WRC-23 Agenda Item 1.2
3600 – 3800 MHz
The need for a balanced approach

Adrián Herbera González
adrian.herbera@intelsat.com

JAMAICA 6th – 8th February

1. FSS services in C band in the Caribbean Region
2. The need for a balanced approach
3. CITEL Agenda Item 1.2 proposals
4. Conclusions

1. C band FSS in the Caribbean Region

Agenda Item 1.2

Agenda Item 1.2: to consider identification of the frequency bands 3300-3400 MHz, 3600-3800 MHz, 6425-7025 MHz, 7025-7125 MHz and 10.0-10.5 GHz for IMT, including possible additional allocations to the mobile service on a primary basis.

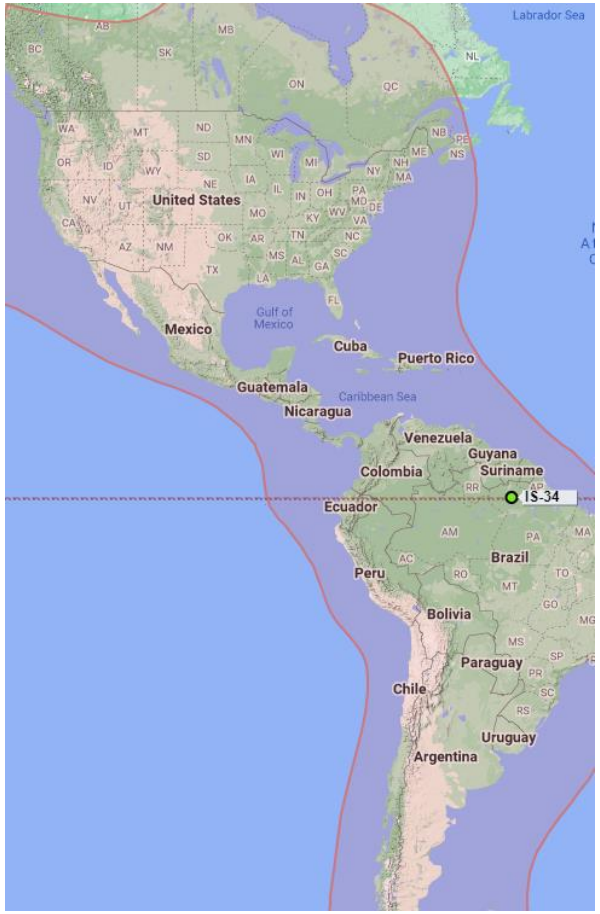
Resolution 245 (WRC-19) calls for studies for the terrestrial component of IMT in the bands:

- 3600-3800 MHz (Region 2);
- 3300-3400 MHz (Region 2);
- 3300-3400 MHz (amend footnote in Region 1);
- 7025-7125 MHz (globally);
- 6425-7025 MHz (Region 1);
- 10000-10500 MHz (Region 2).

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="2">3 600-4 200
FIXED
FIXED-SATELLITE (space-to-Earth)
Mobile</td><td>3 600-3 700
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile 5.434
Radiolocation 5.433</td><td>3 600-3 700
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile
Radiolocation
5.435</td></tr>
<tr><td colspan="2">3 700-4 200
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile</td></tr>
</table>

C band unique characteristics

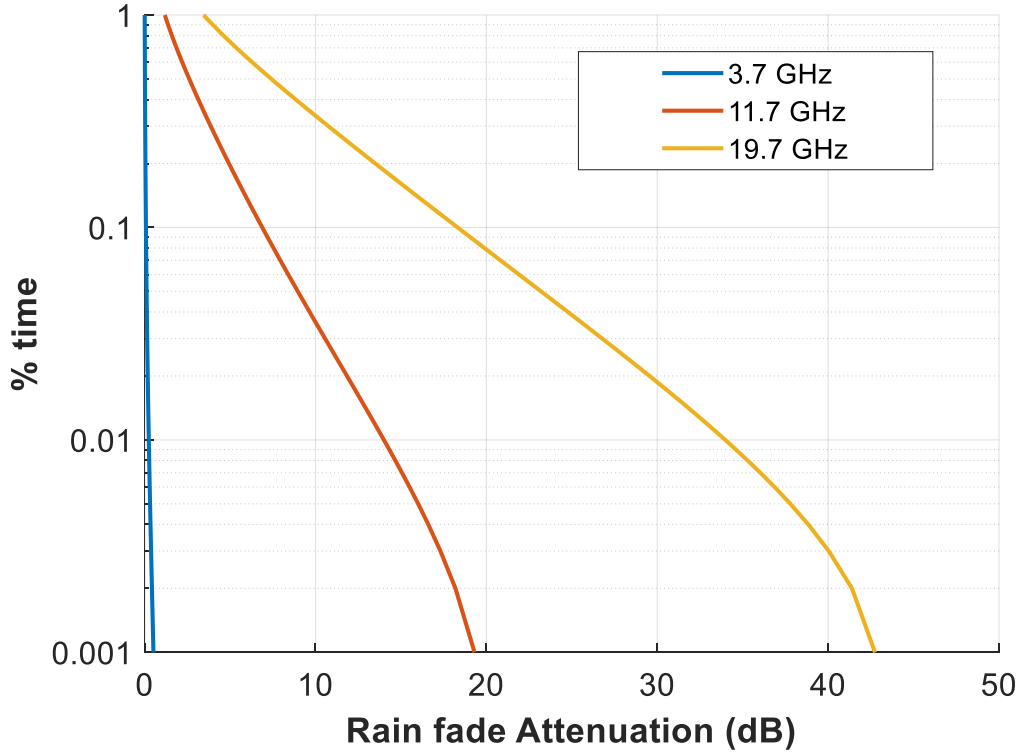
Typically C band beams are wide-regional beams that enhance the distribution of content. New satellites contemplate HTS spot beams in C band too.



Traditional Wide Beam

HTS Spot Beams

C band has unique characteristics for services that require **high availability** less susceptible to signal interruptions from **heavy rains** than higher bands

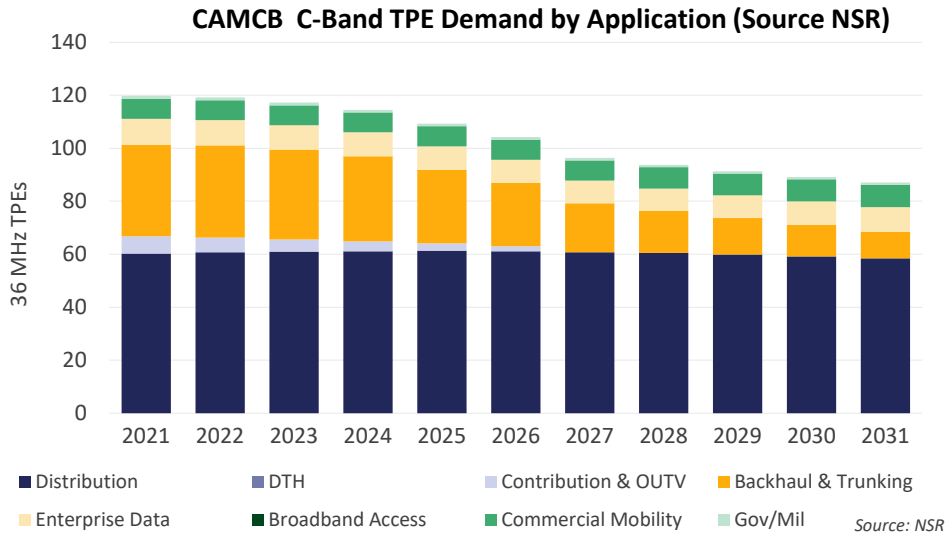


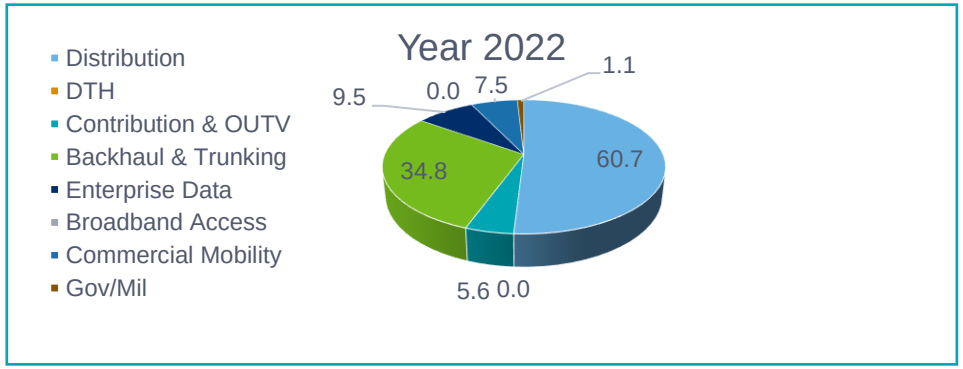
C band is King for Broadcasting

Future Demand for services in C band

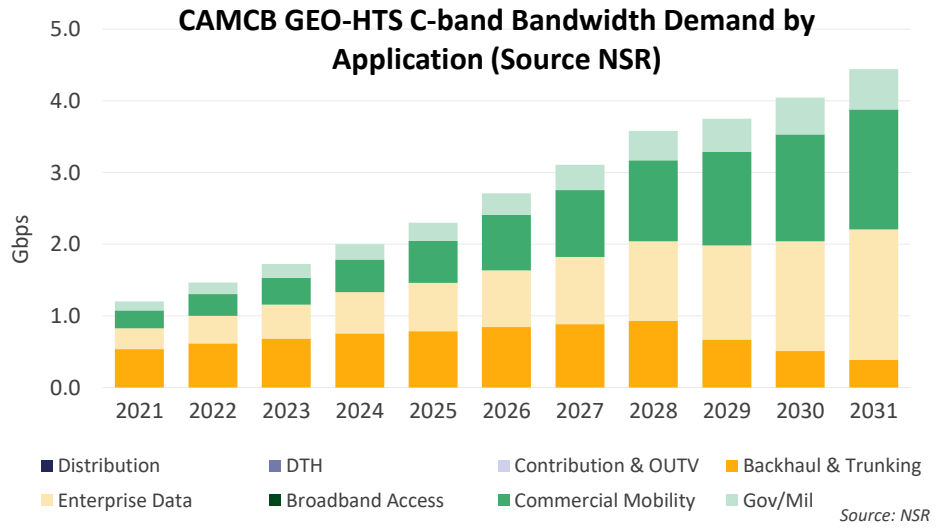
The demand for traditional satellites will decrease while the demand for HTS satellites will increase

✓ Demand for TV distribution will remain constant





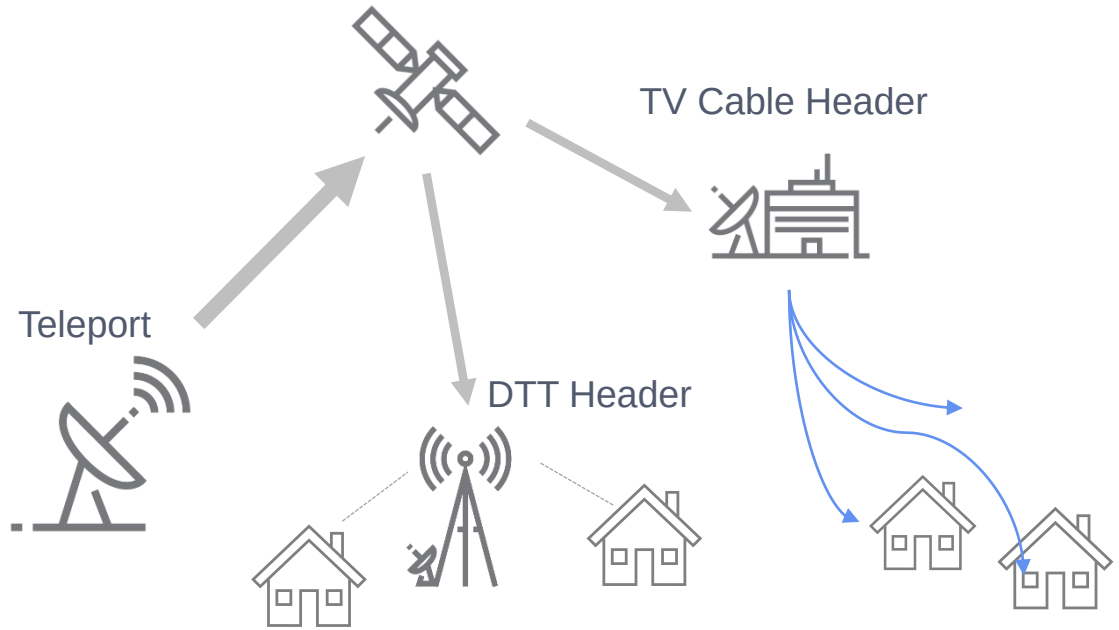
✓ Demand for Commercial Mobility (Cruises) & Enterprise Data will significatively grow in HTS



✓ Demand for Backhaul & Trunking will move from traditional capacity to HTS capacity

Socioeconomic impact of FSS in C band Video Distribution

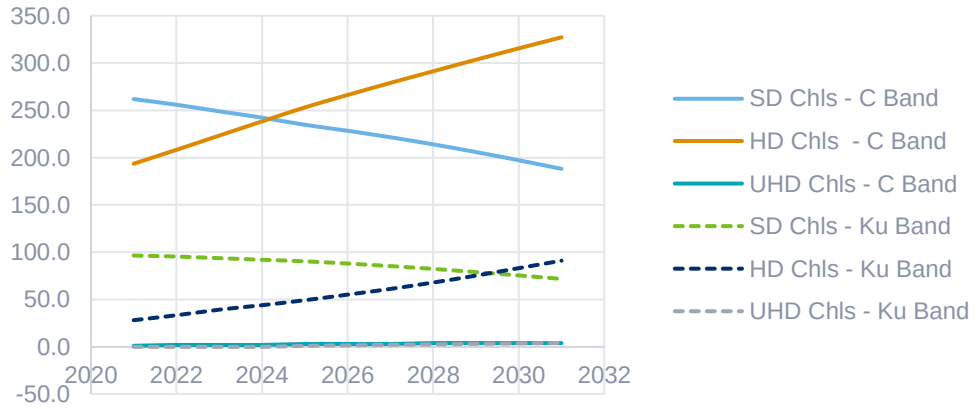
Distribution of media content to the headers of the broadcasters.



Video distribution is not a direct service to consumers, but indirectly impacts most part of the population

The worldwide market of media/broadcasting in 2022 is 84.9 Billion $ and C band is favorite band for broadcasting

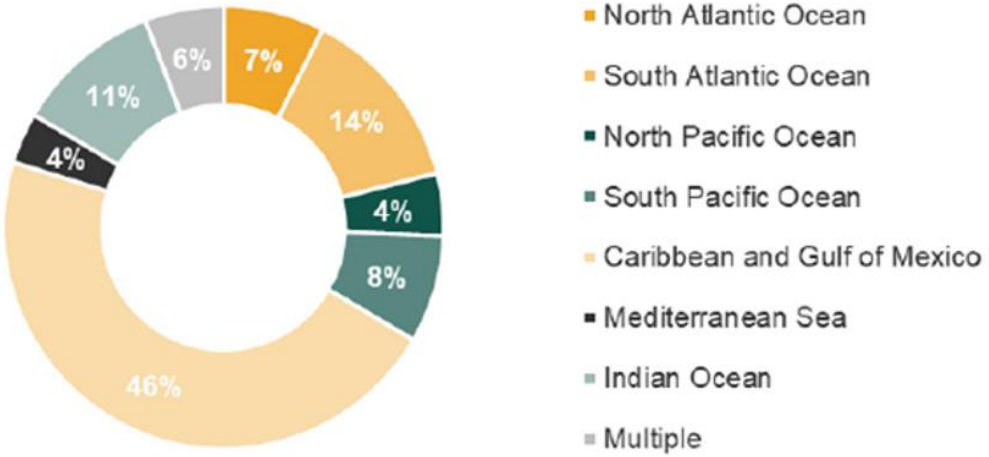
Video Distribution Channels Evolution Central American & Caribbean (Source NSR)



Socioeconomic impact of FSS in C band Cruises

The cruise business in the Caribbean is critical to the local tourism industry. At this point passengers are demanding on-board internet in quantities never seen before. The ability for cruise lines to provide this service is fast becoming a key factor in deciding which cruise line passengers choose.

Active cruise ships by sailing regions (2021)



Source: CIN and Euroconsult research

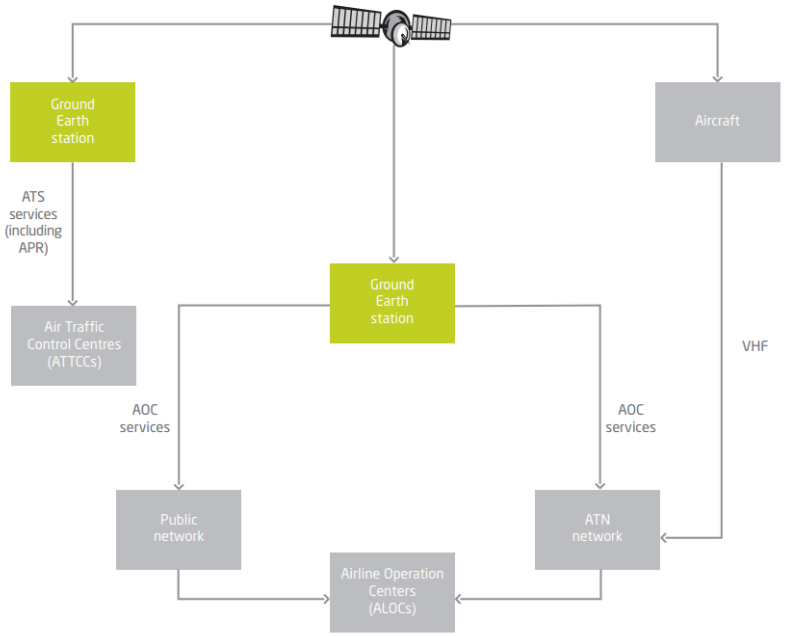
The Caribbean was undoubtedly the favorite cruise destination in 2021with around 46% of total cruise ships

Socioeconomic impact of FSS in C band
Critical services: Air Traffic Control

Satellites and their associated ground communications stations are today the most reliable, secure and efficient way of transmitting data and voice between the different components of air traffic management for LATAM.

Satellite solutions in C-band support:

- AFTN (Aeronautical Fixed Telecommunication Network)
- AMHS (Aeronautical Messaging Handling System)
- Meteorological forecasts and advisory voice services (Air to ground A/G or GROUND-TO-GROUND G/G),
- video services (Remote/Digital Tower), and radar data exchange.



ICAO

COCESNA

Socioeconomic impact of FSS in C band Mobile Backhaul

Why Terrestrial Backhaul Alone Isn't Enough

Cost

Running fiber or microwave backhaul infrastructure over long distances (and challenging terrain) is cost-prohibitive.

ROI

Small population density and low ARPU in rural communities makes it difficult to recover investment.

Time

Building out terrestrial backhaul infrastructure over long distances can take months, a year, or even longer.

Achieve More with Mobile Backhaul via Satellite

1. Cost-efficient Backhaul

Advanced satellite technologies means bandwidth can be cost-effectively distributed dynamically to hundreds—even thousands—of sites using smaller antennas.

2. Worldwide Coverage

Extend coverage to more users and things. Intelsat's fleet of geostationary satellites cover 99% of the world's populated areas.

3. Network Continuity

When network outages occur from damage to terrestrial backhaul, satellite backhaul can be used to keep users connected everywhere they live, work, and play.

4. Faster Deployment

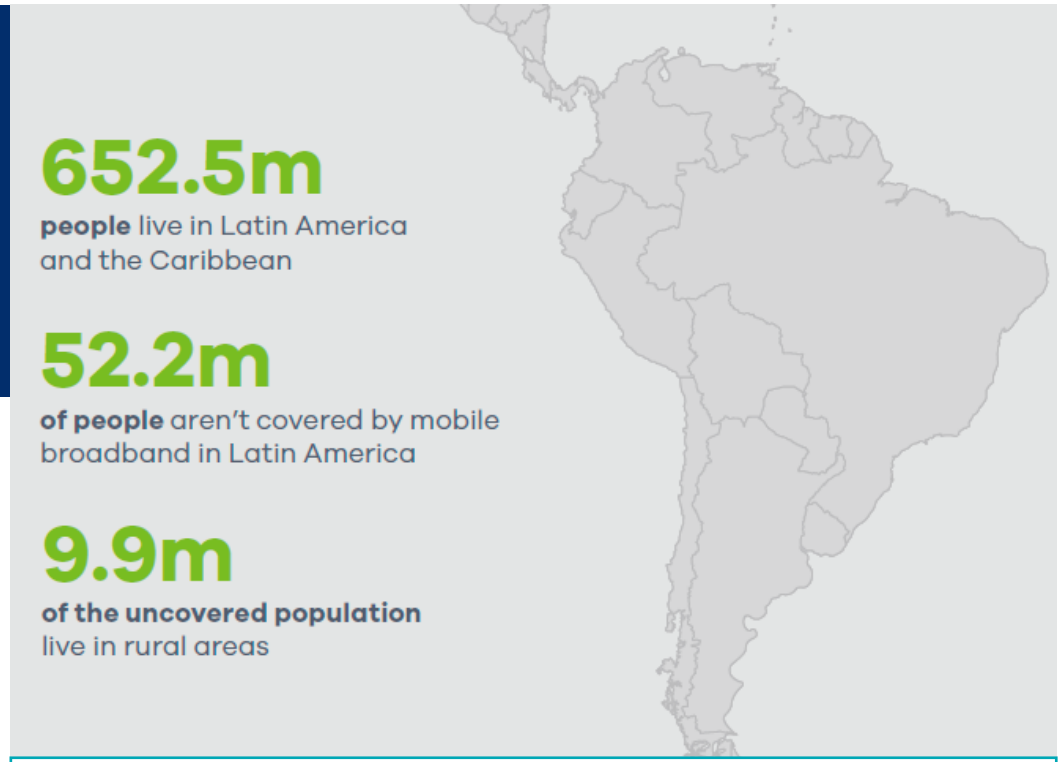
Building out mobile coverage into rural and hard-to-reach areas using terrestrial backhaul takes time. Why wait? Quickly connect rural sites with satellite backhaul.

5. Fiber-like Connectivity

Advancements in satellite hub and modem technologies utilize forward error correction, TCP acceleration, and caching to support the best user experience possible.

6. Professional Services

A full suite of professional services meet the unique planning and implementation needs of every customer.



652.5m
people live in Latin America and the Caribbean

52.2m
of people aren't covered by mobile broadband in Latin America

9.9m
of the uncovered population live in rural areas

Mobile broadband opens doors to social and economic progress for unconnected communities by providing access to opportunities and information that fuel personal and community growth.

Socioeconomic impact of FSS in C band
Many more services

IP Trunking, Backhaul & Rural connectivity

C-band IP trunking solutions provide exceptionally reliable internet access services to Wireless distribution points and backhaul connectivity solutions for mobile networks in remote areas and provides capacity for large regions.

Government

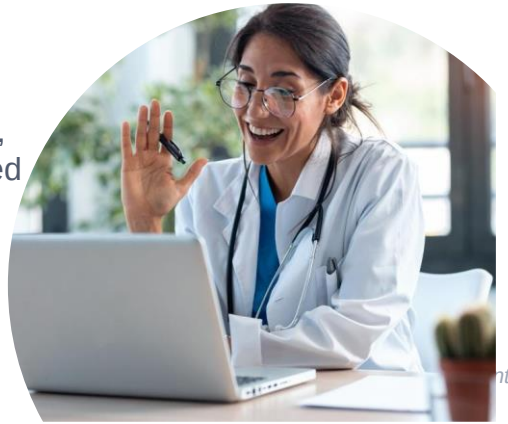
E-government solutions facilitate the efficient delivery of government services to underserved areas in the world.

Emergency response

Global coverage is a key requirement from our users UN (UNICEF, UNHCR in Venezuela), SATMED, Emergency.LU, ECT

Telemedicine

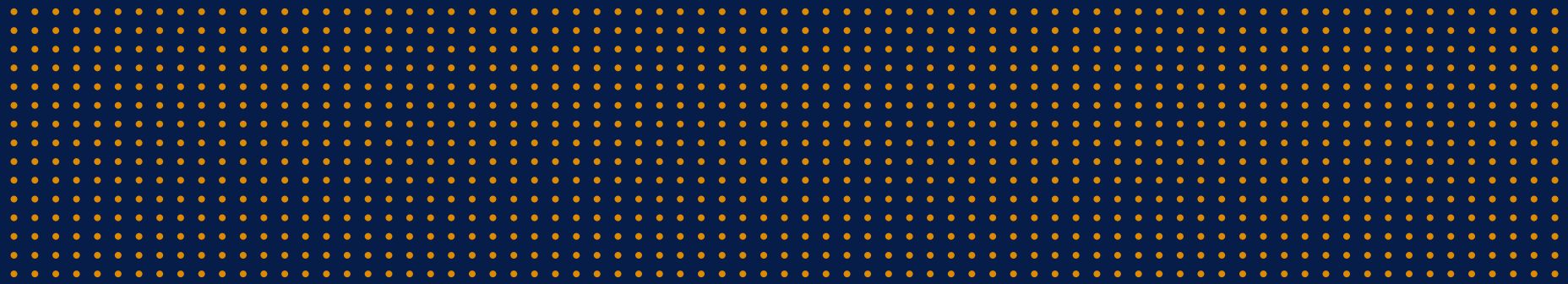
C-band supports the remote delivery of healthcare services, reaching otherwise underserved rural populations.



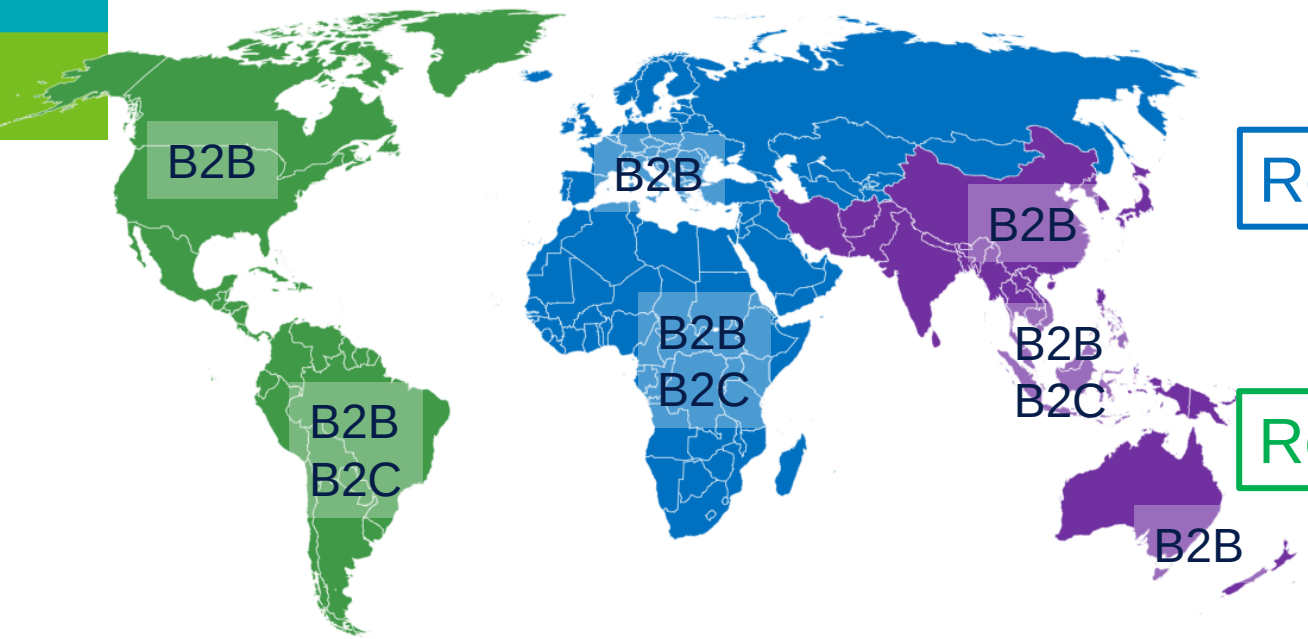
Oil & Gas

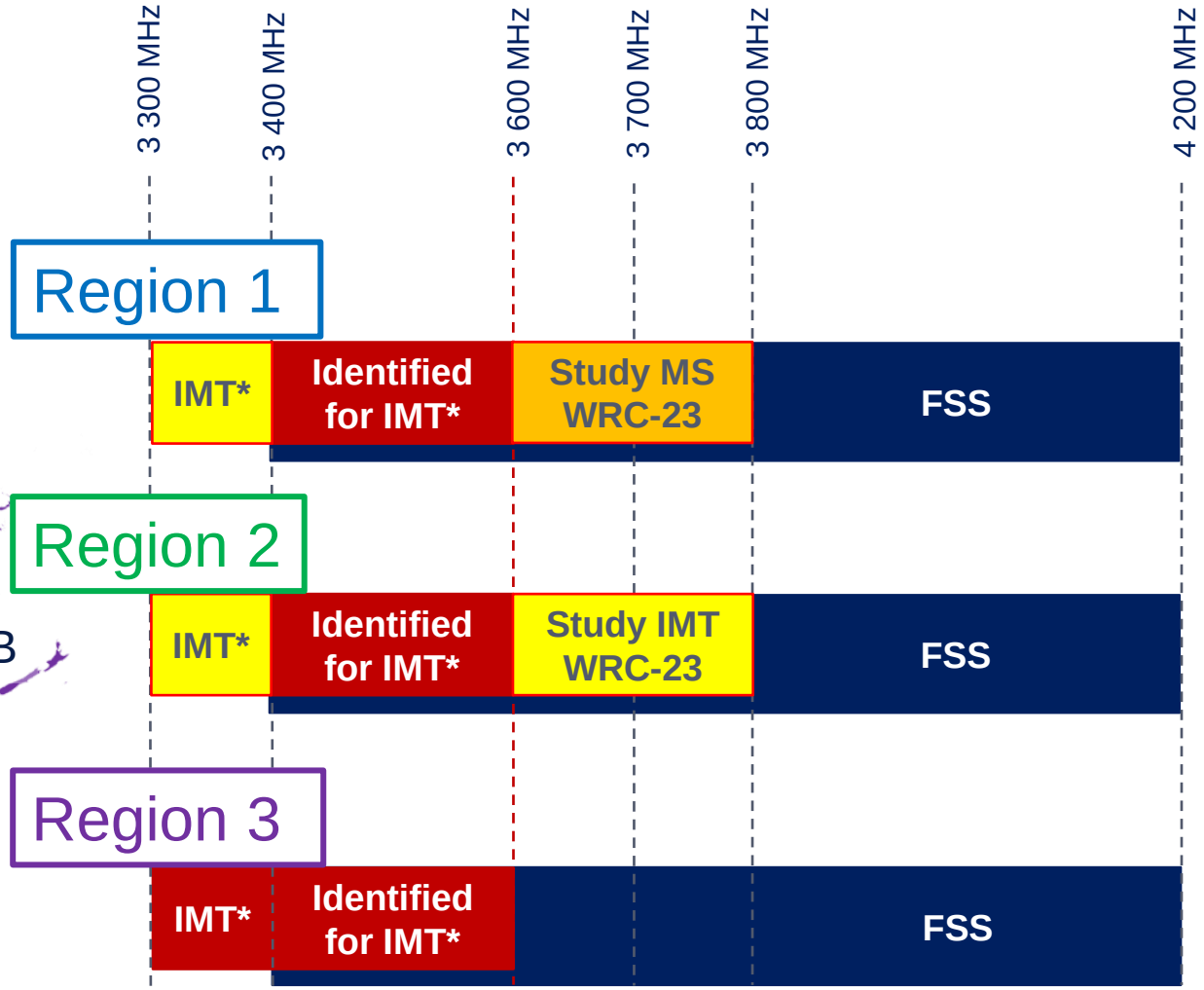
Global coverage is crucial for large vessels, supporting delivery of corporate and crew welfare traffic.

2. The need for a balanced approach



C-Band downlink in WRC-23





B2C: Business to consumers. Higher ES deployment
B2B: Business to business. Lower ES deployment

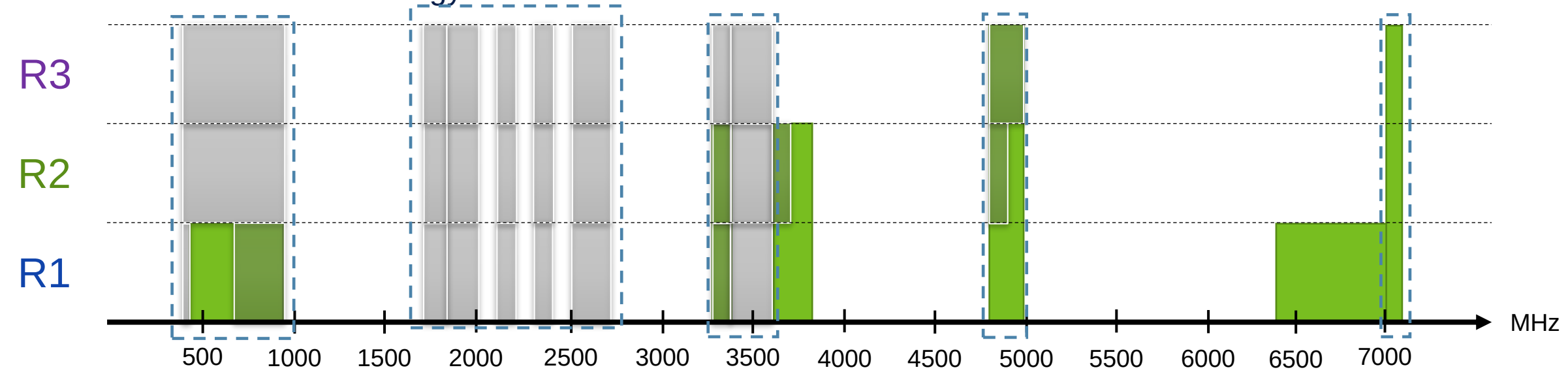
In Region 2, nearly 500 MHz of mid-band spectrum has already been identified below 5 GHz for IMT in the following footnotes

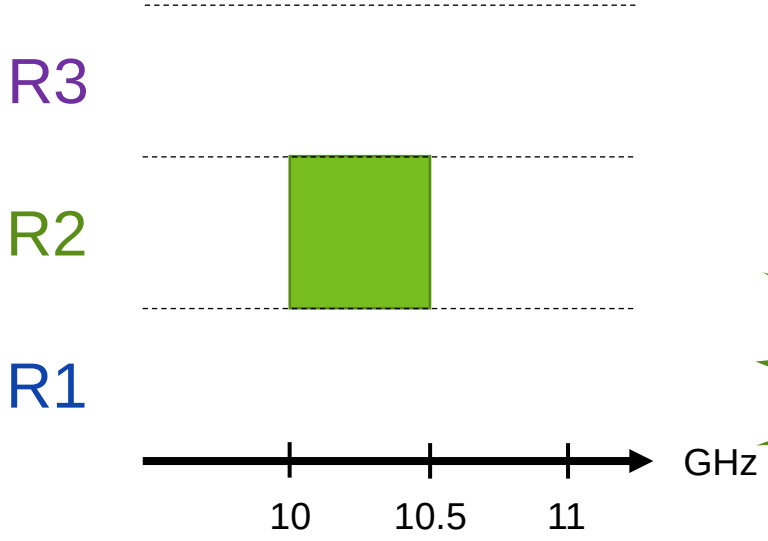
- 5.429D: 3 300 – 3 400 MHz
- 5.431B: 3 400 – 3 600 MHz
- 5.434: 3 600 – 3 700 MHz
- 5.441A: that relates to 4 800 – 4 900 MHz

*Footnotes 5.429B , 5.429D, 5.429F, 5.430A, 5.431B, 5.432B, 5.433A

WRC-23

considered for Mobile technology





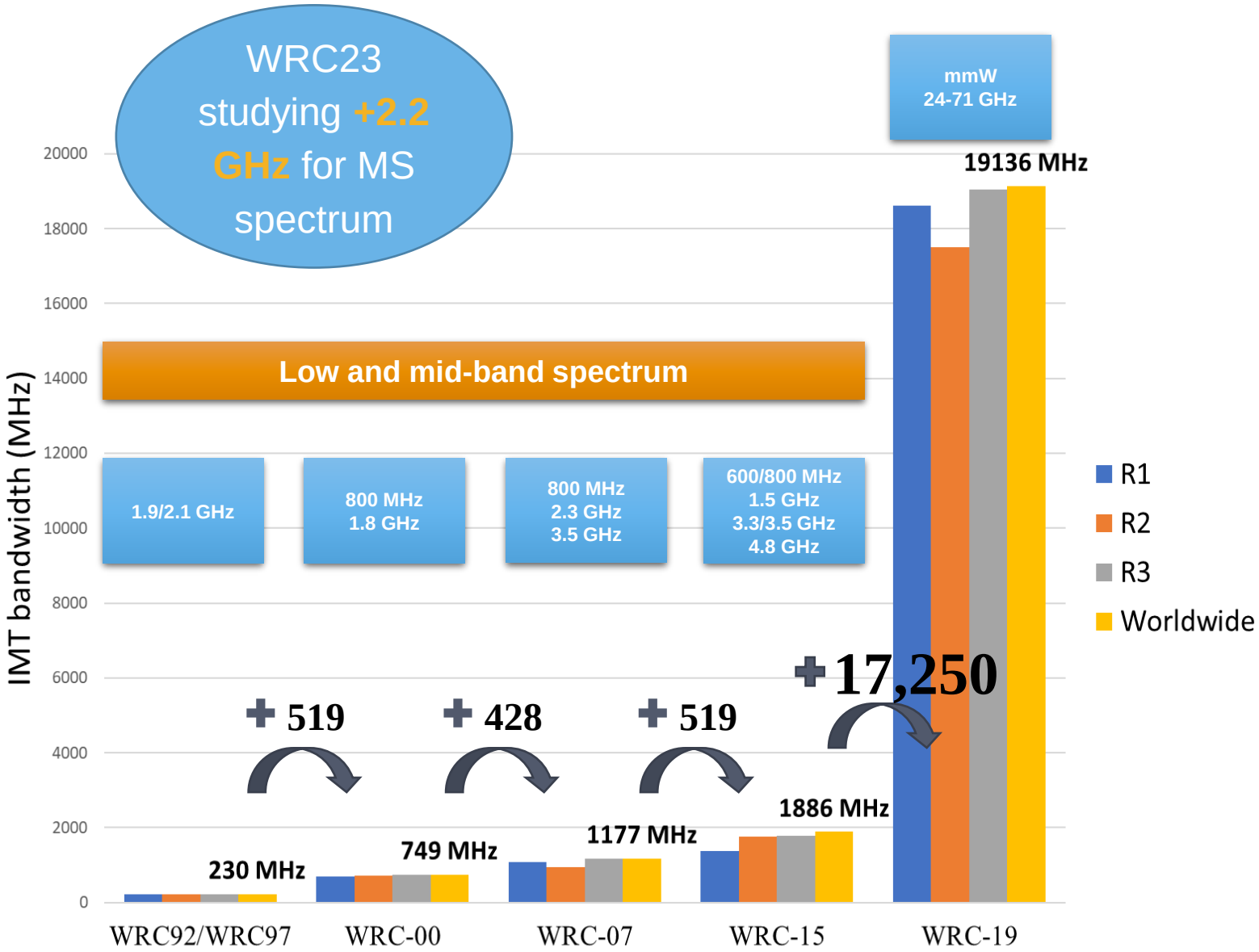
Harmonized spectrum that mobile service should focus on using before demanding more spectrum

Up to 2.2 GHz of spectrum

- Spectrum <1 GHz suitable for coverage applications
- Yet more spectrum solely for urban/suburban densely populated areas

Overview of IMT spectrum growth

An ever-growing pool of spectrum resource



Notes

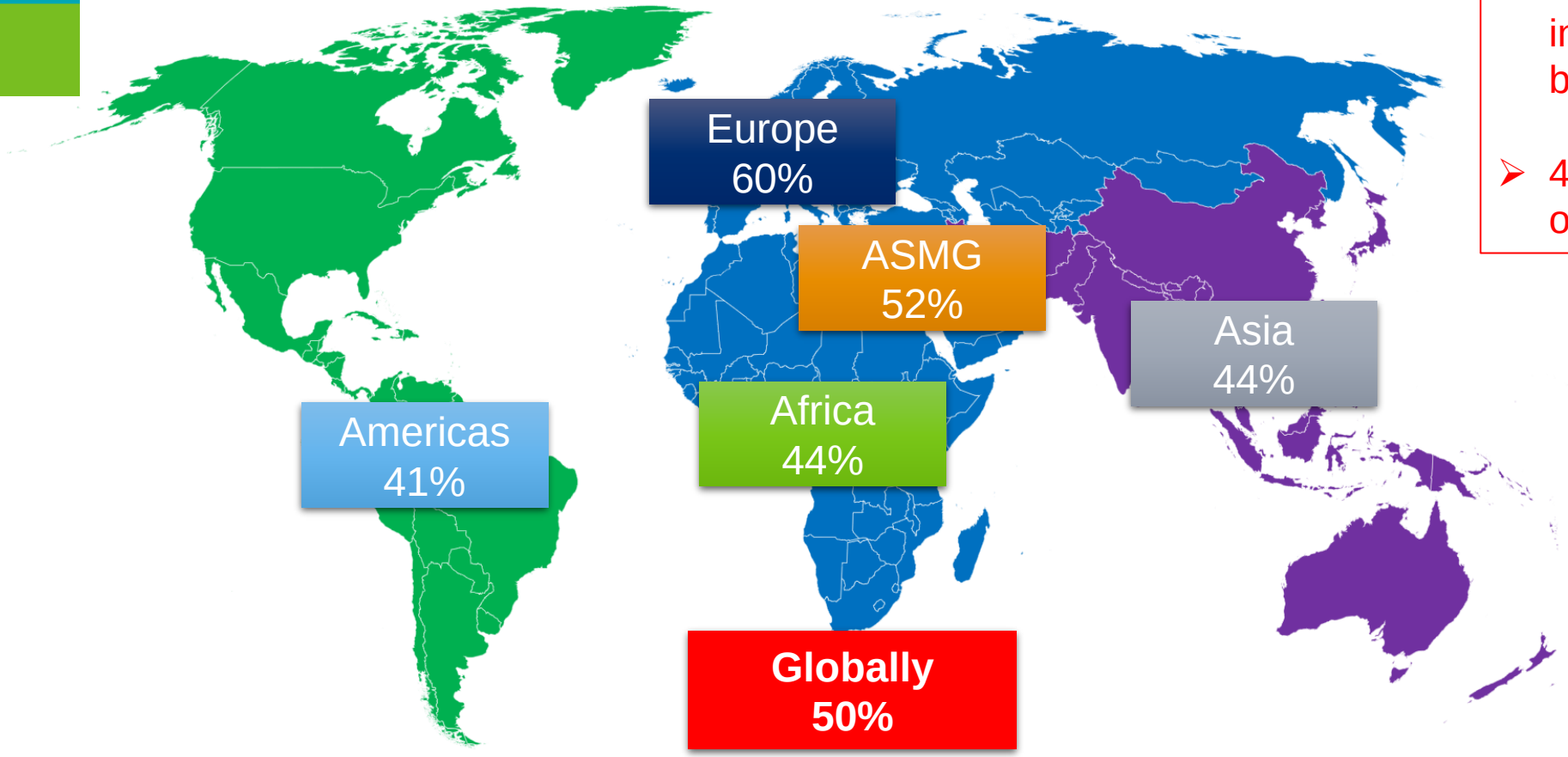
- Bands < 1 GHz suitable for coverage applications
- Bands > 1GHz suitable for capacity in urban areas.
- More than 18 GHz spectrum identified for small cell IMT. So far, this spectrum is mostly unused.

What is the justification for additional IMT spectrum for urban applications?

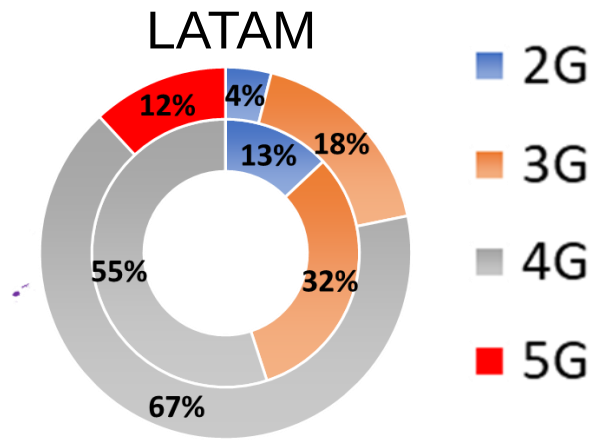
Is all this spectrum effectively used today?

Available vs licensed spectrum

On average globally, only 50% spectrum available below 5GHz (low&mid band) is licensed



- By 2025 only 12% of connections in Latin America are projected to be via 5G;
- 4G is projected to account for 67% of connections in 2025**



2020 (inner circle) → 2025 (outward circle)

Prudent approach is to utilize available spectrum before seeking out yet more and impacting other services

Source: https://www.lstelcom.com/fileadmin/content/lst/marketing/media/2019_Study_LicensingUseofMobileSpectrum.pdf

**Source: GSMA | The Mobile Economy - The Mobile Economy

3. Citel Agenda Item 1.2 Proposals for 3.6-3.8 GHz band

Expected outcome of WRC-23

Despite technical non-feasibility of sharing, NOC is an unlikely outcome of the Agenda Item 1.2

Sharing between FSS ground receivers and Mobile Service – especially IMT – is not feasible in many parts of the world.

IMT AAS antennas do not improve the situation, depending on the location of users AAS antennas may transmit even higher power to specific direction than traditional antenna systems.

Upgrade of Mobile Service up to 3 700 MHz in a country footnote could be a compromise, however conditions for the upgrade are required to allow administrations to protect FSS in the territory of their own countries through coordination and a pfd limit at the borders of neighboring countries.

This is especially critical in Latam and Caribe where some countries depend heavily on satellite connectivity.

3A: **NOC**

3B: Identify 3.6-3.8 GHz for IMT by modifying RR No. 5.434 to list the following conditions:
(1) IMT shall not claim more protection from space stations than that provided in RR Table 21-4 **| (2)** Conditions applicable to the MS equally apply to IMT

3C: Identify 3.6-3.8 GHz for IMT by modifying RR No. 5.434 to list the following conditions:
(1) pfd limit used in RR No. 5.431B for the MS/IMT **| (2)** IMT shall not claim more protection from space stations than that provided in RR Table 21-4 **| (3)** RR Nos. 9.17, 9.18

3D: Identify 3.6-3.8 GHz by modifying RR No. 5.434 to list the following conditions:
(1) RR Nos. 9.17, 9.18 **| (2)** RR Nos. 9.21 **| (3)** IMT shall not claim more protection from space stations than that provided in RR Table 21-4 **| (4)** Revised pfd limit for the MS/IMT.

3E: Identify 3.6-3.7 GHz for IMT in **additional countries** in Region 2 by adding names of countries to RR No. 5.434 while **maintaining all existing conditions**

3F: Identify 3 600-3 700 MHz for IMT in Region 2 by modifying RR No. 5.434 while **maintaining all existing conditions**

Status of AI 1.2: 3.6 – 3.8 GHz in CITEL

2 DIAPS

👍**DIAP Argentina, Bolivia and Mexico**

- NOC in the Frequency Table of allocations
- Invites administrations that want to identify IMT in the 3.6 – 3.7 GHz to add their names to the existing footnote 5.434 (footnote approach)
- Existing footnote 5.434 defines protection for FSS through a PFD limit

👎**DIAP USA and Perú**

- Regional harmonization for 3.6 – 3.8 GHz
- Does not contemplate any regulatory measure to protect FSS (it removes the PFD protection criteria defined in 5.434)

2 Preliminary Proposals

Brazil

- Regional harmonization for 3.6 – 3.7 GHz
- Proposes to maintain the PFD limits defined in footnote 5.434 to protect FSS

Canada

- Regional harmonization for 3.6 – 3.8 GHz
- Proposes to maintain the PFD limits defined in footnote 5.434 to protect FSS

Reasons to support the proposal from Argentina, Bolivia and Mexico

1. The proposal considers the heterogeneous situation of the 3.6 – 3.8 GHz band in Region 2. Different countries have different spectrum needs.

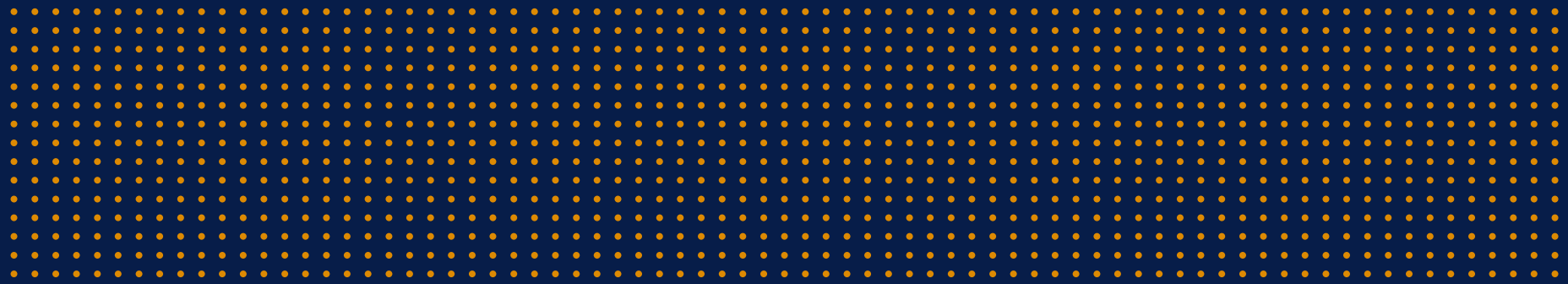
2. The proposal is flexible, fair and balanced, since it allows countries that have the need for additional IMT spectrum, to identify their names in footnote 5.434 and identify nationally the band 3.6 – 3.7 GHz for IMT.

3. The proposal protects FSS since it contemplates the PFD protection criteria defined in footnote 5.434.

4. 3.4 – 3.6 GHz is Region 2 harmonized for IMT. 3.3 – 3.4 GHz is on the way to being Harmonized (IAP). In total you will have 300 MHz of consecutive spectrum for 5G the

   ✚ 100 MHz more could to be added depending on needs.

4. Conclusions



Conclusions

Caribbean Spectrum Management Strategic Plan goals across the region:

1. Harmonization of national frequency allocations and band plans, including common frequencies **and international protocols for disaster management and emergency telecommunications**

2. Minimization of **cross-border interference**

3. Establishment of common approaches **to digital broadcasting switchover**, TV white spaces regulation and spectrum pricing.

THANK YOU

Adrián Herbera González

adrian.herbera@intelsat.com

Spectrum Strategy