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August 30, 2017

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Ex Parte Meeting IB Docket No. 16-408

Dear Ms. Dortch,

This is to inform you that, on August 28, 2017, Daniel Goldberg, Michael Schwartz, David Wendling, and Erwin Hudson of Telesat Canada ("Telesat") as well as Joseph A. Godles of this firm and the undersigned, met with Kevin Holmes, Acting Legal Advisor to Commissioner Carr.

At the meeting, the Telesat representatives discussed the unworkability of the Commission's proposed in-line event rule, as reflected in the attached diagram that was distributed at the meeting (Attachment 1 to this letter), and as further demonstrated in the attached ex parte presentation summarizing a separate meeting of the Telesat representatives with the staff of the Commission's International Bureau (Attachment 2 to this letter). Telesat representatives also distributed and discussed the attached Overview of Telesat's LEO initiative (Attachment 3 to this letter).

Please direct any questions regarding this matter to the undersigned.

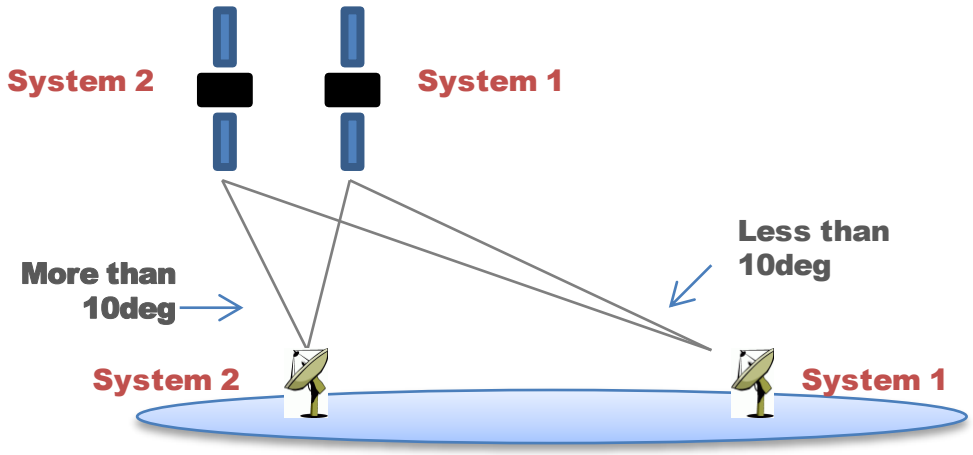
Respectfully submitted,

Henry Goldberg
Attorney for Telesat Canada

cc: Kevin Holmes

ATTACHMENT 1

Operators Have To Know The User Locations Of All Other Systems



The Commission's proposed rule defines an "in-line event" as follows:

"an "in-line event" associated with a specific frequency range occurs when there is physical alignment of space stations of two or more NGSO FSS satellite systems authorized to use this frequency range with an operating earth station of one of these systems such that the angular separation between operational links of the satellite systems is less than 10° as measured at the earth station."

ATTACHMENT 2

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Re: *Ex Parte* Meeting IB Docket No. 16-408

Dear Ms. Dortch,

This is to inform you that, on August 28, 2017, Daniel Goldberg, Michael Schwartz, David Wendling, and Erwin Hudson of Telesat Canada ("Telesat"), as well as Joseph A. Godles of this firm and the undersigned, met with the representatives of the Commission's International Bureau listed in Attachment 1 hereto. Copies of materials provided by Telesat at the meeting are attached as Attachment 2 hereto.

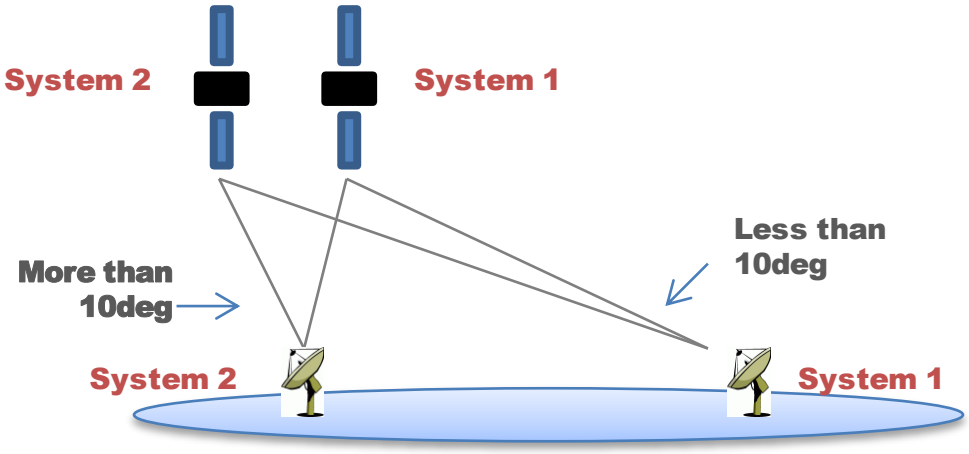
The Telesat representatives began by calling attention to the text of the Commission's proposed rule, which defines an "in-line event" as follows:

> "an "in-line event" associated with a specific frequency range occurs when there is physical alignment of space stations of two or more NGSO FSS satellite systems authorized to use this frequency range with an operating earth station of one of these systems such that the angular separation between operational links of the satellite systems is less than 10° as measured at the earth station."

To implement the proposed rule as drafted, operators would have to know the location of all the users of all other NGSO systems, as shown in Diagram A below:

Diagram A

Operators Have To Know The User Locations Of All Other Systems



An in-line event occurs when the angle formed by the lines from a System 1 user to (a) the System 1 satellite on which the user is operating and (b) a satellite from another constellation operating in the same frequency band (System 2) is less than 10 degrees.

This is because in this example, System 1 will know when an in-line event caused by one of its users occurs, and will be able to reduce the spectrum on which it operates. But unless System 2 knows the location of System 1's users, System 2 will not know that it needs to reduce the frequencies on which it is operating.

As this scenario demonstrates, depending on geometry and user terminal locations, one system operator may experience an in-line event while the other operator may be unaware that an in-line event is occurring. Thus, the proposed rule implicitly requires that operators exchange user location information, because without that information, operators will be unable to determine when certain in-line events are occurring.

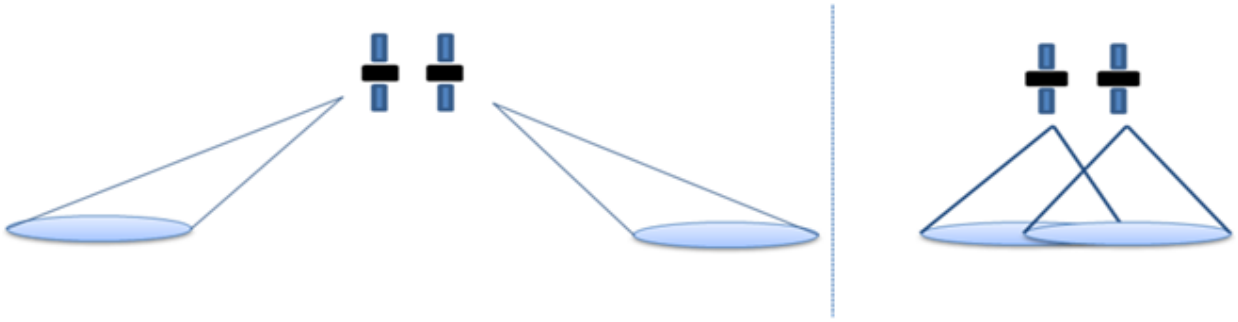
The Telesat representatives stated that sharing beam pointing and coverage information would make the in-line avoidance approach less inefficient, but still unworkable. The proposed rule implicitly assumes that all satellites in a constellation

cover visible earth, and that the coverage of the satellites from different systems completely overlap. This might have been true when the original rule was adopted, but it is not true now: not a single applicant has proposed such a constellation. This assumption will lead to many in-line events being triggered under the rule when there is no interference between the systems.

Diagram B below illustrates this effect, showing that there are situations in which an in-line event would be deemed to occur—because of the angle between a user and the satellites—but in fact there would be no potential interference because the beams of the satellite do not overlap.

Diagram B

Satellite Beams Must Overlap To Create Possible Interference



The Telesat representatives then noted that there is no evidence presented in the above-referenced proceeding to show that a single avoidance angle, whether 10° or any other, even approximates the point at which actual interference would be generated among all systems. Those parties supporting the Commission's 10° proposal have provided no technical analysis. The technical analyses that have been presented all prove the contrary.

In fact, with a fixed avoidance angle, there is simply no way to avoid circumstances (which will be dictated by the design of the relevant systems) in which either an in-line event is deemed to occur when in fact there would be no interference, or an in-line event is not deemed to occur when in fact there would be interference.

The Telesat representatives then noted that a regime designed to require spectrum sharing only in those situations in which an operator would actually suffer interference requires that operators have real-time access to detailed information (above and beyond user location and beam pointing) about the operations of all the other co-frequency systems. To determine when a system will actually cause or suffer interference, operators need to know in real-time and for each of the systems implemented with common spectrum:

- Satellite ephemeris data
- Beam pointing, size and coverage information (including frequencies and polarization being used)
- The location of every other operators' earth stations and when they will be in operation; and
- The characteristics of the relevant earth and space stations such as EIRP, G/T, interference threshold and/or protections criteria.[1]

The Telesat representatives added that it would be practically impossible to implement *any* system requiring real-time determinations of avoidance angles because the relevant system parameters would be changing constantly to meet customer requirements and operational conditions. The operations of NGSO constellations will not be completely predictable or static. NGSO satellites may implement steerable/swept/hopping/staring beams and may adapt beam pointing, bandwidth and power in real time to accommodate changes in demand.

While the normal operation of the constellation is based on planned or scheduled sequence of beam steering and handoffs, the dynamic nature of the system will lead to adjustments to react to changes in customer requirements and system operations. Events such as congestion, heavy rain fade at a site, changes in user demand, etc. will all require changing the satellite/beam selection for a given service area. In addition,

[1] The Telesat representatives noted that OneWeb's recommendation to use a $\Delta T/T$ standard does not make the real-time informational requirement any less demanding. Comments of WorldVu Satellites Limited ("OneWeb"), *In re Updates to Part 2 and Part 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, IB Docket No. 16-408, at 14-15 (filed Feb. 27, 2017). To calculate $\Delta T/T$ requires the provision of the same real-time information.

users will come on and off the systems. Further, the time in which such changes need to be made is measured in milliseconds. There is simply no way that operators can exchange information on changes fast enough to allow the operators to determine if those changes will result in an-line event and to take corrective action.

OneWeb summarized the issue as follows:

> "OneWeb's network will operate with extremely precise and constantly changing beam pointing for its user beams. Beam pointing for user beams cannot be pre-planned, so orbital location data, if sent to other operators, would be received long after that particular location and frequency have been utilized."[2]

In addition, the data required to calculate the avoidance angle (under either the rule as currently proposed or a version of the rule that bases in-line events on the occurrence of actual interference), even if determinable in real time, would be commercially and customer sensitive. It would identify location of customers, which could include, for example, for government operations, the location of a military unit using the system. For military or other users requiring confidentiality, a requirement to provide such information could prevent their use of NGSO systems entirely. It would provide competitors insight into the location of customers allowing them to target those customers or target other areas, in either case, advancing its competitive position *vis-à-vis* the company providing such information.

ViaSat summarized the issue as follows:

> "As an initial matter, real-time pointing data of this type is highly sensitive and competitive business information. A requirement to provide such data would provide competitors with insight into the location of ViaSat's customers and areas being targeted under ViaSat's business plans. Competitors could use this information to either target those areas

[2] Consolidated Response of WorldVu Satellites Limited, IBFS File No. SAT-LOI-20170301-00031, at 12 (filed July 27, 2017). While this statement was made by OneWeb in connection with its V-band Petition for Declaratory Ruling, similar issues arise with respect to the Ka-band proposals Telesat is addressing in the above-referenced rulemaking proceeding.

(harming ViaSat's competitive position) or target other areas (undermining competition)."[3]

The Telesat representatives pointed out that SpaceX's suggestion for a central clearing house for such information solves nothing.[4] Interposing a third party cannot make the fundamental information exchange and timing issues noted above disappear. If anything, interposing a third party will increase the time from when an operator needs to make a change to when that change information is disseminated and evaluated and the time when other operators can respond as required. Similarly, the clearing house does not solve the confidentiality concerns.

If the clearing house is designed to facilitate the exchange of information, even if it "masks" the identity of an operator, given the relatively few constellations and the distinct characteristics of each, operators will be able to "reverse engineer" the information and determine the source of the information.

Moreover, if the clearing house did not just share data among operators, but also were expected to determine when in-line interference events would occur and what actions had to be taken in response, then the FCC would be requiring operators to cede control of their systems to a third party and no operator should be required to do so.

The Telesat representatives stated in conclusion that the FCC should not adopt a rule unless it can be demonstrated the rule is capable of implementation in the real world. In that regard, the Commission's existing rule has not been tested in practice and, in the meantime, NGSO systems have become more complex and less homogenous to the point at which the rule, if it ever would have worked, no longer does. Rather than adopt an unworkable rule, the Commission should require various applicants to coordinate their systems by following the well-known and well-established ITU procedures.

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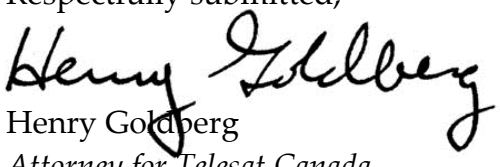
[3] Consolidated Response of ViaSat, IBFS File No. SAT-PDR-20161115-00120, at 4 (filed August 1, 2017) (footnote omitted). While this statement was made by ViaSat in connection with its V-band Petition for Declaratory Ruling, similar issues arise with respect to the Ka-band proposals Telesat is addressing in the above-referenced rulemaking proceeding.

[4] See *Ex parte* letter from William M. Wiltshire, Counsel for SpaceX to Marlene H. Dortch, Secretary, FCC in IB Docket No. 16-408, filed August 17, 2017.

As the Commission recognizes both with respect to coordination under ITU procedures and its own coordination objectives, operators are obligated to participate in good faith in the coordination negotiations that are essential to operation of multiple satellite constellations with a minimum of interference and disruption. The existence of the unworkable in-line event avoidance rule as an illusory "fail safe" to prevent interference will undercut that obligation and distort the coordination process. The Commission should scrap that rule and replace it with Commission-enforced requirements to coordinate in good faith under the ITU coordination framework.

Please direct any questions regarding this matter to the undersigned.

Respectfully submitted,



Henry Goldberg
Attorney for Telesat Canada

cc: Jose Albuquerque
Karl Kensinger
Chip Fleming
Paul Blais
Steve Duall
Clay DeCell

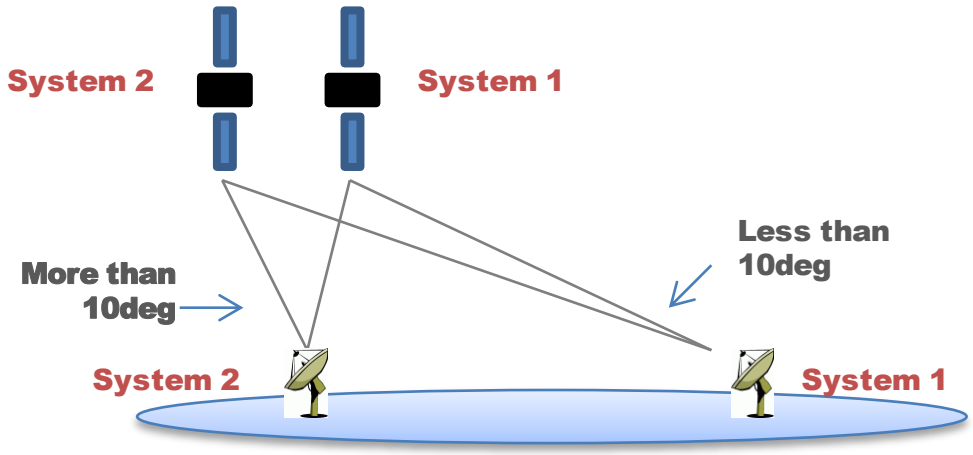
ATTACHMENT 1

International bureau representatives attending the meeting:

Jose Albuquerque, Division Chief
Karl Kensinger, Deputy Division Chief
Chip Fleming, Chief Engineer
Paul Blais, Systems Analysis Branch Chief
Steve Duall, Policy Branch Chief (by phone)
Clay DeCell, Policy Branch (by phone)

ATTACHMENT 2
(HANDOUTS PROVIDED)

Operators Have To Know The User Locations Of All Other Systems



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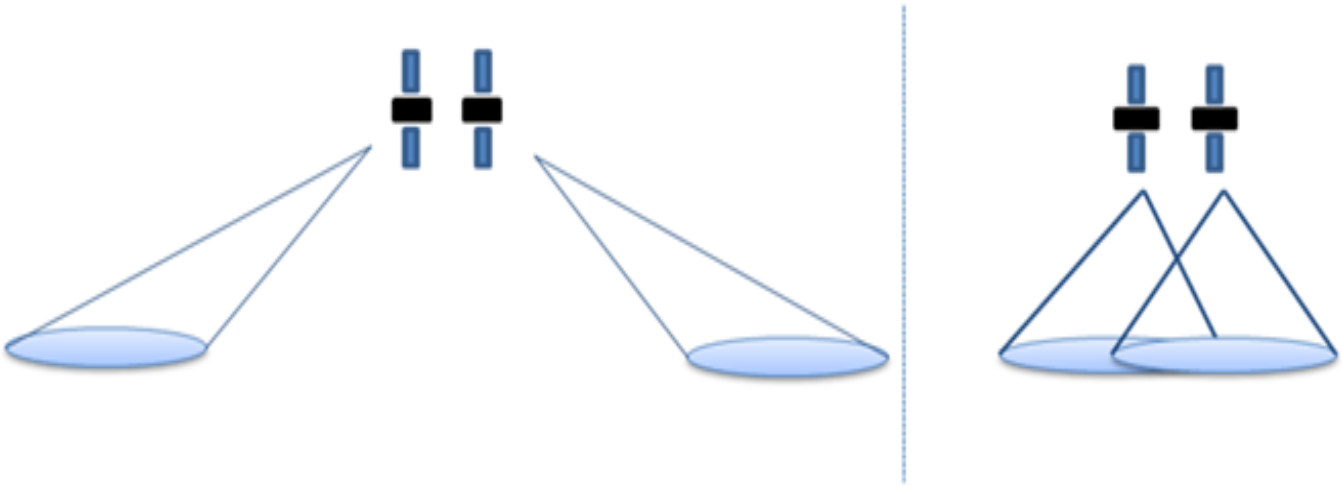
Satellite Beams Must Overlap To Create Possible Interference



ATTACHMENT 3

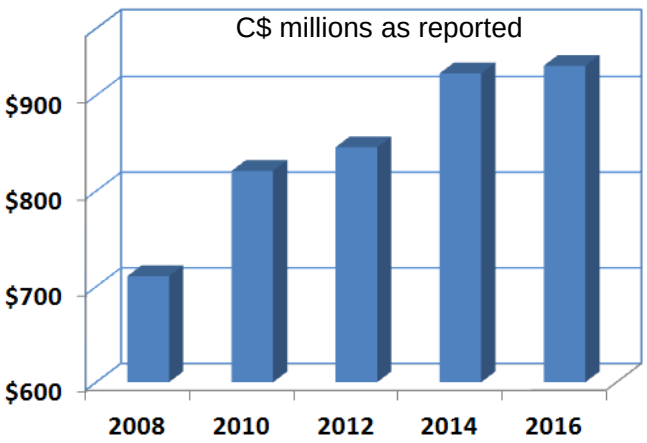
Overview of Telesat's LEO initiative

August, 2017

Telesat Expertise

- Telesat is **one of the largest and most successful satellite operators** in the world, providing services to the private sector and governments
- **Global fleet of 15 satellites** with an additional two GSO and two NGSO satellites under construction
- **Global teleport and terrestrial infrastructure** that is seamlessly integrated with Telesat's satellite fleet
- Telesat's consulting practice **supports customers globally**

Telesat Organic Revenue Growth



Telesat Headquarters, Ottawa, Canada

Market need

Market demands fiber-like connectivity in non-fiber geographies

≈4.5B people unconnected, peak data traffic growing faster than average demand

2/3rd of commercial planes to offer internet connectivity by 2026, up from 1/5th today

100x increase in data demand per cruise ship, from 10Mbps to 1+ Gbps

40x connectivity demand increase by 2025 from Military sector

Wireless operators want high capacity backhaul for data growth, coverage expansion & network resiliency

Resources sector wants secure connectivity in remote areas for increased automation

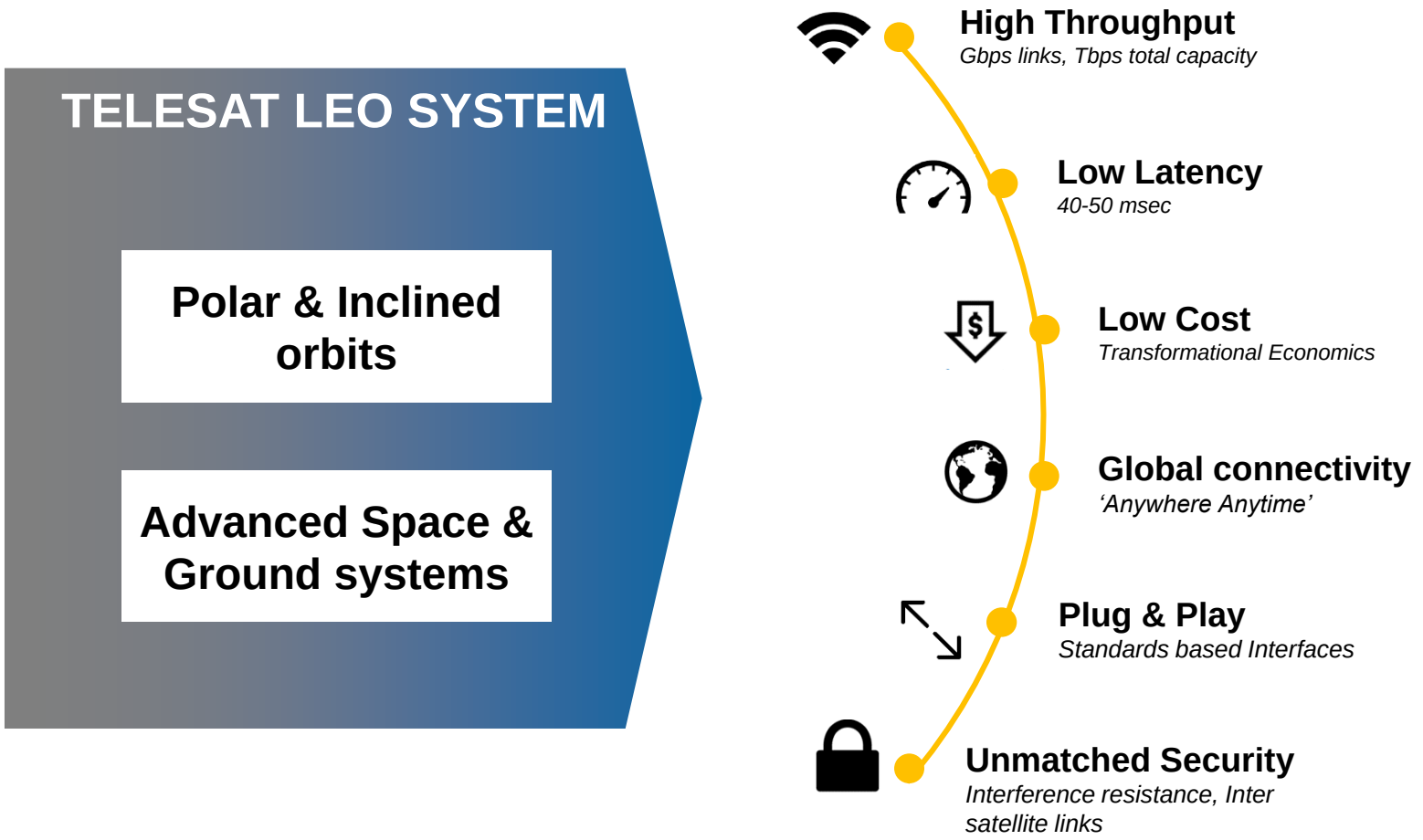
MARKET DEMAND FOR UNIVERSAL FIBER-LIKE CONNECTIVITY

High Throughput | Low Latency | Low Cost | Flexible | Secure | Plug & Play

Source: NSR, Euroconsult, Telesat analysis

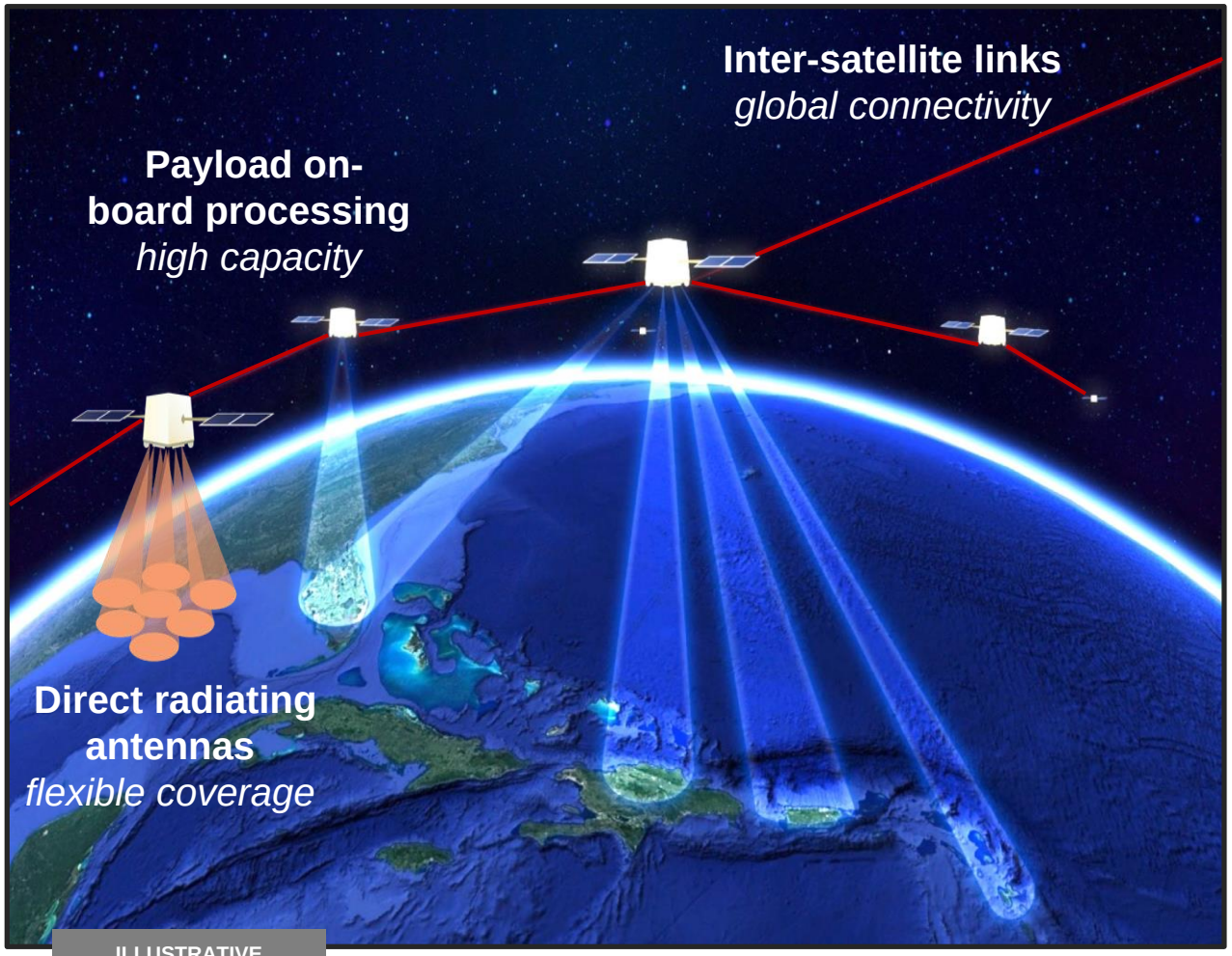
Overview

Telesat LEO: GLOBAL coverage & FLEXIBLE capacity



Overview

Advanced space & ground systems enable highly flexible systems



High capacity enabled in areas of greatest demand

Key use cases

Target users – wide variety of broadband applications

1 Maritime connectivity
- Passenger & Cruise
- Merchant
- Fishing
- Government/ Military

2 Aviation connectivity
- In-flight connectivity
- Operational connectivity
- Government/ Military

3 Fiber complement
- 5G coverage
- High security links
- Ultra-Low latency apps
- Critical redundancy
- Government/ Military

4 Satellite Backhaul
- Consumer (phone, home)
- Government/ Military
- Enterprise
- Internet of Things (IoT) aggregation

5 Rural & Remote Connectivity
- Government/ Military
- Enterprise

Economical Terrestrial backhaul options
Metro/ Urban areas

Unsuitable or No Terrestrial Backhaul options available

Semi-urban areas

Other areas