SITAONAIR

SITAONAIR submission in reply to TRAI's Consultation Paper

On

In Flight Connectivity (IFC)

Consultation Paper 14/2017 issued by the Telecom Regulatory Authority of India (29th September 2017)

I. INTRODUCTION

Airlines operating connected aircraft are expected to double by 2019 to meet the connectivity needs of their passengers. As a major stakeholder in global mobility, Indian aviation needs to keep path with passengers' expectations and international competition. Authorizing IFC services in India will therefore be an important development for the Indian civil aviation.

SITAONAIR contribution to TRAI consultation on IFC

We are delighted to have this opportunity to contribute our submission to the TRAI consultation process. We do so as a global IFC provider as well as an integrator of IFC services across multiple aircraft types, satellite technologies, satellite terminals (antennae) and on-board transmission equipment. We sincerely hope this perspective will enable us to make observations that will be both relevant and helpful for the TRAI.

Our comments are based on over 10 years' experience in providing IFC services on aircraft flying in all parts of the world. In addition, we have discussed extensively the issues raised in the TRAI consultation with our airlines customers and with our satellite partner Inmarsat. Representatives of SITAONAIR also took part in the ITU-APT forum which took place on 23 October in Delhi.

SITAONAIR remains at the disposal of the TRAI to attend any open house or other direct consultations that the TRAI may wish to conduct.

SITAONAIR History and Commercial Offerings

OnAir was created in 2005 as a joint venture between Airbus, one of the world's leading aircraft manufacturers, and SITA, the leading IT solutions provider to the air transport world and 100% owned by air transport industry members. The venture brought together the expertise of an Airbus-sponsored company developing in-flight e-mail and text-messaging services, and SITA's inflight passenger communications program, which was focused on inflight mobile telephony. In December 2007, it provided the first mobile telephony in the world on-board a commercial aircraft.

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OnAir offers its airline customers a suite of connectivity options that includes (1) Mobile OnAir, the industry's first Mobile Communication System enabling passengers to use their mobile phones for email, data, and voice services; (2) Internet OnAir, an in-cabin Wi-Fi service for internet access; and (3) OnAir Play, a streaming video entertainment and content-based service. Mobile OnAir first flew in December 2007, and Wi-Fi based connectivity began to be offered in March 2010. OnAir Play has been available since the fall of 2013. Further discretions of these products, and how they work, are set out in Annex I.

Since January 2015, OnAir has used the name SITAONAIR, reflecting its position as a full subsidiary of the SITA Group. SITAONAIR is the SITA Group's business dedicated to products and service on-board aircraft.

The SITA members in India are: Air India, Jet Airways, Spice jet, Indigo, Go Air, Vistara, AirAsia India, Airports Authority of India, Mumbai International Airport and Bangalore International Airport.

SITA history and presence in India

The SITA Group has a strong local presence in India with more than 300 staff currently employed in Gurgaon and Chennai and over 60 years' experience working collaboratively at the heart of Indian aviation. SITA Group services are provided already to Air India, AirAsia India, Air Costa, GoAir, IndiGo, Jet Airways, SpiceJet, and Vistara and at the 38 AAI Airports as well as Mumbai and Bangalore.

SITAONAIR engagement with Indian Government entities and other stakeholders over many years

Over recent years, SITAONAIR has engaged on a regular basis with senior-level officials at the Department of Telecommunications, the DGCA, the Ministry of Civil Aviation, the Airports Authority of India, the Prime Minister's Office, as well as with BSNL and other stakeholders in the industry as the policy and process for authorising in-flight connectivity ("IFC") in India has developed. Over this time, we have developed a sense of the support which these many stakeholders have for in-flight connectivity as well as the particular factors that need to be addressed in the context of India.

SITAONAIR

II. ISSUES FOR CONSULTATION

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

a. Internet services

b. Mobile Communication services (MCA service)

c. Both, Internet and MCA

As the TRAI has noted in para 1.1 of the Consultation Paper, airline passengers "desire seamless connectivity regardless of their location". With the wide adoption of smartphones, people want to remain connected anywhere at any time. According to a global survey conducted by Inmarsat, 60 % of passengers believe that In-flight Wi-Fi is necessary and some of the respondents indicated that "they would stop using their preferred airline within the next year if uninterrupted in-flight connectivity was not available for passengers". Through its customer care service, SITAONAIR also observes the frustration of passengers when the IFC services are not available.

Because none of the services are currently available in the Indian airspace due to the absence of authorization to provide IFC services, Indian airlines are deprived from offering a service for which there is growing customer demand. Equally, foreign airlines overflying India airspace must interrupt service provision.

As just noted, SITAONAIR's internet and mobile services are not available in foreign aircraft when crossing Indian airspace. As the routes of many of our airlines customers (e.g. Aeroflot, Singapore Airlines, Emirates, Etihad, Qatar Airways, Philippines Airlines, Saudi Airlines, Thai Airways) cross Indian airspace, this has a significant impact on passenger experience - passengers cannot use the services during part of their journey. SITAONAIR's foreign airline customers are therefore also wishing that all IFC services be made available over India.

We also note that the current prohibition is not universally or consistently respected.

For the reasons stated above, SITAONAIR considers that both internet and MCA services should be made available in Indian airspace.

We are aware that some particular consideration may be paid to MCA services, and so add a few additional comments on this. MCA is a growing industry with cellular communications being used more and more for data and SMS. MCA is particularly appreciated by passengers because of its facility of use. Passengers simply select the OnAir network on their mobile phones to access the service and the service is then invoiced by their home network operator on their mobile phone bill. Our experience also suggests that the availability of MCA services in fact stimulates the internet service demand as well.

We also highlight that for MCA services the question of interference with terrestrial networks has been comprehensively addressed by the CEPT and MCA systems complying with the technical conditions prescribed by the ECC decisions ensure that MCA services present no risk of interference

with terrestrial networks. Safety and security aspects are also addressed by the airworthiness certificate delivered by the respective civil aviation authorities. Some additional information on this can be found in Annex II.

If for any reason the TRAI were to consider that there are additional complexities in establishing a policy for authorizing MCA in India, the IFC Policy could in an initial period only cover Internet services while leaving for a second stage the authorization of MCA on board Indian aircraft. In these circumstances, however, we would respectfully suggest that MCA services on board foreign aircraft overflying India should nevertheless be authorized from the outset, subject only to security requirements (see our response to Question 13).

Q.2: Should the global standards of AES/ESIM, shown in Table 2-1, be mandated for the provision of AMSS in Indian airspace?

As the mentioned standards are widely used for the provision of IFC services, we agree with the TRAI that both global standards of AES/ESIM should be mandated for the provision of AMSS in Indian airspace.

Nevertheless, many of our airlines' customers registered in foreign countries use the SwiftBroaband ("SBB") services provided by Inmarsat and operating in the L-band's following frequencies:

- 1518-1559 MHz (Space-to-earth)
- 1619.5-1660.5 MHz (Earth-to-space)

For these existing foreign registered aircraft, we would respectfully suggest that the TRAI includes a mention regarding the L band within the global standard table with the following references:

- Decision ECC (12)01 on Exemption from Individual Licensing and Free Calculation and Use of Terrestrial and Satellite Mobile Terminals operating under the control of networks
- Resolution 222 (REV.WRC 12) Use of the frequency bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service, and procedures to ensure long-term spectrum access for the aeronautical mobile-satellite (R) service
- ETSI EN 301 473

We would assume that the National Frequency Allocations Plan (NFAP) will be updated accordingly.

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 ?

ECC Decision (06)07 as amended on 18 November 2016 and EC Decision 2008/294/EC and Commission Implementing Decision 2013/654/EU (as amended by Decision 2016/2317) set technical and operational limits which ensure that airborne mobile phones and MCA system are prevented from

interfering with terrestrial cellular mobile networks. As further explained in Annex II these decisions have been adopted on the basis of extensive studies carried out by the CEPT and have been recognized worldwide as a global standard. We therefore do not believe that any further measures are needed.

While SITAONAIR supports a technology and spectrum neutral approach to MCA services and would welcome in principle the possibility to offer MCA services using other frequencies/technologies than those allowed in the EC and ECC decisions, we believe that a harmonized approach of the use of the spectrum and technologies across administrations is important to ensure that MCA can be used in any national airspace that the aircraft is crossing. We therefore believe that allowing MCA services in the GSM 1800 MHz frequency band, in the UMTS 2100 MHz band and in the LTE 1800 MHz band, in line with EU and other regulations, is sufficient.

We therefore respectfully suggest that TRAI/DOT immediately allow MCA services under the conditions set out in the relevant EC and ECC Decisions mentioned above including EC Decision 2016/2317 in respect of the requirement of the Network Control Unit ("NCU") to screen only the ground UMTS networks. We also respectfully recommend to TRAI to ensure that the Policy setting out the conditions under which MCA can be provided is "future proofed" by making provision for allowing (as may be needed in the future) 1) additional frequencies/technologies that could be found suitable for harmonized use of MCA systems and/or 2) changes in the technical and operational conditions under which MCA services are allowed.

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 ?

SITAONAIR is supportive of the IFC policy covering the provision of "gate to gate" internet services.

From a technical angle, there is no obstacle to provide such internet "gate to gate": it simply needs to be noted that the internet service will have to be enabled by a satellite link as the aircraft fuselage attenuation and the location of the access points within the airport will prevent passengers on board aircraft from accessing the internet service provided by the ground internet service provider. For more information, see Annex II. As such, there will be no competition with ground ISP and likewise there is no justification for an altitude restriction for Internet services as Internet services do not cause interference to other ground providers.

In order to allow Internet "gate to gate" in India, we believe that the IFC Policy should specifically authorize the use of the aircraft earth station within airport and allow the licensee to provide internet access services from the gate. Restrictions on the use of Personal Electronic Devices (PEDs) (e.g. mobile phones) during critical phases of flights (i.e. take-off and landing) will also need to be removed by the Civil Aviation Authority.

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

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SITAONAIR believes that any holder of an appropriate license should be permitted to provide IFC services on Indian registered aircraft and that, subject to compliance with any security requirements (see answer to Question 13) all IFC service providers providing service on foreign aircraft which overfly India should be permitted to provide those services during such overflight (see our comment on Question 11). We note that a Unified Licensee having authorization for Access Service/Internet Service (Cat-A) may be considered as appropriately licensed, and suggest also that other Telecommunication Service Providers ("TSPs")s holding appropriate licenses should also be authorised.

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

We are of the understanding that IFC services are a subset of general telecommunications services and are in our view well covered under the ambit of services provided under Unified Licence with Access Service/Internet Service authorization as well as under any other suitable TSP licenses. As stated above in our answer to Question 5 above, the modalities can be framed within the existing licensing regime for such provisioning of IFC services. We therefore do not see a need to create a separate category of IFC Service Providers. However, if TRAI would considers that creating a separate category of IFC Service Provider would be useful, we would have no objections.

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?

In Annexure 2.1 of the consultation paper, TRAI has noted that in many countries it is the IFC provider which is directly authorized to provide MCA services without having the need for a partnership with a local entity holding appropriate license to provide mobile services. The same is true for Internet services. As an example, SITAONAIR is directly authorized to provide IFC services on board aircraft registered in countries such as Singapore, Philippines, UAE, Oman as well as in Europe.

However, in India, we understand that foreign entities are not allowed to apply either for a Unified Licence or any other appropriate license and the alternative of permitting IFC through a partnership with a licensee holding appropriate authorizations (as referred to in the comments under Question 5) would be a simple and efficient way of authorizing IFC services in Indian registered aircraft.

On the question of spectrum rights for the operation of MCA services (para 3.18 of the consultation paper) we would like to highlight that MCA service providers need access to GSM1800, UMTS2100 or LTE1800 bands in order to use such spectrum within the aircraft (between passenger handset and the airborne pico-base station) and we therefore see the merit in considering that access to such frequencies can be granted through an extension of the local Mobile Network Operators' (MNOs') spectrum right (to apply in the sky) and through an agreement between the IFC provider and an authorized MNO granting access to such frequencies to the IFC provider. This way there will be no need to grant spectrum right to the IFC provider. This is a model we operate successfully in other

jurisdictions. However, we would like to emphasize that from an architecture perspective, SITAONAIR does not use any network from a national MNO as the traffic generated on board the aircraft needs to be routed through the SITAONAIR ground mobile network (located in Monaco) in order to ensure airborne-to-ground roaming coverage.

When IFC services are provided on Indian registered aircraft through a local partner holding relevant licences for TSP services and spectrum use, we do not see a need to require the same from IFC providers.

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 registration process?

As mentioned under Question 7 above, we do not see any merit in imposing additional licensing requirements on the IFC service provider: access to spectrum and authorization to provide telecommunications services will be covered under the agreement with the Licensee.

If the IFC Policy were to define operational and technical requirements applying to the provision of MCA services and/or Internet services (e.g. altitude restriction and NCU for MCA, or power limits for both services), IFC providers would naturally need to comply with such requirements. In this case a simple registration process could be an efficient way to ensure compliance.

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

We believe that any appropriately licensed entity in India should be authorized to partner with IFC service providers. As already noted, this would therefore include Unified License holders as well as holders of any other suitable TSPlicense.

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

In order to encourage the take-off of IFC services in India and allow Indian consumers to benefit shortly from the services, we encourage TRAI to support a simple but efficient regulatory regime for authorizing IFC services. We believe that authorizing IFC services through a partnership with an appropriate license holder (or directly by any entity holding such licence) and, if found appropriate by TRAI/DOT, through registration of the IFC service, would be and would give DOT/TRAI appropriate level of control. We therefore do not think that there is a requirement of additional restrictions or regulations over and above the already existing rules/regulations in place. We note that issues relating to air safety are of course of paramount importance to the operation of IFC but fall under the responsibility of the DGCA.

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?

The question of the authorization of IFC services on board foreign aircraft is critical. Seamless provision of IFC services requires ensuring that the IFC services can be used in any national airspace that the aircraft is crossing without suffering from interruptions. To ensure this, the Chicago Convention and in particular International Civil aviation Organization ("ICAO") Resolution A29-19 "Legal aspects of the global air-ground communications", set out the principle of mutual recognition of authorizations granted in the State of registry of the aircraft for air to ground communications.

More specifically, ECC Decision 06(07) provides that countries shall allow the use of MCA systems when such system has been authorised by the country of registry of the aircraft in accordance with the mandatory technical conditions. In Asia-Pacific, a similar approach was adopted in August 2007 by the 4th meeting of APT's Wireless Forum in its Framework Opinion ("The Framework for the Use of Mobile Phone On-board Aircraft"), which recommends airborne mobile systems to be authorised by the State where the aircraft is registered and calls for mutual recognition of national authorisations.

In addition, Article 17 of the Chicago Convention provides that "aircraft have the nationality of the State where they are registered". One should therefore consider that IFC services provided within a foreign aircraft are not provided on Indian "territory". Likewise, the ground segment of the IFC provider will often be outside India and there is therefore no reason for the Indian licensing regime to be applied to foreign aircraft.

Based on the above reasons, SITAONAIR respectfully suggests 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 (see answer to Question 13).

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?

If making rules under Section 4 of Indian Telegraph Act, 1885, is an efficient way to ensure that shortly after publication of the IFC Policy, holders of a suitable TSP license will be authorized to provide IFC through partnership with an IFC Service Provider, SITAONAIR would be supportive of such approach.

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

SITAONAIR can operate using any of the options discussed in section 3.19 to 3.22 of the consultation paper.

We respectfully suggest that the ability for a security agency to intercept communications and communications data does not depend on whether the satellite is Indian/foreign owned or leased. What matters is the level and quality of information which can be accessed by the security agency.

With reference to the last sentence in section 3.19 of the consultation paper, we would also like to mention that it is not really a question of foreign airlines "wanting" or "not wanting" to switch to an Indian Satellite System: the question is also one of operational efficiency. Satellite terminal de-registration and re-registration is complex and subtle, adding in another layer adds also complexity and the risk of service degradation. Equally, if Indian registered airlines were to be subject to specific country by country requirements, the advantages for airline passenger connectivity, as outlined in section 1.1 of the Consultation Paper would be diluted.

Security control over the usage of IFC can in our view and experience be achieved by either of the three following options:

- Requiring communication traffic over Indian airspace to land directly in a ground earth station located in India;

- Allowing traffic to land in a foreign ground earth station and routing such traffic directly to an node in India (Forced Call Routing ("FCR")); or

- Allowing traffic to land in a foreign ground earth station and copying the traffic to a node in India (Mirror Copy ("MC")).

Requiring traffic to land in a ground station in India would be the most onerous and time-consuming solution as, to our knowledge, no foreign satellite provider operating in L, Ka or Ku band that is required for the backhaul of IFC services, already has an operating ground station in India. If the costs of building a ground gateway is passed on to IFC service providers, this could raise the price of providing IFC services in India

We also understand that satellite providers often operate with a limited number of ground earth stations (typically three or four) and that if all administrations were to require aero traffic to be landed in a local ground station, the economic case for providing IFC Services would be profoundly affected.

A FCR or MC can be put in place at a much lower cost than a ground station and within a shorter time (6-9 months) and would therefore allow a faster introduction of IFC services in India without raising costs to entry. We note that from an IFC Service Provider perspective, the FCR solution has an impact on the quality of service and thus on passengers' experience as it creates some delay in the communications.

SITAONAIR therefore favours a MC solution as mentioned in section 3.21 of the consultation paper as being the optimal solution to meet security requirements.

As we understand that some stakeholders may prefer traffic to land in a ground station in India, an alternative would be to allow the mirror copy solution for an initial period (say, two years) – while

usage and traffic patterns can be studied. The TRAI/DoT could then, if it felt appropriate, undertake additional consultation and issue new requirements if considered necessary. We would respectfully counsel here the need for an appropriate time period for compliance with any new requirements.

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

We do not think that requiring IFC services on board domestic flights through INSAT only is necessary. As mentioned by TRAI in sections 2.2 to 2.5 of the consultation paper, satellite operators providing the backhaul for IFC services must operate in certain defined bands allocated to AMSS. As long as satellite operators operates in such bands and in compliance with the conditions prescribed by the relevant global standards, all satellite operators should be able to provide satellite backhaul for IFC services. Not authorizing other satellite providers including foreign ones would reduce an IFC's choice of supplier, raise costs and add technical complexity.

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?

Our answer is the same as for Question 14 for domestic flights: IFC providers should be free to choose INSAT or another satellite operator for the satellite backhaul.

We note that in questions 14 and 15 TRAI suggests that a distinction could be made for security requirements between International flights (including Indian registered and foreign airlines) and domestic flights. This is also discussed in section 3.22 of the consultation paper. We need to counsel caution here. Aircraft may be used for a mix of domestic and regional/ international routes (e.g. B737/A320 used for (as an example) a Delhi Mumbai route but also for a Delhi Dubai route) thus applying a different requirements for domestic and international flights could be quite complex.

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

(a) Foreign registered airlines.

Administrations do not in principle request SITAONAIR to pay any charges in relation to foreign aircraft. This is consistent with the fact that administrations which recognize the authorization of the State of Registry of an aircraft do not consider that foreign airlines are carrying out any licensable activities in their airspace or are subject to national telecommunication regulations. Note that the only activity which administrations may ask to regulate on board a foreign aircraft is security, but no fee would normally be requested for what is actually a cost borne by the satellite/IFC providers.

SITAONAIR therefore respectfully suggest that TRAI should not charge the IFC service provider operating on board foreign registered aircraft.

(b) Indian registered airlines.

Overall, we believe that any fees should be set at a level that does not dampen demand.

We would initially like to comment that there are two types of charges which can be applied on IFC providers.

The first one is linked to service access (the IFC provider is required to pay a fee in return of obtaining permission to provide a service). Such fees should not normally exceed what is necessary for covering administrative costs.

The second one is related to a fee linked to consumption of the service or a revenue based fee that some administrations may request. We understand that this is the case for Unified License holders in India, where the Unified Licensee are subject to License fee and SUC applicable on the AGR. From a commercial perspective, SITAONAIR does not encourage such consumption fees on its services as it has a deterrent effect on the take-up of the service. However, in case TRAI would recommend such a fee, we do agree with TRAI's comment in section 3-23 of the consultation paper that determining fee on revenues generated over Indian airspace is something which is almost impossible to do in any accurate way (the only way to do it is to do some quite complex and approximate calculations using assumptions and proxies).

A simpler alternative, which has been put in place in many countries is to impose a nominal fee related to the aircraft.

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

In the section 3.24 of the consultation paper, TRAI list the most suitable satellite bands for IFC services and it is unclear for SITAONAIR whether the L-band will be considered in the satellite bands for operation. Therefore, SITAONAIR would like to re-iterate its request to TRAI to consider the L-band in its regulatory framework. In the same section, TRAI mentioned the mobile technologies that can be used on board an aircraft and are GSM or LTE services. We assume that UMTS is part of the MCA technology.

We support the view of the TRAI that the IFC regulatory framework will list the satellite frequency bands which are suitable for the IFC service (L-, Ku- and Ka-bands) however we counsel TRAI to remain open to any future suitable satellite bands. The IFC service provider will then select any of the listed satellite frequency bands that is relevant for its IFC services.

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

We believe 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.

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For SITAONAIR,

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2 November 2017.

SITAONAIR

ANNEX 1: PRESENTATION OF SITAONAIR

1. SITAONAIR global experience

SITAONAIR combines the proven knowledge of airline communications and IT of SITA with OnAir's expertise in supplying in-flight connectivity. With its unrivalled industry-backed heritage, SITAONAIR empowers 400+ airlines and 16,000+ aircraft to navigate the complexity of connectivity and unlock connected aircraft value. We work in partnership with the air travel community, helping support its digital transformation, to unlock the true value of data, grow ancillary revenues, and enhance the passenger experience, operational efficiency and airline safety. Our co-created solutions for passengers, cockpit and cabin crew, and aircraft data management equip the industry to address the challenges and value-generating opportunities it presents. We support Air Navigation Service Providers in defining and implementing next generation solutions of Air Traffic Management. SITAONAIR provides the complete range of products and services an airline needs to realise the full potential of the connected aircraft regardless of fleet size, route structure or aircraft type. We provide in ground and inflight connectivity, cockpit data services, air traffic management solutions, aircraft communications and infrastructure.

2. SITAONAIR's IFC SERVICES

1.2 Internet OnAir

SITAONAIR' Internet IFC product, "Internet OnAir", provides a consistent, secure, high speed Wi-Fi hotspot in the aircraft. Passengers can connect and access the internet from 3,000 metres using their personal electronic devices ("PEDs") (e.g. mobile phones, laptots). They are captured by the Internet OnAir inflight portal attached to the Wi-Fi network on board. Passengers can then browse the content available on the portal and buy a Wi-Fi session to connect to the internet or use a code given to them by the airline to access a free of charge session. From an airline perspective, Internet OnAir represents an extension of their marketing activities and an opportunity to acquire valuable insights and data about the passengers' profile and behavior. Technically, cabin traffic is forwarded via the on-board server to an externally mounted satellite terminal for transmission over the satellite network to a terrestrial gateway. Once on the ground, the traffic is routed from the gateway to the SITAONAIR internet infrastructure located in the Netherlands.

The figure below shows how Internet OnAir works:

1. Passengers connect to the onboard 'Hotspot' via their mobile device such as laptop computers or Wi-Fi enabled smartphones.
2. Data request is processed by the onboard connectivity server
3. Signal is transmitted via satellite
4. Internet ONAIR ground infrastructure processes passenger payments in real-time
5. Internet-based traffic managed by SITAONAIR ground infrastructure

2.1. Mobile OnAir

SITAONAIR's inflight mobile service, «Mobile OnAir», allows airline passengers to use their mobile phones during flights for phone calls, text messages and mobile data usage in the same way as on the ground. The service initially used the GSM technology operating in a few channels within the 1800 MHz band. Since the launch of the first generation of the "Mobile OnAir" system, the use of mobile phones on board aircraft has increased with a growth estimated at 10-20% a year with over 50% of passengers using their mobile phones for data. To support the mobile data usage growth, SITAONAIR therefore has recently launched a new inflight mobile connectivity service based on the UMTS technology offering download speeds of up to 21Mbps (depending on satellite backhaul).

Access to the inflight "Mobile OnAir" service is available once the aircraft is at an altitude of at least 3,000 meters above ground. With the onboard systems over which SITAONAIR's mobile service works, the cabin crew have full control to deactivate the voice capability if the airline so chooses (e.g. night flights), thus the services can be optimised to suit the overall passenger interest.

The figure below depicts how Mobile OnAir works:

1 Passengers use their mobile phones just as they do on the ground
2 Pico base station picks up the signal
3 Signal is processed by the on-board GSM server
4 Signal is transmitted via satellite to the ground earth station
5 SITAONAIR ground mobile infrastructure located in Monaco, processes signal and directs passenger traffic to its destination

SITAONAIR's role is to manage the mobile connectivity between the passengers' mobile devices (when airborne) and the ground, so as to enable passengers to access the telecommunications network of their home MNOs. Once the traffic lands within the ground infrastructure, it is treated like any other mobile traffic passing between subscribers using different "home" MNOs. By signing roaming agreements with SITAONAIR (these roaming agreements are specific to the aero environment), MNOs around the globe have the possibility to extend the scope of their roaming coverage. SITAONAIR is party to more than 350 roaming agreements with terrestrial mobile network operators around the world. Subscribers to any one of these mobile network partners can use their own personal phone (or other mobile device) to connect while in the air. All use of the system is billed to the passenger by the passenger's mobile service provider at the roaming rate set by that wireless carrier for the service.

2.2. OnAir Play

"OnAir Play" enables wireless content distribution (e.g. video, magazines, moving maps) to passengers' own devices from an onboard server. Content can be frequently, automatically and easily updated giving up to date access to city guides and magazines. With OnAir Play, airlines can reduce the weigh added, and therefore the fuel required, by In-Flight Entertainment devices without sacrificing the passenger's experience.

2.3. SITAONAIR's customers

Twenty airlines around the world have recognized the value that connectivity services provided by SITAONAIR (Mobile OnAir, Internet OnAir and OnAir Play) brings to their passengers, including Egypt Air, Emirates, Ethiad, Qatar Airlines in the MEA region, Singapore Airlines, Thai Airways (internet OnAir only), Garuda (Internet OnAir only), CEBU (Internet OnAir only) and Philippines Airlines in Asia and British Airways (Mobile OnAir), Iberia and Aeroflot in Europe. These airlines fly more than 800 aircraft equipped with either Internet OnAir, Mobile OnAir or both on more than 1 300 flights a day. This means than approximately 300 000 passengers have access to our passengers connectivity services every day. Of these, 50,000 will use Mobile OnAir and 35 000 will purchase an Internet OnAir sessions.

2.4. SITAONAIR's portfolio of Telecom approvals

For all of its airlines customers, SITAONAIR directly or indirectly (e.g. through an agreement with a local Telecommunication Service Provider) holds appropriate authorization in the country where the aircraft is registered. In addition in order to ensure seamless provision of the services during an entire international flight, SITAONAIR has ensured that the services can be provided in over 170 overflown countries. SITAONAIR looks forward to being able to provide Indian airline passengers on domestic and international flights, the same level of connectivity that many international airlines customers already enjoy.

SITAONAIR

ANNEX II TECHNICAL CONSIDERATIONS IN AUTHORIZING IFC SERVICES IN INDIA

1. Prevention of interference to terrestrial mobile Network

Ensuring that mobile communications services on-board aircrafts does not pause harmful interference to the cellular networks located on the ground is a key consideration in authorizing MCA services. In Europe, this issue was addressed by the European Conference of Postal and Telecommunications administrations ("ECPT") that carried out a compatibility study between 2003 and 2006. This study, adopted in 2006 as ECC Report 093, concluded that airborne GSM systems could be introduced without causing harmful interference, provided they comply with certain technical conditions in relation to power limits and that they are not activated below 3,000 meters (10,000 feet). In particular, all MCA aircraft have to be equipped with a Network Control Unit ("NCU") which role is to raise the noise floor in certain mobile receive bands to prevent airborne mobile handsets from connecting to a ground base station. At the time of the MCA inception, the NCU covered all the mobile bands used worldwide.

As noted in para 2.26 of the TRAI Consultation, the ECPT[1] and the EC[2] subsequently allowed UMTS and LTE technologies in the 2100MHz and 1800 MHz respectively to be used in aircraft. To ensure prevention from interference to the ground cellular network, these decisions required the NCU to prevent terrestrial connections by airborne mobile handsets in two additional bands (791-821 MHz and 2570-2690 MHz frequency range).

However, we would like to bring to TRAI's attention that in November 2015 the EC Commission mandated the ECPT to undertake technical studies to determine whether the need for the NCU continued to be justified.

The ECC Report 63 of 17 November 2016 concluded that MCA operations without an NCU are sufficient to guarantee a reasonable protection against resulting interference and signalling issues to and from terrestrial GSM and / or LTE wireless telecommunication systems. The same conclusion was reached in relation to future technologies related to 5G. It is therefore only for UMTS systems, that the Report concludes that an NCU remains necessary to prevent connection of User Equipment onboard to mobile communications networks on the ground. The ECC and EC decisions were therefore amended respectively on 18 November 2016 and 16 December 2017 to reflect these changes[3]. We note that as the current NCU design already covers these bands, the technology remains fully compliant with these new standards.

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[1] ECC Decision(06) 07

[2] EC Decision 2008/294/EC and Commission Implementing Decision 2013/654/EU

[3] Commission Implementing Decision (EU) 2016/2317 of 16 December 2016 amending Decision 2008/294/EC and Implementing Decision 2013/654/EU, in order to simplify the operation of mobile communications on board aircraft (MCA services) in the Union

It is worth mentioning that additional investigations could be made in future to demonstrate that an NCU would not be required as well for UMTS due to some specific conditions (e.g. pilot channel pollutions).

2. Prevention of interference to avionic system

A quite distinct topic from the question of interference with mobile terrestrial network operator and yet very important aspect of IFC services is ensuring that mobile phones, can be safely used on aircraft.

To be able to activate the IFC service, it should be demonstrated that Transmitting-Portable Electronic Devices ("T-PEDs"), i.e. mobile phones, do not have an adverse effect on the avionic system. Such demonstration is done via a radio frequency test called T-PED test, performed inside the aircraft cabin. Basically, this is done with a signal generator transmitting inside the aircraft cabin within the various cellular bands at a given power level while an engineer controls the avionic system. This test is descripted in the DO-294B or the ED-130 ""Guidance on Allowing Transmitting Portable Electronic Devices (T-PEDs) on Aircraft" developed respectively by the Radio Technical Commission for Aeronautics ("RTCA") and the European Organisation for Civil Aviation Equipment ("Eurocae").

Another test called an Electromagnetic Immunity ("EMI") test is required. It consists in activating on the ground the IFC system and ensuring that it has no adverse impact on the avionic system.

Both tests (amongst other requirements) are necessary to obtain the airworthiness certification.

Airworthiness certification is fully handled by the Civil Aviation Authority of the country in which the aircraft is registered. Obtaining the airworthiness certification is a mandatory process to be able to activate the service on-board the aircraft. We believe therefore that the TRAI can be fully satisfied that these matters are already regulated in the appropriate forum and do not need further consideration here.

3. Internet gate to gate

In respect of providing Internet services gate to gate we note that in Europe, the use of earth stations is currently restricted in the vicinity of airport based on the ECC Report 66 "PROTECTION OF AIRCRAFT FROM SATELLITE EARTH STATIONS OPERATING ON THE GROUND IN THE VICINITY OF AIRFIELDS". Nevertheless, with the help of aviation expert, the CEPT Working Group Spectrum Engineering ("WG SE) performed new calculations by taking into account current regulation on aircraft protection from electric field and concluded that there will be no impact to aeronautical safety due to the operation of earth stations in both Ku and Ka bands. Based on these finding, an ECC Report 272 has been prepared by the WG SE and is currently under public consultation until 28 November 2017. As a result, we expect that restrictions on earth station operation within airfields would be removed from ECC Decisions for both Ku and Ka band.