

RJIL/TRAI/2017-18/553

03rd November 2017

To,

Sh. Syed Tausif Abbas

Advisor (NSL),

Telecom Regulatory Authority of India,

Mahanagar Doorsanchar Bhawan,

Jawahar Lal Nehru Marg, New Delhi 110002

Subject: Comments on Consultation Paper No. 14/2017 on 'In Flight Connectivity' dated 29.09.2017.

Dear Sir,

Please find enclosed herewith comments of Reliance Jio Infocomm Ltd. on the consultation paper on 'In Flight Connectivity' dated 29.09.2017, for your kind consideration.

Thanking You,

For **Reliance Jio Infocomm Limited,**



Kapoor Singh Guliani
Authorised Signatory



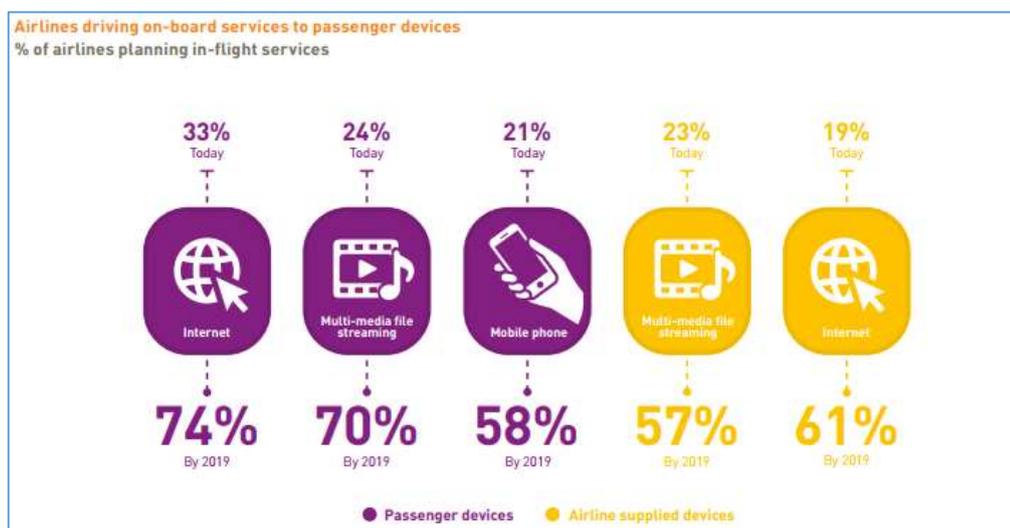
Enclosure: As above.

**RELIANCE JIO INFOCOMM LTD'S COMMENTS ON TRAI'S CONSULTATION PAPER ON
"IN FLIGHT CONNECTIVITY"**

(Consultation Paper No 14/2017 Dated 29th September, 2017)

General Comments:

1. At the outset, we thank the Authority for issuing this consultation paper to discuss the technical, licensing and commercial modalities for providing In-flight communications. In Flight Connectivity ("IFC") is slowly acquiring the status of utility service instead of the earlier perception of a luxury service and it is imperative that India should have a comprehensive policy and regulation in place to facilitate this service.
2. As per the international service provider SITA's Airline IT trend survey 2016¹, airlines are attaching growing importance to providing connectivity and entertainment through the passenger's own device. It reports that by the end of 2019, nearly three-quarters (74%) of airlines will provide wireless internet access to passengers and 70% will provide multi-media streaming to the passenger's own device.



3. In a similar vein, the IFC survey by Inmarsat² reports that, of the passengers who have experienced high quality inflight Wi-Fi, 40% rank IFC as a top 3 driver of airline choice, behind only price and schedule of the flight. The survey goes on to state that 44% of the said consumers will stop using their preferred airline if it offered poor quality IFC.
4. We submit that there are two primary modes currently known to provide IFC, with different characteristics. The first mode uses ground-based mobile broadband network including towers for backhaul, which send signals up to an aircraft's antennas

¹ <https://www.sita.aero/globalassets/docs/surveys--reports/airline-it-trends-survey-2016.pdf>

² <https://www.inmarsat.com/aviation/commercial-aviation/in-flight-connectivity-survey/>

(usually on the base of the fuselage) subsequent to which a Pico cell is used to provide connectivity inside the aircraft. 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 is therefore practical for IFC on domestic routes as there are unlikely to be large bodies of water and the mobile broadband network is reasonably ubiquitous.

5. The second popular method uses satellite communications. This leverages the connectivity provided by the geostationary satellites, which send and receive signals to earth via receivers and transmitters. These satellites are no different from those used for television signals, weather forecasting etc. However, this mode has an inherent issue of slower internet speeds and cost. Many satellites being used for IFC offer around 12 Mbps. The other flaw of this technology is that it is a double hop system leading to higher latency.
6. Connectivity through mobile communications, especially the modern LTE communication networks, eliminates most of the flaws in satellite communication systems and provides superior speed, higher throughput and low latency with cost efficiencies. This solution requires a dedicated LTE backhaul for air to ground connectivity to avoid interference with the licensed LTE spectrum used for terrestrial networks operated by telecom operators. Air to ground systems are designed as a complete system that can be installed in aircrafts and as tower mounted base stations with both types of modems delivered in a compact package that integrate baseband and radio in a single box. It is an ideal solution for vertical applications that require mobility such as aircraft, train and ships. It is capable of delivering speeds upto 100 Mbps and operates in licensed or unlicensed spectrum bands using Advanced Interference Mitigation techniques. This solution reduces operating expenses and minimizes capital expenditure.
7. This network comprises multi ground base-sites, each comprising of multiple sectors operating a TDD air interface and use of advance antennas on both ground sites and aircraft. The Ground Base Station (OIDMA LTE eNodeB) is a compact lightweight radio located on cellular towers, with antenna system directed to the sky. And the Airside terminal radio modem is built into a fully flight approved (FFA) enclosure and is used to terminate a trusted wireless backhaul solution to the aircraft. Inside the aircraft, a Wi-Fi AP associated with LTE CPE with LTE radio, connected to aircraft antenna is deployed.
8. We submit that the objectives of national security should be paramount while deciding a regulatory framework for any communication system and IFC should be no exception. We submit that IFC services should be only provided by Unified License - Access Services authorization holders in India. The international IFC providers can

provide this service in India in association with such licensees, which will ensure that all the requirements under the Unified License are adhered to by any service provider.

9. We also submit that as there is extensive terrestrial telecommunication activity and we are regularly grappling with interference related issues, the Authority should ensure that the introduction of IFC in India is done in an interference free manner. We recommend that a separate band of spectrum suitable for LTE deployment be carved out for IFC.
10. We further submit that the Authority should not get involved with the commercial arrangements between international IFC service providers and UL access authorization holders. The government revenue will anyways be protected as the revenue share from these services will become a part of the adjusted gross revenue of the licensees.

Summary:

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| <ol style="list-style-type: none">1. Inflight communication services should be permitted with both LTE backhaul and satellite backhaul. In case of satellite backhaul based IFC in Indian airspace, the earth station should be based in India.2. Scope of IFC services should include data, voice, video and messaging services.3. Provision of IFC service can be carried out in the existing Unified Licensing framework.4. Pan - India Access Services authorization holders should be permitted to offer IFC on standalone basis while international IFC service providers should be required to provide the service only in association with a UL Access Services authorisation holder.5. To avoid any possible interference with terrestrial spectrum, the Authority should recommend carving a dedicated spectrum band for IFC services. Inside the Aircraft, last mile access should be provided through WiFi. |
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Issue wise comments

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

- a) Internet Services
- b) Mobile Communication Services (MCA service)
- c) Both, Internet and MCA

Response:

1. The earliest implementations of IFC were around provision of internet services in aircrafts, however with time this has expanded to cover the whole gamut of communication services including voice, video and rich communication services including SMS and MMS along with internet services.
2. We submit that as various contours of IFC are still developing, the Authority should not limit its scope in India. We recommend that the scope of permitted IFC services should include internet, voice, video and rich communication services including messaging services.

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

Response:

1. The Global standards discussed by the Authority are sufficient for satellite based IFC. These standards are based on space segmentation supported by satellite system. However, to limit the standardization of IFC with only satellite based communication networks or the Aeronautical Mobile Satellite Service ("AMSS") would not be a prudent forward looking policy.
2. The Authority should propose a policy that includes mobile network communication services as well. As discussed in the general comments, the satellite systems have inherent flaws of latency and delay. Moreover, satellite back-haul will have less throughput compared to LTE backhaul between aircraft and terrestrial eNodeB.
3. Considering the already existing demand for IFC and the future expected spike in demand post the implementation of the policy framework, the Authority should also propose alternative standards based on eNodeB based terrestrial system with LTE radio as backhaul.
4. This solution will support both mobile communication and internet services for IFC subscribers. We have done a thorough analysis of this proposed solution and we

understand that about 300 LTE eNodeB's will be required to cover all the domestic flight paths over Indian territories. A similar analysis can also be done for the flight paths taken by international flights passing Indian airspace.

5. We submit that even internationally, the regulators are supporting and promoting this solution of LTE backhaul instead of satellite backhaul and are already implementing it in many countries in Europe and parts of USA and Australia. The Authority should permit IFC with LTE backhaul and the standards like ETSI EN 303 339 V1.1.1 (2016-06) for 'Direct Air to Ground' communications or other equivalent standards proposed by accredited national or International bodies.
6. We understand that many international flights providing IFC through satellite backhaul may continue to prefer the satellite based IFC while passing through Indian Airspace, however as a forward looking measure and to provide more and better options to the consumers, the Authority may recommend both satellite and LTE backhaul based solutions. Further, in case of satellite backhaul based IFC, the earth station should be based in India.

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

Response:

1. There could be two sources of interference to the terrestrial cellular system. The first source can be the interference between the IFC LTE backhaul and the terrestrial LTE services in case the frequency bands under use are overlapping or adjacent. To address this issue, we recommend that the Authority should propose a dedicated LTE band for air-to-ground LTE backhaul.
2. This is already being done in other countries. Nokia is implementing LTE backhaul in the gap between up-link and down-link FDD allocation as a TDD system in Europe. In USA, Airspan is executing POC on 5.8 GHz unlicensed band in LTE TDD system. With this specific allocation, the backhaul will not interfere with the terrestrial LTE system.
3. The second source of interference is from the mobile telephony (user equipment) inside the aircraft. We submit that one mode of addressing this issue would be to use Wi-Fi as the last-mile access medium in the aircraft. This is easier to implement as Wi-Fi is already available for inflight entertainment service in most flights and it can be leveraged to provide voice and data services. This will help address the interference

issues and will also be user friendly as it will also support Over The Top (“OTT”) applications along with the bearer communication services. We submit that the Voice over Wi-Fi solutions have already been tested by security agencies in India and are working well.

4. Under the proposed implementation, Wi-Fi Access Point (“AP”) should be connected to CPE installed in the aircraft having LTE backhaul at one end and Ethernet on the other end. LTE backhaul end should be connected to the antenna of the aircraft and Ethernet end should be connected to the Wi-Fi AP of the aircraft. This will have the added advantage of not requiring to switch off the IFC below height of 3,000 meters.
5. Technology neutrality is the hallmark of the Unified Licensing framework implemented in India and there is no need to interfere with that and the Authority may not propose specific technology wise frequency bands for implementing IFC in India. However, we submit that to avoid all possible interference issues a dedicated spectrum slot may be proposed for IFC and the service providers offering IFC should be free to implement technology of choice in this band.

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

Response:

1. At present, most of the mobile networks extend coverage from the arrival/ departure gates to inside of the aircraft and the subscribers are requested to disconnect from the terrestrial networks only when there is a possibility of interference with the aircraft communication system during or just before the flight.
2. We submit that with the proposed technological architecture indicated in the response to question 3 above, there should not be any difficulty in implementation of gate to gate communication for both voice and data.

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

And

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

And

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

And

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

And

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

Response:

1. We submit that the mobile and internet communication services envisaged under proposed IFC services in Indian airspace are already covered under the scope of communication services provided by the Unified License Access Services authorization holders. Therefore it is imperative that only the Unified Licensees with pan-India Access Services authorization be permitted to offer this service in an unrestricted manner.
2. Further, Unified License already has a provision for unrestricted Internet Telephony under the Access Service authorization, for provision of voice communication in the IFC which would be primarily unrestricted internet telephony. Thus the ideal way for any service provider desirous of offering IFC in India would be to obtain Unified License with Access Service authorization. However, in order to accelerate the implementation of IFC, the Authority may permit the international IFC service providers to enter into commercial arrangements with telecom service providers having Access Service authorization for carrying their voice and data traffic.
3. This solution will also address the associated issues related to Interconnection and other mandatory regulatory obligations like customer traceability, lawful interception and monitoring in Indian airspace and call detail records etc. The Access Service providers will already have these systems in place and the same will be extended to

the in-flight customers latched on to its network while the flight is in Indian airspace. The telecom service providers may be required to intimate the Department of Telecommunications (DoT) of any such commercial arrangements in place.

4. We do not see any value in creating a separate category of IFC service providers as these service providers will be required to enter into commercial arrangements with the Access Service providers for providing voice/ data services in Indian airspace.
5. Similarly, we submit that there is no case for making changes in the Section 4 of the Indian Telegraph Act, 1885 in order to facilitate provisioning of IFC services in Indian airspace. As discussed above, there are sufficient options available under the existing regulatory framework to facilitate the provision of IFC.

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

And

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

Response:

1. The international IFC service providers should be permitted to tie-up with the suitable authorization holder in India basis the services they wish to provide. Clearly to provide communication services they need to tie-up with Access Services authorization holders or GMPCS authorization holders etc. as per their business case.
2. We submit that type of services to be provided and the consequent tie-up with an appropriate authorization holder would imply that the applicable terms and conditions of the Unified License and the TRAI Regulations/Directions will apply.
3. Further, for the service providers opting for IFC with satellite backhaul, the terms and conditions of multiple authorization including ISP, GMPCS and INSAT MSS would be applicable, as detailed below (extracts from various Unified License conditions):

Chapter VI: Security Conditions

39.23 The Licensee shall also ensure compliance of the following conditions:

- (iii) For security reasons, domestic traffic of such entities as may be identified/ specified by the Licensor shall not be hauled/ routed to any*

place outside India. For this purpose, location of satellites serving India for domestic traffic shall not be treated as outside India.

Chapter XII: GMPCS Service

2.2 *The Licensee shall establish Land Earth Station Gateway in India for the purpose of providing Global Mobile Personal Communication by Satellite (GMPCS) Service. GMPCS Service may be provided using one or more Satellite Systems provided that the Land Earth Station Gateway Switch is established separately in India for each Satellite System.*

7.1 *The operation and maintenance centre of the GMPCS Gateway shall also be located in India. The Licensee shall demonstrate the system capabilities with respect to security aspects including monitoring to the Licensor or its authorized representative prior to starting of operations in India.*

7.15 *All calls originating or terminating from Mobile Terminals in India shall pass through the GMPCS Gateway Switch located in India. Such calls will not be routed through any other Gateway located outside India. All inter-network calls will be routed through GMPCS Gateway switches i.e., one the GMPCS switch of the Licensee and other that of the licensed telecom service providers. All International calls outgoing or terminating in a PSTN/ PLMN shall be routed via licensed International Long Distance gateway switches located in India. All national calls outgoing or terminating in a PSTN/ PLMN shall be routed via licensed telecom service provider's network. Domestic traffic should not be hauled/ routed to any place outside India.*

Chapter XV: INSAT MSS-R Service

5.3 *Operation and Maintenance of Hub Station:*

(i) *The HUB station as well as all **INSAT-MSS Reporting Service** Terminals shall be within the geographical boundary of India.*

4. In order to promote the adoption of IFC services in India, the Authority should prescribe a simplified, easy and quick framework to implement regulatory regime. Therefore, we do not feel the need to impose any additional regulations/ restrictions over and above the existing regulations/ restrictions applicable for Unified Licensees.

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

Response:

1. We submit that the concept of reciprocity for foreign airlines discussed in para 3.15 of the consultation paper seems to be a fair and easy process at face-value, however the Authority may review this concept against the needs of security agencies and the issues pertaining to national security.
2. We further submit that there should be no relaxation or discrimination in the regulations/ restrictions for IFC in Indian airspace for foreign carriers. All the rules/ regulations for providing IFC in Indian airspace for the airlines registered in India should be equally applicable to foreign registered airlines also.

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

Response:

1. Evidently, all the options discussed in para 3.19 to 3.22 are based on the singular assumption that satellite backhaul is the only feasible option for providing IFC and that the foreign airlines will not be able to ensure compliance with security and other requirements. We submit that this is not the case. LTE backhaul is an efficient solution that is being deployed in most of the developed countries along with the satellite backhaul solutions.
2. We submit that satellite system or LTE backhaul is a connectivity methodology for connecting to service providers' core network. Hence interception facility for lawful intercept is possible in either case.
3. As detailed in our responses to preceding questions, we submit that the best option is to implement LTE backhaul solution for IFC in India wherein the international IFC service provider shall also align with a Unified Licensee. This in turn will ensure implementation of usage control and compliance with lawful interception requirements as envisaged in licensing condition.

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

And

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

Response:

1. We reiterate our submissions that IFC service in domestic or international flights need not be only satellite based and LTE backhaul based solutions are not only possible but more effective than the satellite based systems.
2. Satellite system has the inherent disadvantage of higher cost per bit, high latency and low bandwidth, whereas LTE backhaul will have lower cost per bit, low latency and higher throughput but with the only limitation of coverage on landmass. However, since the domestic flight paths being almost on landmass, this limitation does not apply.
3. Further, in case the international IFC service provider or the airline chooses to adopt only satellite backhaul then the service providers should be mandated to use either Indian satellite system or foreign satellite leased through DOS while it is in Indian airspace along with the mandatory requirement to host the earth station in Indian territory to ensure a semblance of control over the communication and to help protect national security concerns. Provision of services should be permitted based on tie-up with the suitable authorization holder in India.
4. These service providers should also be given the option of switching over to LTE backhaul while flying over Indian airspace.

Q.16 Please suggest how the IFC service providers be charged in the following cases?

- (a) Foreign registered airlines
- (b) Indian registered airlines

Response:

1. We submit that as the international IFC service providers will be required to enter into an arrangement with Unified License holders for providing IFC services in Indian airspace, the Authority may leave the commercial decisions to the market forces and not intervene in the same.

2. As the revenue share earned by the Indian licensee will become a part of its adjusted gross revenue (“AGR”), the government receipts from IFC services are protected.

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

Response:

1. In line with the well-established policy regime, spectrum neutral approach should be adopted.
2. However, to overcome the drawback of satellite systems, LTE backhaul should be encouraged. The LTE backhaul should be of on a dedicated band specifically for IFC to avoid interference with terrestrial cellular systems. In Europe, dedicated band carved out from Inmarsat’s European MSS S-band at 2.1 GHz has been used. In USA, pilot trial is being conducted on unlicensed 5.8 GHz band.

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

Response:

1. We reiterate our submissions that IFC should not be restricted to satellite technology only and dedicated LTE band should be allocated as has been permitted in Europe, USA and Australia.