COMMENTS OF TELESAT INTERNATIONAL LIMITED

In response to the Consultation on the "Draft decision on National Frequency Plan (NFP) amendment in the 28 GHz"

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Introduction

Telesat is grateful for the opportunity to provide its comments on the *Draft Decision on National Frequency Plan (NFP) amendment in the 28GHz band*. Telesat applauds the Ministry's of Economic Affairs and Climate intention to revise the 2014 National Frequency Plan in order to reflect the change of use in the 28GHz band parts of 27.9405-28.0525 GHz and 28.9485-29.0605 GHz. However, Telesat is of the view that further updates to the NFP could be considered in accordance with the ITU Frequency Allocation Table and in line with relevant ECC decisions, including ECC decision (05)01, ECC/Decision (13)01 and ECC/Decision (15)04.

Telesat provides herein comments in relation to the use of radio frequencies 27.9405-28.0525 GHz, 28.9485-29.0605 GHz by wireless camera surveillance networks for the benefit of the public order and safety. Moreover, Telesat would respectfully propose some additional updates to the NFP, in relation to the possible use of 27.5-29.5 GHz and 17.7-20.2 GHz by Fixed Satellite Service (FSS) in the Netherlands, trusting that the Ministry of Economic Affairs and Climate will find them useful. These comments are preceded by a short introduction on Telesat connectivity solution based on the deployment of a constellation of Low-Earth Orbit (LEO) satellites, the Telesat Lightspeed™ system.

1. **Telesat Lightspeed™**

Telesat is launching Telesat Lightspeed™ [1], a revolutionary satellite constellation of highly advanced satellites in Low-Earth Orbit (LEO – ~1,000 km of altitude from Earth; ~35 times closer than traditional geostationary satellites)[1]. Telesat announced on the 9th of February 2021 that it has entered into an agreement with Thales Alenia Space to be the prime manufacturer of Telesat's Lightspeed system[2] .

Telesat Lightspeed™ will deliver fiber-like quality throughput (Gbps links with low latency) anywhere on Earth. The system is also a future-proof solution for backhaul cellular/5G traffic and will provide high-speed broadband access to rural and remote communities, as well as planes, ships, enterprise and government users. Furthermore, as a highly advanced and efficient system

[1] More information about the Telesat Lightspeed™ System is available at: https://www.telesat.com/leo-satellites

[2] https://www.telesat.com/press/press-releases/manufacturer-announcement/

with unparalleled economies of scale (multiple Tbps of usable capacity with global coverage), Telesat Lightspeed™ will deliver to target markets at significantly lower cost when compared to traditional alternatives using terrestrial and/or other space technologies.

The frequency bands of Telesat Lightspeed™ include the 17.8 – 18.6 GHz, 18.8 – 20.2 GHz bands in the space-to-Earth direction, and the 27.5 – 29.1 GHz and 29.5 – 30.0 GHz bands in the Earth-to-space direction for both user terminals such as Earth Stations In Motion (ESIM), VSATs and gateway earth stations.

Telesat Lightspeed™ is a highly flexible system that will allocate capacity dynamically based on demand, thus maximizing system efficiency. Each satellite in the constellation will be designed for maximum flexibility in terms of coverage, by means of steerable beams and inter-satellite links, and in terms of bandwidth and power assignment, by means of onboard processing.

Specifically, Telesat Lightspeed™ will make use of:

- Direct Radiating Array satellite antennas, which will provide independent agile beams, each with beam steering and beam forming capabilities, allowing beams to be generated where and when required, based on traffic demand;

- On-board Processing, which will perform signal regeneration (i.e., demodulation and re-modulation) and routing of traffic on board the spacecraft;

- Multiple Optical Inter-Satellite Links (OISL) beams on each satellite which will connect the satellites within the Telesat Lightspeed™ Constellation, enabling a highly resilient mesh network and avoiding the need for a spacecraft to be in the visibility of a feeder-link earth station to be able to provide connectivity with those User Terminals within its field of view.

The Telesat LEO satellites are capable of producing in real-time multiple and independent steerable beams, a feature that allows the system to implement complex and highly efficient frequency reuse schemes. Each beam can be assigned spectrum and power that considers both local demand and spectrum regulatory constraints. Furthermore, in order to serve user terminals which may be randomly scattered across the entire field of view of the satellite, each satellite beam may hop more than 20 different locations within the field of view at a rate fast enough that all user terminals, in practice, share

full access to the satellite. Beam hopping is a powerful capability that will allow Telesat Lightspeed™ to efficiently serve highly distributed and highly concentrated demands at the same time.

A wide variety of user terminals (maritime, aero and land) will access Telesat Lightspeed™, and, in particular, terminals equipped with both electronically steered antennas and mechanically tracking reflector antenna terminals.

Feeder-link connectivity to all satellites will be ensured via *Landing Stations* consisting of sites of up to 15 full motion antennas of approximately 4-metre diameter that will provide the satellite constellation with the forward uplink and return downlink connectivity required to serve user terminals globally. Initially, approximately 18 Landing Stations sites are planned to be deployed around the world, with plans for additional Landing Stations to accommodate growth.

Minimum avoidance angles between GSO satellites and Telesat's NGSO satellites have been calculated based on relevant limits defined in the ITU Radio Regulations, where applicable. These will be adjusted based on coordination agreements, as required. Steerable beams on each Telesat NGSO satellite allow handover to an adjacent satellite before the minimum avoidance angle is reached. Interference management will be carried out through the operation of Telesat's Constellation Network Operating System (CNOS), which will manage the overall radio resource allocation of the entire constellation and ensure compliance with the relevant operational and regulatory limits.

2. Comments to the Consultation

This section contains Telesat's comments related to the NFP and in particular to the proposed change of use of frequency bands 27.9405 – 28.0525 GHz and 28.9485 – 29.0605 GHz and to a possible additional allocation of the 27.5-29.5 GHz (Earth to Space) and 17.7-19.7 GHz (Space to Earth) to FSS coordinated earth stations links.

Telesat understands that the sub bands 27.9405 – 28.0525 GHz and 28.9485 – 29.0605 GHz are currently assigned to the Ministry of Justice as FS links and initially were necessary for the performance of public duties. However, following indication from the Ministry of Justice that these bands are not used anymore, the Ministry of Economic affairs and Climate considers to allocate

these sub bands for the fixed point to multipoint links required by the camera surveillance networks, for the benefit of public order and security.

Telesat applauds Ministry's decision to implement ECC/DEC/(05)01 *on the use of band 27.5-29.5 GHz by the FS and uncoordinated earth stations of the FSS*, thus promoting a clear harmonized regulatory framework for future investment and deployment of fixed and fixed satellite systems. In particular, Telesat notes that, in accordance with the NFP, the bands 27.8285-28.4445 GHz and 28.9485-29.4525 are designated for the use of FS systems and the bands 27.5-27.8285 GHz, 28.4445-28.9485 GHz and 29.4525-29.5 GHz for the use of uncoordinated FSS earth stations. The particular spectrum allocations could facilitate the deployment and the free circulation and use of uncoordinated earth stations since studies have shown that the interference between FS and *uncoordinated transmitting FSS terminals* is regarded to be unacceptable on co-frequency basis in the same densely populated geographical area.

It is important to note though that ECC/DEC/(05)01 identifies bands for FS and uncoordinated FSS earth stations, namely satellite user terminals that could be deployed in an uncoordinated basis in some parts of the 27.5-29.5 GHz as referenced in (h) and (k) in the considering part of the decision.

As mentioned in the decision ECC/DEC/(05)01, coordinated FSS earth stations –such as Gateways or Landing Stations- can still make use of the whole band 27.5-29.5 GHz, using established co-ordination procedures.

The 27.5-29.5 GHz band is already vastly used for gateway satellite earth stations, as sharing with terrestrial systems is feasible wherever the location and characteristics of the terrestrial systems are known.

Telesat notes that according to the current version of NFP, Fixed Satellite Links are only allowed to the parts of the uplink (Earth to Space) Ka band of 27.5-29.5 GHz that are used also by uncoordinated satellite earth stations. However, according to ITU RR frequency allocation table, the whole band of 27.5-29.5 GHz is allocated to both FS and FSS on a primary basis. In addition, as also referred to ECC/DEC/(05)01, coordinated FSS stations can make use of the whole 27.5-29.5 GHz. Therefore, Telesat would respectfully propose to add to the NFP the use of Fixed Satellite Links (Earth to Space) referring to coordinated FSS earth stations to the sub-bands

27.8285- 27.9405 GHz, 27.9405-28.0525 GHz, 28.0525-28.4445 GHz, 28.9485-29.0605 GHz, 29.0605-29.1 GHz and 29.1-29.4525 GHz currently allocated only to FS.

Taking into account the above considerations, Telesat is of the view that the sub bands 27.9405 – 28.0525 GHz and 28.9485 – 29.0605 GHz could be allocated to FS and in particular to camera surveillance point-to-multipoint links, provided that this spectrum and more in general the 28GHz could be also used by FSS coordinated earth stations such as Gateways.

With respect to the FSS licensing conditions as mentioned in the distribution mechanism column of the NFP in the 27.5-29.5 GHz, Telesat notes that "permit is granted in the order in which the application is received". It is important to note though, that this licensing approach for FSS should not replace or supersede the regulatory framework that the ITU Radio Regulations have provided to the international community for decades. In particular, Telesat is of the view that the licensing conditions should be consistent with the relevant ITU regulatory provisions and the explicit requirement that later-filed systems protect earlier-filed systems, while all have the obligation to coordinate in good faith.

Telesat wishes to highlight to the Ministry of Economic Affairs and Climate that ITU provisions shall apply irrespective of whether licenses an earlier-filed system before or after a later-filed system operating in the same spectrum in the Netherlands. In other words, should a system request a license to Ministry of Economic Affairs and Climate, this would impose on all future systems (whether they are already licensed by the Ministry or not) the same technical constraints that are known through the application of the well-established ITU coordination and notification procedures.

Telesat would like also to provide some comments with respect to the FSS allocation in the 17.7-20.2 GHz band. More specifically, Telesat notes that in the band 18.1-19.7 GHz, fixed satellite links (Space to Earth) are allocated on a secondary basis and licensing does not apply. This means that FSS cannot claim protection from harmful interference from stations of FS (primary service) to which frequencies are already assigned or may be assigned at a later date. No licensing applies either for the satellite exclusive band of 19.7-20.2 GHz. While this licensing approach would be ideal for the sharing of this frequency band between FS and uncoordinated FSS stations, it would not provide satellite operators with the adequate regulatory certainty they need for the deployment

of coordinated earth stations (gateways) in Netherlands. Satellite operators would need to invest millions of euros to design, manufacture and deploy their gateways. In order to do so, the relevant licensing framework for the operation of FSS should be established taking into account the successful coordination with other operators sharing this band. The technical conditions defined in the coordination agreements would offer the necessary protection of FSS fixed earth stations and set the conditions for operation of both FSS and FS in an interference free environment.

In addition, the 17.7-18.1 GHz is allocated only to FSS (Earth to Space), and according to the current version of NFP, FSS (Space to Earth) could not use this sub band. However, this band is critical for the deployment of broadband satellite services including ubiquitous VSATs and earth station in motion (ESIM) applications as mentioned in ECC/DEC/(13)01 and ECC/DEC/(15)04. The 17.7-18.1 GHz is also being used as a reception band for Gateway applications.

In any case, and in order to protect the FS in the 17.7-19.7 GHz, the power flux density at the Earth's surface produced by emissions from space stations will never exceed the limits indicated in ITU RR article 21.16 and in particular Table 21-4.

Taking into account the above, Telesat would respectfully suggest that the Ministry of Economic Affairs and Climate considers the allocation of 17.7-19.7 GHz to FSS (referring to coordinated earth stations/Gateways) on a co-primary basis with FS, in line with ITU RR frequency allocations table. The necessary licensing framework referring to the FSS Gateway applications could be established in the 17.7-19.7 GHz and 19.7-20.2 GHz following successful coordination with FS (for the 17.7-19.7 GHz) and in line with ITU regulatory framework. For the uncoordinated earth stations like ubiquitous VSAT or ESIM, the 17.7-19.7 GHz could be allocated on a secondary basis. These terminals could operate without license but would be subject to conditions in line with the relevant ECC decisions.

Conclusion

To conclude, Telesat would agree with the amendment of the 2014 NFP related to the allocation of the 28GHz and in particular of the sub bands 27.9405 – 28.0525 GHz and 28.9485 – 29.0605 GHz to camera surveillance networks for public order and security, provided that the 28 GHz will be also allocated to coordinated FSS earth stations (Gateways).

Telesat most welcomes this opportunity to provide proposals on the update of the 2014 NFP pertaining to the allocation of FSS to 28GHz and 17GHz and to the relevant licensing framework, remains available for any additional clarifications and looks forward to continuing the discussion and collaboration.