International Civil Aviation Organization

Eighth Meeting of the Common aeRonautical Virtual Private Network Operations Group (CRV OG/8)

Video Teleconference, 17 – 19 May 2021

Agenda Item 12: Any other business

COHABITATION BETWEEN VSAT and 5G CELLULAR NETWORK

(Presented by DSNA - France)

SUMMARY

This paper presents the DSNA background and experience regarding the potential influences of the 5G cellular network deployment on operational VSAT terminal stations.

1. INTRODUCTION

1.1 DSNA presented in the CRV-OG/6 meeting 08-10 May 2019 in Bangkok the WP/06. This document intended to justify the need for a VSAT (Very Small Aperture Technology) link for international ATC exchanges link to avoid the SPOF (Single Point Of Failure) created by a unique terrestrial telecommunication access in isolated territories (small pacific Island). The objective of a VSAT is to set up another independent telecommunication access point to increase the availability and, thus the safety of the global architecture.

1.2 Nevertheless, since the CRV-OG/6 meeting the context has changed. The telecommunication operators have been awarded the frequencies to test and begin the 5G cellular network deployment. At least in **Europe**, the new 5G cellular network operates in the 3.4 Ghz to 3.8 Ghz range corresponding to the beginning of the C-band which is also used by the VSAT telecommunication terminals for receiving space-to-earth signal in the 3.4 Ghz to 4.2 Ghz band.

1.3 Some countries limit the 5G spectrum below 3.6 Ghz and some others will use the range 4.8 Ghz to 5 GHz or frequencies above 4.4 Ghz.

1.4 DSNA operates three VSAT terminal stations in the C-band spectrum which are part of the VSAT network operated by the Air Navigation Service Provider ASECNA in the ICAO AFI Region.

1.5 The goal of this paper is:

- to present the DSNA background,
- to share its experience regarding the consequences of the 5G cellular network deployment against the VSAT terminal technology using the C-band,
- to present the solution(s) currently available and known to mitigate the issue and
- finally to get information and feedback from PCCWs and the ASIPAC Region in terms of the band allocated to the 5G, the potential operational experience regarding the cohabitation between 5G/VSAT and the potential threaten on the VSAT technology using the C-band spectrum.

2. DISCUSSION

2.1 TECHNICAL BACKGROUND

2.1.1. Satellite communication terminals operate in different frequency bands, one of which is called C-band. Terminal operating in C-band normally receive signals in the range of 3.4 Ghz to 4.2 Ghz and transmit signal in the range of 5.85 Ghz to 6.425 Ghz (Standard C-band). Until recently there was no other widely-deployed technology operating in this band.

2.1.2. The C-band spectrum is mainly used for operational purpose as it is the least sensitive to meteorological perturbation like rain. Two other bands are available: the ku-band (10-18 Ghz) and the ka-band (18-31 Ghz) which is the most sensitive to meteorological disturbance.

2.1.3 Although some terrestrial networks like some Wi-fi or radar technology operate in the same range of frequency, they are not widespread enough to raise interference concern. The 5G cellular technology is expected to be deployed widely and in the same spectrum. Unlike other technologies listed above the power of the transmit signal is enough to saturate the VSAT C-band receiver which might cause a total loss of operational service.

2.2 CURRENT SITUATION

2.2.1. DSNA, in close relationship with the Frequency Regulatory Authority the VSAT reception frequencies for all the stations have been shifted outside the 5G spectrum (above 3.8 Ghz, between 3.9 Ghz and 4.2 Ghz).

2.2.2. In spite of this counter-measure protection, perturbations and interferences have been detected on one of the VSAT operational station due to the 5G deployment commencing. The survey made by the Frequency Regulatory Authority demonstrated that a 5G station located at around 100 m was at the origin of the issue.

2.2.3. The conclusion which could be derived from this survey is that, perturbations and interferences could append even if the frequency of the VSAT reception signal is outside the authorized 5G spectrum.

2.3 MORE EFFICIENT MITIGATION EXPECTED

2.2.1. A waveguide filter specifically designed to reject the 5G disturbances is foreseen to be installed in the reception branch and evaluated within the following weeks

2.2.2. Up to now DSNA could not rely on any experiment survey conclusion proving or not the efficiency of such a filter.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matter as appropriate

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