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| **The 32nd Meeting of the APT Wireless Group** **(AWG-32)** |  |
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**QUESTIONNAIRE ON AIR-TO-GROUND COMMUNICATION SYSTEM BASES ON IMT TECHNOLOGIES IN THE ASIA PACIFIC REGION**

**Section 1: Elementary Part**

# 1. Introduction

There is a growing demand for affordable air to ground and ground to air connectivity, due the rising expectation for connectivity in airplanes. Traditionally, connecting an aircraft with the ground can be achieved between satellite and terrestrial systems. For example, GSO-satellites have the advantage of a global coverage spanning both land and sea, which makes them suitable for intercontinental flights which flying over remote land and dispersed islands. Some satellite-based in-flight connectivity (IFC) services suffer from long latency.

Nowadays, Several test campaigns have demonstrated that terrestrial IMT networks can respond to this type of connectivity demand. Standards Developing Organizations (SDOs) such as ITU-R, 3GPP are currently standardizing functionalities to support these use cases.

Despite phenomenal advances in terrestrial mobile communications, providing broadband IFC to aircraft passengers could be further improved. Besides using satellites, IFC services also can be provided using direct air-to-ground (ATG) communications, because The alternative approach based on ATG communications leverages cellular technology to establish direct connectivity between terrestrial base-stations (BSs) and aircraft. For instance, the European Aviation Network connects the European skies using satellites in combination with an gound network based on long-term evolution (LTE). The Gogo Biz ATG network uses a variant of the third-generation (3G) code division multiple access (CDMA) 2000 technology to provide IFC in North America.

**1.1 APT studies in the past**

APT Wireless Group (AWG) developed APT Reports on Broadband Wireless Air-To-Ground (ATG) Communications Links with Passenger Aircraft during the period of 2019 ([APT/AWG/REP-95](https://www.apt.int/sites/default/files/2019/07/APT-AWG-REP-95_-_APT_Report_BB_Wireless_Air-to-Ground.docx)). The APT Report discussed operation scenarios, key operating issues, technical aspects and spectrum issues. However, considering increasing demand for in-flight bandwidth and developing of IMT technologies, thus it could be difficult to fully reflect current status of ATG in APT Region. Finally, it is notable that ATG communication, as one of the lasted specific applications, also always is interested in APT region.

**1.2 ITU-R studies**

Report ITU-R M.2282-0 was developed in ITU-R Working Party (WP) 5A; then it was published in 2013 to provide an overview of general principles, technical characteristics and operational features of terrestrial systems for public mobile communications with aircraft. Meanwhile, in response to the demand of the aviation industry for broadband connectivity such systems have been deployed and are in commercial operations. Ten years after its initial release the Report is being updated to reflect the latest state of the industry in this cycle. Based on its working plan, it is going to upgrade the Draft to Preliminary Draft Report in 2023.

**1.3 Development of IMT technologies**

The advent of new radio (NR), applied in Recommendation ITU-R M.2150, offers new opportunities to enhance ATG performance. 5G communication techniques such as large antenna arrays, multi-user beam-forming and higher order modulation schemes will improve ATG systems to provide capacity levels estimated by the industry. With this motivation, the 3rd Generation Partnership Project (3GPP) has been developing specifications for NR-based non-terrestrial networks which include support for ATG communications.

Based on above aspects, At AWG-31 meeting, AWG decided to develop a new APT report for Air-to-ground (ATG) communication system bases on IMT technologies in APT Region. AWG invites APT Members to respond to this questionnaire to support the study.

**2. Objectives**

The objective of this questionnaire is to collect information on current or intended Air-to-ground (ATG) application based on IMT technologies from APT member and ATG industry.

**3. Responsible Group**

Working Group on Space, Aeronautical and Maritime (WG SAM)

Task Group on Aeronautical and Maritime (TG A&M)

**4. Meeting at which the Questionnaire was approved**

AWG-32

**5. Deadline for Responses**

AWG-34

**Section 2: Questionnaire Part**

**Questions**

1. Could you share current status/statistical data on broadband in-flight connectivity (IFC) to aircraft passengers in your country?

**<Answer>**

1. Which radiocommunication services are currently applied for broadband IFC to aircraft passengers in your country? Please select all that apply.

**<Answer>**

[ ]  Mobile Services (MS)

[ ]  Mobile Satellite Services (MSS)

[ ]  Fixed Satellite Services (FSS)

[ ]  Others

1. If you select more than one option in the question 2, does your administration grant the license separately or combined in a single license?

**<Answer>**

1. Who has (will hold) the license for broadband IFC to aircraft passengers in your country (MNO or others)?

**<Answer>**

1. Are there demands from industries and/or general users for broadband IFC in your country?

**<Answer>**

[ ] Yes [ ] No

1. Which technology trends could be suited for broadband IFC in your country? Please select all that apply.

**<Answer>**

[ ]  Air-to-ground (ATG) (also called as Direct Air-to-Ground Communications (DA2GC))

[ ]  GSO-satellites

[ ]  Others

Please provide details if necessary.

1. If ATG will be considered, Which candidate technologies are/will be applied forATG application in your country?

**<Answer>**

1. How do you describe the current commercialization status of ATG application?

**<Answer>**

[ ]  Already, on the market

[ ]  Planned already, commercialization will start in a few years

[ ]  Under consideration, probably to commercialize in the future

[ ]  No plan to commercialize

1. If the answer to the question No. 8 is “Already, on the market”, does the ATG devices installed on the aircraft has to obtain design approval from the Civil Aviation Authority (CAA)?

**<Answer>**

1. If the answer to the question No. 8 is “Already, on the market” or “Planned already, commercialization will start in a few years”, how much is the spectrum fee? and how long is the license duration?

**<Answer>**

1. Can ATG application and its devices be utilized in your countries’ current regulations?

**<Answer>**

[ ]  Yes

[ ]  No

1. Does your country have some plans to establish new regulations for ATG and its devices?

**<Answer>**

[ ]  Yes

[ ]  No

1. If the answer to the question **No. 11** or **No. 12** is “Yes”, what frequency ranges are (will be) regulated for ATG application and its devices? and what is the maximum transmit power of terrestrial base-stations and its devices?

Please check all possible frequency ranges.

**<Answer>**

1. If the answer to the question **No. 11** or **No. 12** is “Yes”, what incumbent radiocommunication services should be protected from ATG application and its devices?

Please check all possible incumbent systems and specify their frequency ranges.

**<Answer>**

1. Do you have any study results on impact on radiocommunication services, any on-going studies, or any plans of impact studies?

**<Answer>**

[ ]  Yes. We have some impact study results.

 (Could you explain the study briefly?)

[ ]  Yes. We have on-going studies.

 (Could you explain the study briefly?)

[ ]  Not yet started but, we have some plans of impact study.

 (Could you explain the plans briefly?)

[ ]  No.

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