by the ITU, however, a spectrum neutral approach should be adopted. Another stakeholder submitted that AES/ESIM operations in the bands identified in the international standards should be permitted. In addition, 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.
- 2.117 One stakeholder proposed that provision of IFC services should be addressed on a spectrum and technology neutral basis, similar to the terrestrial mobile industry. In the context of bands for which there is an internationally agreed regulatory framework for IFC internet services available,
- 2.118 Some stakeholders submitted that IFC services should be permitted in any satellite frequency bands (i.e. L-, Ku- and Ka-bands) used by the different IFC operators for their satellite backhaul. Some stakeholders

were of the view that the frequency bands laid down by DoT for VSAT should be adopted for this service as well. As the VSAT services evolve to cover additional frequency bands such as Ka, this service would automatically extend to the same. One stakeholder suggested that only L- band and Ka- band should be allowed while another stakeholder recommended the use of Ka- band.

2.119 A few stakeholders submitted that TRAI should consider an Air-to-Ground communication system which does not even use satellite frequency bands. One of these stakeholders recommended that India should adopt regulations favorable to the use of unlicensed bands with beam-forming rules like that of the US and elsewhere, particularly at 2.4 GHz, but additionally could consider doing the same at 5.8 GHz. Some stakeholders have submitted that to overcome the drawback of satellite systems, LTE backhaul should be encouraged. The LTE backhaul should be on a dedicated band specifically for IFC to avoid interference with terrestrial cellular systems.

2.120 One of the stakeholders has opined that IFC applicants should be permitted to demonstrate that proposed systems are compatible with other operations in India in recognized IFC bands. In addition, they should be permitted to introduce equipment that operates in new bands subject to demonstrating there is no material potential for interference from the proposed operations.

Analysis

2.121 The Authority examined the comments of all the stakeholders. At present, IFC services are being provided mainly using Ku and Ka satellite bands. L-band is also being used by a few IFC service providers. In future, internationally coordinated new bands may emerge that can be used for this purpose. Therefore, it seems appropriate to adopt a

spectrum neutral approach. Limiting the IFC service to a subset of bands will not be the best solution for passengers and airlines, as it will limit the choice by creating avoidable regulatory limitations. However, as IFC services are provided over satellite networks that share frequencies with other services, as well as share with other satellite services, it is essential that they should operate in frequency bands that have been harmonized and coordinated for their use by the ITU.

2.122 In view of the above, **the Authority recommends that spectrum neutral approach should be adopted in satellite backhaul subject to the condition that the frequency bands have been harmonized and coordinated for their use by the ITU. It would facilitate the IFC services in all the bands (L, Ku and Ka) in which IFC services are currently being provided.**

K. Miscellaneous Issues

2.123 During the consultation process, some stakeholders submitted that there is no apparent need of dedicated bandwidth for IFC services. It may lead to the sub-optimal utilization of bandwidth and may increase the cost of operations. The Authority concurs with this suggestion and is of the view that satellite operators should be permitted to use of bandwidth already assigned to satellite operators for the use of IFC also. The Authority also agrees with the suggestions given by some stakeholders that in case of multiple spot beam satellite, an aircraft may pass through many beams. In such a scenario, although, aircraft connects to multiple beams over its flight path, but at a time only one beam is being used by it. Therefore, DOS should consider not charging for individual beams but evolving the charging mechanism based upon the actual usage of the bandwidth.

2.124 In view of the above, **the Authority recommends that:**

- i. **Satellite operators should be permitted to use of bandwidth already assigned to satellite operators for the use of IFC services also.**
- ii. **In case of multiple spot beam satellite, an aircraft may pass through many beams. In such a scenario, DOS should consider not charging for individual beams but evolve the charging mechanism based upon the actual usage of the bandwidth.**

L. Additional Recommendations

2.125 Additionally, **the Authority makes following recommendations:**

- i. **TEC should issue Interface Requirements (IR) for AES (Aircraft Earth Station) before the start of service.**
- ii. **DGCA should work out a mechanism to ensure compliance of ICAO requirement for the equipments to be installed in the aircraft.**
- iii. **The framework recommended for IFC services in Indian airspace should be made applicable to business jets and executive aircrafts also.**

CHAPTER- III: LIST OF RECOMMENDATIONS

3.1 The Authority recommends that both, Internet and Mobile Communication on Aircraft (MCA) service should be permitted as In-Flight Connectivity (IFC) in the Indian airspace. (Para 2.14)

3.2 The Authority recommends that

(i) The Aircraft Earth Station (AES)/ Earth Station in Motion (ESIM) should be in conformance with the relevant standards set by International standardization bodies, such as, ITU, ETSI, etc.; or set by International fora such as 3GPP, 3GPP-2 etc. as recognized by TEC and subject to modifications/adaptation, if any, as may be prescribed by Licensor/TEC from time to time.

(ii) IFC communication systems using Direct-Air-to-Ground Communications (DA2GC) systems should also be permitted, provided they are in compliance of standards set by international bodies mentioned in point (i) above, as recognized by TEC and subject to modifications/adaptation, if any, as may be prescribed by Licensor/TEC from time to time.

(Para 2.24)

3.3 The Authority recommends that:

For MCA Services

(i) For MCA services, there should be flexibility to IFC service providers in terms of use of technology and frequencies inside the aircraft cabin; consistent with international standards, provided no harmful interference is caused.

- (ii) **The operation of MCA services should be permitted with minimum height restriction of 3000 meters in Indian airspace for its compatibility with terrestrial mobile networks.**

For Internet Services

- (iii) **Internet Services through Wi-Fi onboard should be made available when electronic devices are permitted to be used only in flight/airplane mode. Such announcement is made after boarding is completed and the aircraft is about to taxi. It would ensure that there is no encroachment on the scope of terrestrial internet service provided by TSPs as well as practically there won't be any appreciable discontinuity in the provisioning of Internet services to the fliers.**

(Para 2.39)

3.4 The Authority recommends that a separate category of "IFC Service Provider" should be created to permit IFC services in Indian airspace for airlines registered in India. (Para 2.48)

3.5 The Authority recommends that an IFC service provider be permitted to provide IFC services, after entering into an arrangement with Unified Licensee having appropriate authorization. (Para 2.57)

3.6 The Authority recommends that:

For Internet Services

- a) IFC service providers shall partner with a Unified Licensee having authorization for Access Service or Internet Service (category 'A') to provide Internet services onboard.**

- b) If IFC service provider partners with Unified Licensee having Access Service Authorization for the provision of Internet services onboard as part of IFC, the satellite backhaul connectivity can be provided by a Unified Licensee having NLD Service authorization having its satellite gateway within the service area of the partnering Access Service provider.
- c) If IFC service provider partners with Unified Licensee having Internet Service (Category 'A') authorization for the provision of Internet services onboard as part of IFC, then (i) If the licensee also has the Commercial VSAT CUG service authorization, it can provide the satellite links also. Alternatively, (ii) Unified Licensee with National Long Distance (NLD) service authorization can provide the satellite links.
- d) Necessary provisions may need to be created in the Access Service authorization, Internet Service (Category 'A') authorization, Commercial VSAT CUG service authorization and NLD service authorization.

(Para 2.64)

3.7 The Authority recommends that:

For MCA Services

- i. IFC service providers should be permitted to provide MCA services in Indian airspace in either of the following manners:
 - a. When MCA service is provided in partnership with Indian Unified Licensee- Provision of MCA services by an IFC service provider shall be permitted in

partnership with a Unified Licensee having authorization for Access Service. In this case, the satellite backhaul links may be provided by a Unified Licensee having authorization for NLD services having its satellite gateway within the service area of the partnering Access Service provider.

OR

b. When MCA service is provided in partnership with Foreign Mobile Service Provider- Provision of MCA services by an IFC service provider shall be permitted in partnership with a foreign mobile service provider. This would, however, be permitted only when the same IFC service provider is providing the onboard Internet services in partnership with an Indian Unified Licensee with appropriate authorization, as recommended in Para 2.64. Use of foreign satellites and gateway would be permitted for the establishment of satellite backhaul links only for the provisioning of MCA services.

ii. Necessary provisions may need to be created in the Access Service authorization, Internet Service (Category 'A') authorization, Commercial VSAT CUG service authorization and NLD service authorization.

(Para 2.70)

3.8 The Authority recommends that:

i. IFC service provider should be required to get itself registered with the DoT and it need not necessarily be an Indian entity.

- ii. **Permission for the provision of IFC services can be given to the registered IFC service providers by making the rules under Section 4 of Indian Telegraph Act, 1885.**
- iii. **After getting registered with DoT, IFC service providers, along with the partnering Unified licensees with authorisation as recommended in Para 2.64 and Para 2.70, should make a joint application for the provision of IFC services in Indian airspace.**

(Para 2.80)

3.9 The Authority recommends that the regulatory requirements should be same for both Indian registered and foreign registered airlines for offering IFC services in Indian airspace. (Para 2.87)

3.10 The Authority recommends that:

For Internet Services

- i. **The deployment of a gateway in India provides an effective mechanism to lawfully intercept and monitor the in-cabin internet traffic while the aircraft is in Indian airspace. Therefore, the onboard Internet traffic must be routed to a Satellite Gateway on Indian soil. Such an obligation should be imposed regardless of whether the satellite in question is an Indian Satellite System or not.**

For MCA Services- When MCA service is provided in partnership with Foreign Mobile Service Provider

- ii. **For the interception and monitoring of MCA traffic, if the partnering mobile service provider is a foreign licensee, mirror copy (MC) gateway solution should be permitted. As**

recommended in Para 2.70 (i)(b), the IFC service provider can provide MCA services in partnership with Foreign Mobile Service Provider, only when the same IFC service provider is providing the onboard Internet services in partnership with an Indian Unified Licensee with appropriate authorization. Mirror image of the MCA traffic in the Indian airspace from the foreign Gateway should be routed to the Indian Unified Licensee with whom IFC Service provider has partnered with for the purpose of providing onboard internet services. It would be the joint responsibility of IFC service provider and the partnering Indian Unified Licensee to ensure that the mandated Lawful Interception requirements are met through mirror-mode gateway mechanism.

For MCA Services- When MCA service is provided in partnership with Indian Unified Licensee

- iii. For the interception and monitoring of MCA traffic, if the partnering mobile service provider is an Indian Unified licensee with Access Service authorization, the onboard MCA traffic must be routed to a Satellite Gateway on Indian soil. Such an obligation should be imposed regardless of whether the satellite in question is an Indian Satellite System or not.

Use of Satellite Capacity

- iv. Mandating the use of INSAT system (Indian Satellite System or foreign satellite capacity leased through DoS) for IFC services in Indian airspace is not necessary. Therefore, the IFC service provider should be permitted to use either INSAT systems (Indian Satellite System or foreign satellite capacity leased

through DoS) or foreign satellites outside INSAT systems in the Indian airspace.

(Para 2.104)

3.11 The Authority recommends that:

- i. To promote the adoption of IFC services in Indian airspace, the IFC service provider should be imposed a flat annual Licence Fee of token amount of Rs. 1. However, the same may be reviewed and amended at a later stage, if need be.
- ii. There should not be any difference in the charges to be levied for domestic and foreign airlines in Indian Airspace.

(Para 2.113)

3.12 The Authority recommends that spectrum neutral approach should be adopted in satellite backhaul subject to the condition that the frequency bands have been harmonized and coordinated for their use at the ITU. It would facilitate the IFC services in all the bands (L, Ku and Ka) in which IFC services are currently being provided. (Para 2.122)

3.13 The Authority recommends that:

- i. Satellite operators should be permitted to use of bandwidth already assigned to satellite operators for the use of IFC services also.
- ii. In case of multiple spot beam satellite, an aircraft may pass through many beams. In such a scenario, DOS should consider not charging for individual beams but evolve the charging mechanism based upon the actual usage of the bandwidth.

(Para 2.124)

3.14 The Authority recommends that:

- i. TEC should issue Interface Requirements (IR) for AES (Aircraft Earth Station) before the start of service.**
- ii. DGCA should work out a mechanism to ensure compliance of ICAO requirement for the equipments to be installed in the aircraft.**
- iii. The framework recommended for IFC services in Indian airspace should be made applicable to business jets and executive aircrafts also.**

(Para 2.125)

Annexure

(Without its Annexure)

F.No. 20-504/2016/AS-I
Department of Telecommunications
(Access Services-I)
20 Ashoka Road, Sanchar Bhawan, New Delhi
Dated the 10th August, 2017.

To

The Secretary,
Telecom Regulatory Authority of India,
Mahanagar Door Sanchar Bhawan,
Jawahar Lal Nehru Marg,
Old Minto Road,
New Delhi.

Subject: In-Flight connectivity (IFC) for Voice, Data and Video Services.

Sir,

It is proposed to introduce In-Flight connectivity (IFC) for Voice, Data and Video Services over Indian Air space for domestic, international & overflying flights in Indian Air space. A Note was submitted for consideration of Committee of Secretaries for allowing In-Flight Connectivity for Voice, Data and Video services on 9th January 2017 (Annexure-A). A meeting of Committee of Secretaries was held on 30th January 2017 for the same and the proposal was agreed in principle with the direction that draft Rules may be framed. The minutes of meeting of COS are annexed at Annexure-B.

Before framing the draft rules, TRAI is requested to furnish their recommendations on licensing terms and conditions for provision of In-Flight connectivity (IFC) for Voice, Data and Video Services and associated issues such as entry fee, license fee, Spectrum related issues including usage charges & method of allocation and other conditions, as per clause 11(1)(a) of TRAI Act 1997 as amended by TRAI amendment Act 2000.

This issues with the approval of Secretary, Department of Telecommunications .

Yours faithfully,


(R.K. Soni) 10/8/17
Dir (AS)
Tel: 23036284