Satellite for Resilient Communications in the Caribbean

School of Digital Transformation and Innovation in the Caribbean 2025





Agenda

and Innovation in the Caribbean 2025

- About GSOA
- Fundamentals of Satellite:
 - History
 - Basic architecture
 - Orbits and Spectrum
 - Service Types: FSS, BSS, and MSS
- Risks to infrastructure
 - Cyber
 - Physical (manmade or natural)
- Integrating Satellite to Resilience Planning
- Policy Recommendations



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Introduction to GSOA

and Innovation in the Caribbean 2025 عـرب سـات AIRBUS ALL SPACE ARSAT amazon project kuiper Astroscale ARABSAT arianespace **GSOA** provides a AVL Bluant ECHOSTAR Embratel AVAN 7 azercosmos CATAPULT SCrosslynx star one platform for collaboration Gilat hispasat ···· iridium global invacom group INTEGRASYS between member INTELSAT companies involved MDA **OMTN** in the satellite Nilesat Monaco (1) KYMETA NIGCOMSAT LOCKHEED MARTI ecosystem globally and a unified voice RIVER SIAVDV QUADSAT Rascom Star Ovzon RCS PLANS ADVISERS SPACE NETWORKS for the sector OQ TECHNOLOG SPACE **SATCUBE** SES[^] SATELICT SPACE 42 يبط التبخان السومة SAUDI NET LINK SPACEBRIDGE NORWAY

TELESAT

ThalesAlenia

THURAYA

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Sputnik 1 (1957)



Intelsat 33e (2016)



Telstar 1 (1962)



ViaSat-3 (2025)

Fundamentals of Satellite



Early Bird 1 (1965)



Eutelsat One Web (2024)



Basic Architecture





Types of Orbit – all contribute to convergent

networks





Satcom Frequencies

L-band	S-band	C-band	X-band	Ku-band	Ka-band	Q-Band	V-Band
1 - 2 GHz	2 - 4 GHz	4 - 8 GHz	8 - 12 GHz	12 - 18 GHz	26 - 40 GHz	30 - 50 GHz	40 - 75 GHz

1. Critical Services

Satellites support weather forecasting, remote sensing, defense and security, and positioning/navigation/timing (PNT) services.

3. Integration with 5G/6G

Non-terrestrial networks (NTN) are being integrated into 5G and 6G ecosystems through evolving 3GPP standards.

2. Global Connectivity

Satellite technology enables people, enterprises, governments and things to connect worldwide, including remote regions and disaster-stricken areas.

4. Expanding Capabilities

New technologies allow connectivity to small antennas in smartphones, fixed terminals, and vehicles.



Towards a Fully Integrated Ecosystem

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Fundamentals of Ground Segment





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Economics of the Digital Divide



Terrestrial solutions currently cover 96% of the population using infrastructure deployed across 20% of the geographical area.

The remaining 4% represents 80% of the landmass.

Achieving 100% with only terrestrial technologies requires a multiple increase in current investment.

World population distribution as percentage of landmass (source UNdata)



- Satellite Communications Service Types
 - FSS Fixed Satellite Service
 - BSS Broadcast Satellite Service
 - MSS Mobile Satellite Service
- Other ITU Satellite Services:
 - RNSS
 - EESS
 - Amateur Satellite Service



FSS – Fixed Satellite Service

Earth Stations in Motion





hughesnet







Cellular Backhaul



Fixed Broadband residential/enterprise



Trunking



BSS – Broadcast Satellite Service

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Contribution links



Special Events



Satellite News Gathering



DTH TV Services



Cable Distribution



ΙοΤ

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MSS – Mobile Satellite Service







Safety Services (GMDSS & GADSS)



Connected Cars



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Infrastructure Risks

Cyber



Physical

- Manmade accidental or intentional damage
- Natural hurricanes, earthquakes, fire, landslides





Integrating Satellite into Resilience Plans Equipment Issues

Placement

Capacitation & Preparedness

Import

Obstacles to effective emergency response

- Authorization of satellite comms
- Customs/import processes to bring equipment in quickly, on a temporary basis
- Awareness Telecom Authority







Integrating Satellite into Resilience Plans Spectrum Issues

Radio spectrum is the lifeblood of satellite systems. Adoption of spectrum policies based on internationally harmonized frequency allocations and usage conditions, in line with ITU Radio Regulations, provides the most efficient and effective approach against risks of harmful interference. Access to spectrum is critical for the development, procurement, and deployment of satellite systems, which require substantial investment and long lead times. Spectrum licensing at national level ultimately determines the conditions to deploy satellite solutions.

Best Practice Recommendation

- Adhere to the international spectrum allocation table established in the ITU Radio Regulations for global harmonization and efficient use of spectrum.
- Promote international and regional harmonization of spectrum access to provide certainty for satellite system development.
- Establish stable licensing terms, ideally matching the satellite system lifespan, with a presumption of annual renewal to reassure operators for their long-term investments and service continuity.



Integrating Satellite into Resilience Plans Spectrum Issues

Issue Overview

The fees and taxes associated with licensing and operating satellite communication systems has direct implication on the adoption of the service. Ensuring that these costs are predictable, fair, and not prohibitive is essential to fostering long-term investments and encouraging innovation. This involves setting licensing fees limited to administrative cost recovery, adopting fair fee structures for NGSO systems, maintaining predictability in fee schedules, and reducing import duties and taxes to spur digital adoption.

Best Practice Recommendation

- Limit licensing costs to the regulator's administrative costs for processing applications and maintaining the licenses.
- Administer licensing on a "per site" basis rather than "per antenna" basis for NGSO systems with multiple antennas.
- Avoid extremely high "per MHz" spectrum fees that could discourage the use of large bandwidths necessary for highcapacity services.
- Ensure that fees are predictable and stable over the long term to support satellite systems' business cycles.
- Reduce import duties on gateway equipment and user terminals, and lower taxes on telecom services to benefit consumers and encourage digitalization.



Integrating Satellite into Resilience Plans Licensing issues

ESIM – often exempt for foreign flagged vessels/aircraft; the lightest licensing needs

Best Practice recommendation:

- Recognize foreign-issued licenses for satellite terminals on aircraft and vessels, provided these terminals comply with local spectrum regulations.
- Ensure no need for separate local radio station licenses for satellite terminals licensed by foreign competent regulatory authorities when installed on aircraft or vessels and make this explicit in regulations to remove the need for letters of no objection.
- Allow the operation of satellite terminals on foreign vessels and aircraft within territorial waters, national seaports, national airspace, and on a gate-to-gate basis for aircraft without imposing additional restrictions.





Integrating Satellite into Resilience Plans Licensing Issues

Wholesale – licensing focused on responsible spectrum use;

Best Practice Recommendation:

- Embrace "Open Skies" Policies: Facilitate the open provision of satellite capacity allowing domestic telecom licensees the freedom to select the best backbone infrastructure for their users.
- Light Touch Landing Rights Regime: If Landing Rights are deemed necessary adopt a simple and straight-forward procedure consisting of registration of basic satellite data without any additional economic and regulatory burdens.
- Eliminate the Need to Establish a Local Entity: This specific requirement that exists in some countries is a big obstacle for the provision of satellite capacity, which exceeds country borders by nature, and may result in a less competitive offer for satellite service providers.
- Ensure Long-Term Access to Spectrum: Stable access to spectrum in the specific bands used by satellite is key for regulatory certainty and to ensure satellite operation in the long-term, allowing for the return of the strong investments required to put satellite systems in operation.
- Assign Spectrum Fees to Service Providers, Not Satellite Operators: When providing satellite capacity, satellite operators do not make use of spectrum. Assigning payment of spectrum to service providers is a good way to ensure that providers of satellite capacity can supply space capacity at competitive prices.





Integrating Satellite into Resilience Plans

Satellite Service Provider

Licensing issues

Best Practice Recommendation

- Single Window for License Applications: Single point of entry for all license and authorization applications, encompassing all necessary approvals.
- Online License Applications and Digital Signatures: Online platform for license applications to facilitate ease of submission, tracking, and efficiency.
- **Predictable Approval Timelines:** Transparency & predictability in the application review process by setting clear timeframes & deadlines for the national administration to grant licenses by law.
- Limit Licensing Fees to Administrative Cost-Recovery and Reduce Regulatory and Economic Burdens: Rationalize cost of spectrum & reduce other economic obligations.
- Ensure Long-Term Access to Spectrum: Key for regulatory certainty & satellite operation in the long-term, allowing for the return of the strong investments required to put satellite systems in operation.
- Eliminate the Requirement of Local Establishment to Get Market Access: A local legal representative would suffice for the national authority to manage relations with the licensee.
- Implement the Figure of Blanket License: Authorizing groups of low power terminals with similar technical features under a single license, allowing to bring connectivity to users.



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Policy Recommendations

Vulnerability Mitigation

Preparedness

Public-Private Partnerships

Best Practice Recommendation

- Adopt the Tampere Convention Framework: Countries should invoke and adhere to the Tampere Convention to expedite the provision of satellite and other telecommunications services in disaster situations.
- Facilitate Rapid Deployment: Establish policies that enable swift deployment of satellite technology during emergencies, ensuring regulatory processes do not delay disaster relief efforts.
- Tabletop exercises: With all stakeholders to practice incident response before a critical situation.
- **Promote International Cooperation:** Encourage cross-border collaboration and mutual assistance, respecting national sovereignty while fostering cooperation for effective disaster response.
- Utilize Satellite as a Primary Solution: Recognize satellite communications as a cost-effective and immediate solution for disaster relief, enabling global coverage and rapid response.
- **Collaborate with ITU Recommendations:** Align national policies with ITU guidelines to leverage satellite technology effectively in disaster mitigation and relief initiatives.







Network readiness leads to National Readiness

Satellite is *essential* for network readiness





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