

Introduction to the Golden Band for 6G

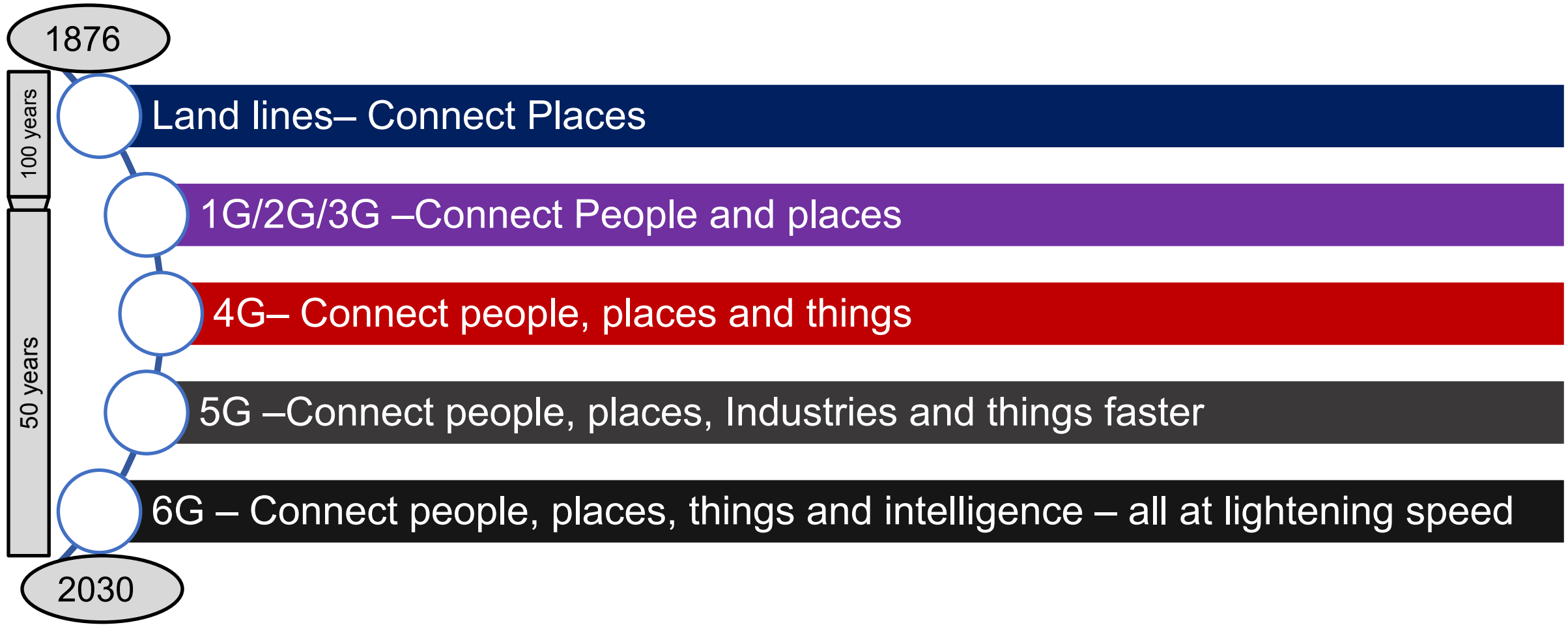
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Vice Chairman - World Wireless Research Forum (WWRF)
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About IAFI

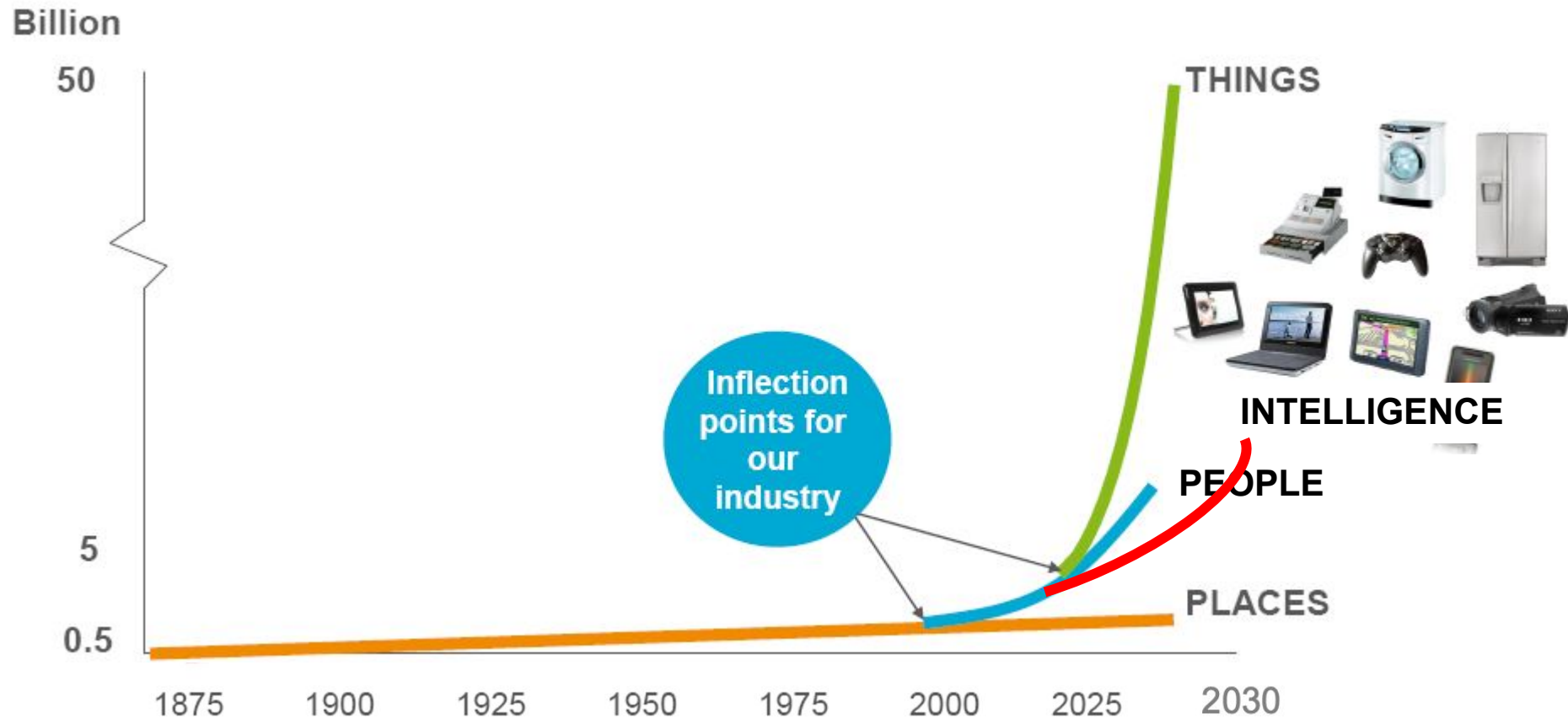
- The ITU-APT Foundation of India (IAFI) is a Registered non-profit, non-political industry Foundation that represents the interests of the telecommunications and ICT sector in the Asia Pacific Region.
- IAFI is working for last 24 years with the prime objective of encouraging involvement of professionals, corporate, public/private sector industries, R&D organizations, academic institutions, and such other agencies engaged in development of Indian Telecom sector in the activities of the International Telecommunication Union (ITU) and the Asia Pacific Telecommunity (APT).
- IAFI has been recognized as an International/Regional Telecommunications Organization by the International Telecommunications Union (ITU).

Our Vision and Mission	Foster sustainable growth of the telecommunications and ICT sector by facilitating international cooperation, promoting best practices, and advocating for favourable policies and regulations.			
	Advocacy and Policy Development:	International Collaboration	Standards and Best Practices	Capacity Building and Training
Activities	Contributing to ITU and APT Studies, conferences and activities	Organising events that support our vision and Mission	Collaborating with stakeholders including members, governments, industry experts	Promoting Research and Development

What is 6G – An inflection point in the Mobile Telecom Journey



6G is an Evolution from Connecting "places", to connecting "people", to connecting "things" to connecting "intelligence"



ITU has been leading the successive G Standardization

3G/4G/5G/6G named by the ITU as IMT family
“International Mobile Communications”

IMT



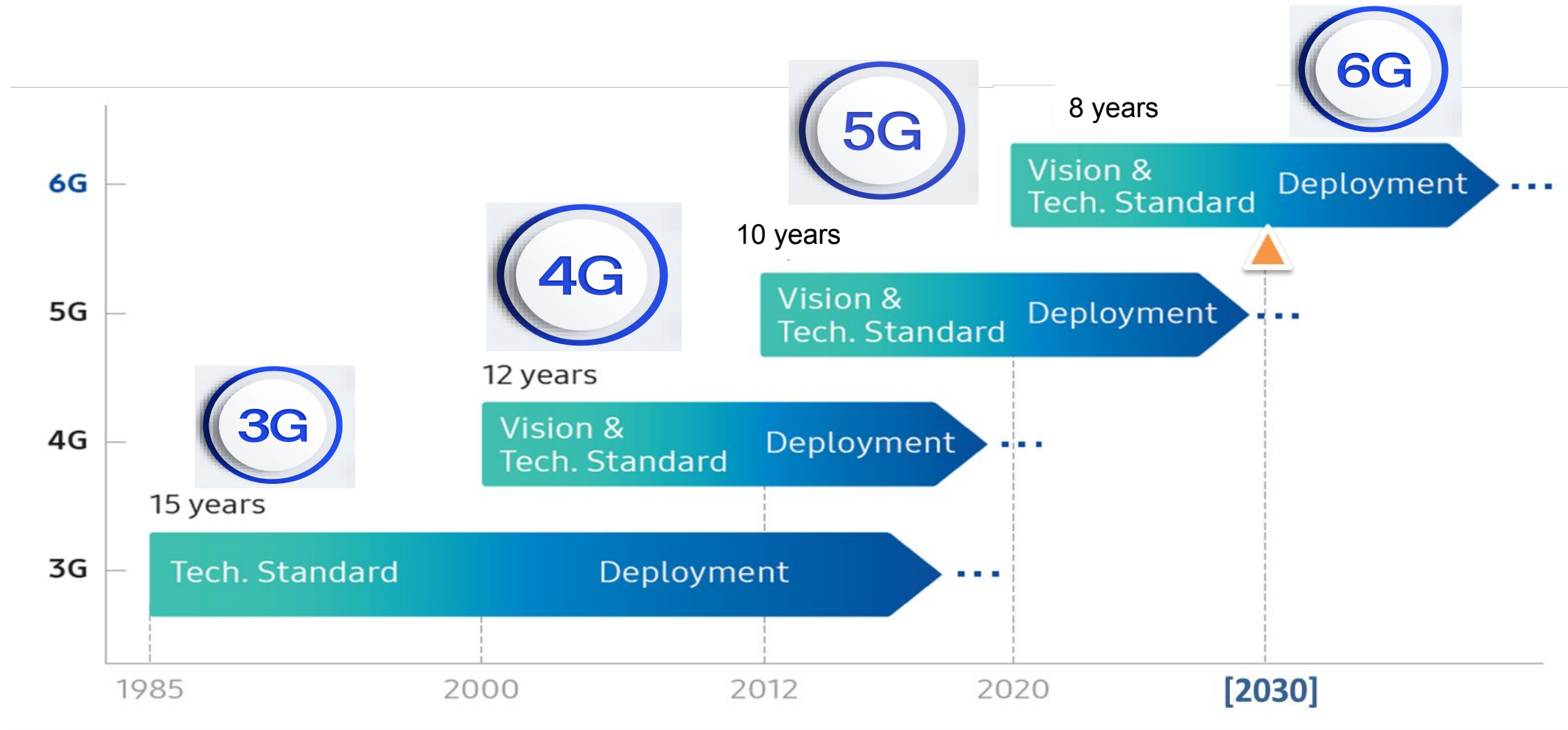
**3G /
IMT-2000**

**4G /
IMT-Advanced**

**5G /
IMT-2020**

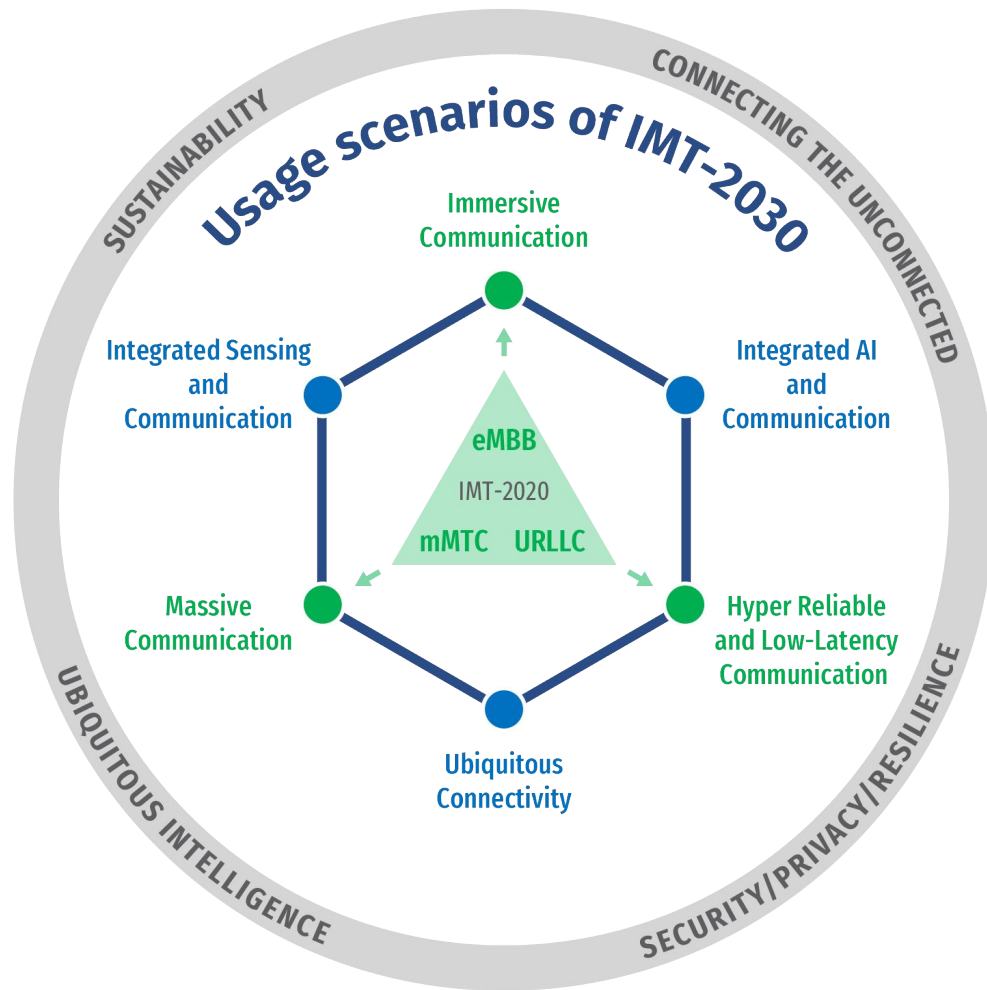
**6G /
“IMT-2030”**

6G will be implemented by 2030



6G overarching requirements finalized by the ITU in 2023

Ubiquitous Intelligence, Sustainability, Connecting the unconnected and security



ITU 'Framework & overall objectives of the future development of IMT for 2030 and beyond

ITU developed 6G - IMT-2030 -'Framework' Recommendation. It took 2 years to develop from 2021 to 2023. **This “Framework” is now the global dominant and de-facto standard 6G reference point**

6G Usage Scenarios - 6 groups

3 evolving from IMT-2020 (5G)

- eMBB → **Immersive** Comms
- mMTC → **Massive** Comms
- URLLC → **HRLLC** (Hyper Reliable & Low-Latency Comms)

3 New for IMT-2030 (6G)

- **Integrated** AI & Comms
- **Ubiquitous** Connectivity
- **Integrated** Sensing & Comms

Spectrum is key to meeting the 6G overarching requirements



Ubiquitous Intelligence

Spectrum enables AI-native networks and intelligent services everywhere



Sustainability

Spectrum enables greener, more efficient networks

Efficient and optimized use



Connecting the unconnected

Spectrum expands coverage to bridge the digital divide

Access to new frequency bands



Security

Spectrum provides resilient, reliable and secure connectivity

Trusted and robust networks

More capacity and flexibility

SPECTRUM

THE FOUNDATION FOR 6G

SPECTRUM TODAY | A MORE CONNECTED, INTELLIGENT AND SUSTAINABLE TOMORROW

But the Radio Frequency Spectrum is a limited natural resource

40 Radio Communications service are all vying to get the same limited frequency bands, in particular bands below 300 GHz

THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

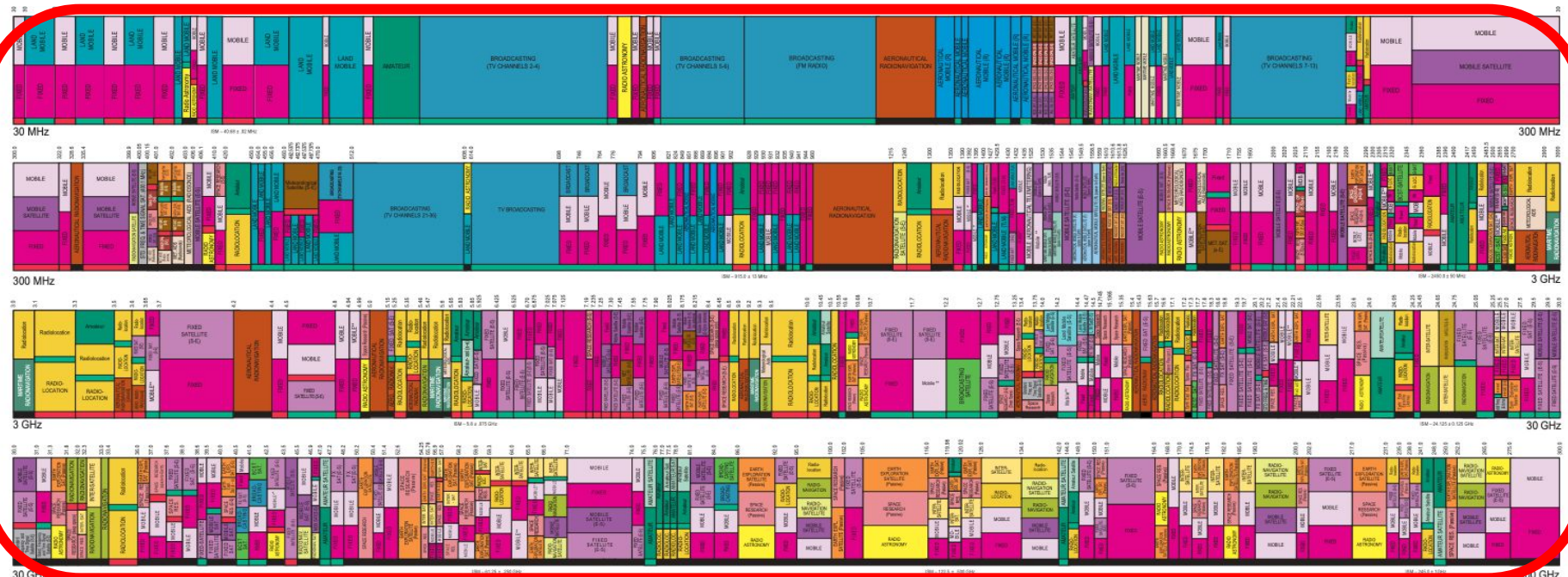
AERONAUTICAL MOBILE	INTER-SATELLITE	RADIO ASTRONOMY
AERONAUTICAL MOBILE SATELLITE	LAND MOBILE	RADIO DETERMINATION SATELLITE
AERONAUTICAL RADIO NAVIGATION	LAND MOBILE SATELLITE	RADIO LOCATION
AMATEUR	MARITIME MOBILE	RADIO LOCATION SATELLITE
AMATEUR SATELLITE	MARITIME MOBILE SATELLITE	RADIO NAVIGATION
BROADCASTING	MARITIME RADIO NAVIGATION	RADIO NAVIGATION SATELLITE
BROADCASTING SATELLITE	METEOROLOGICAL AID	SPACE OPERATION
EARTH EXPLORATION SATELLITE	METEOROLOGICAL SATELLITE	SPACE RESEARCH
FIXED	MOBILE	STANDARD FREQUENCY AND TIME SIGNAL
FIXED SATELLITE	MOBILE SATELLITE	STANDARD FREQUENCY AND TIME SIGNAL SATELLITE

ACTIVITY CODE

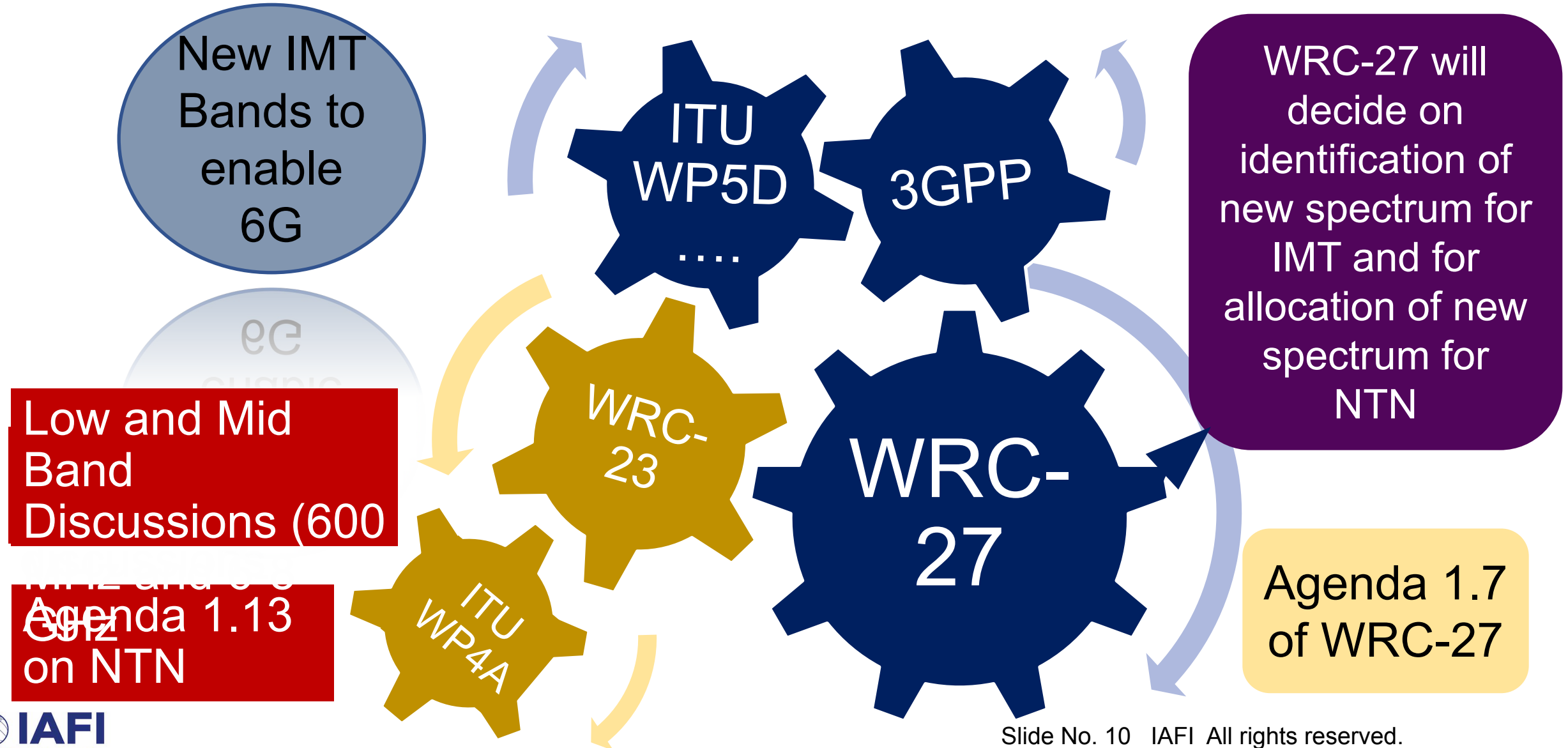
GOVERNMENT EXCLUSIVE	GOVERNMENT/NON-GOVERNMENT SHARED
NON-GOVERNMENT EXCLUSIVE	

ALLOCATION USAGE DESIGNATION

SERVICE	EXAMPLE	DESCRIPTION
Radio	Radio	Radio
Fixed	Fixed	Fixed
Mobile	Mobile	Mobile
Land Mobile	Land Mobile	Land Mobile
Land Mobile Satellite	Land Mobile Satellite	Land Mobile Satellite
Maritime Mobile	Maritime Mobile	Maritime Mobile
Maritime Mobile Satellite	Maritime Mobile Satellite	Maritime Mobile Satellite
Amateur	Amateur	Amateur
Amateur Satellite	Amateur Satellite	Amateur Satellite
Broadcasting	Broadcasting	Broadcasting
Broadcasting Satellite	Broadcasting Satellite	Broadcasting Satellite
Earth Exploration Satellite	Earth Exploration Satellite	Earth Exploration Satellite
Fixed	Fixed	Fixed
Fixed Satellite	Fixed Satellite	Fixed Satellite
Mobile	Mobile	Mobile
Mobile Satellite	Mobile Satellite	Mobile Satellite
Standard Frequency and Time Signal	Standard Frequency and Time Signal	Standard Frequency and Time Signal
Standard Frequency and Time Signal Satellite	Standard Frequency and Time Signal Satellite	Standard Frequency and Time Signal Satellite



Decisions on Spectrum Allocation and identification are made in the **ITU World Radio Conferences**



There is already large amount of spectrum identified for IMT (2G, 3G, 4G, 5G) by the Previous WRCs – But here is why we need to identify new bands for IMT to enable 6G



Cities with over 50% of the world's urban population will be capacity-constrained by 2030 if mid-band spectrum remains at today's levels.

Critical for India



A global average of 2-3 GHz of total mid-band spectrum will be required in urban areas by 2035-2040; higher-demand countries will need 2.5-4 GHz in this period.



A harmonised spectrum roadmap that delivers the total mid-band spectrum requirements should be developed to enable operators to meet these capacity demands from 2030.



WRC-27 needs to identify sufficient mid band spectrum below 10 GHz to ensure that 6G can be rolled out .

Further, 6G will need much larger contiguous bands due to larger Channel Sizes

1876

Land lines—No Spectrum Needed

1G/2G –Very Little Spectrum: 25-200 KHz Channel

3G/4G—Large Spectrum: 5-10 MHz Channel

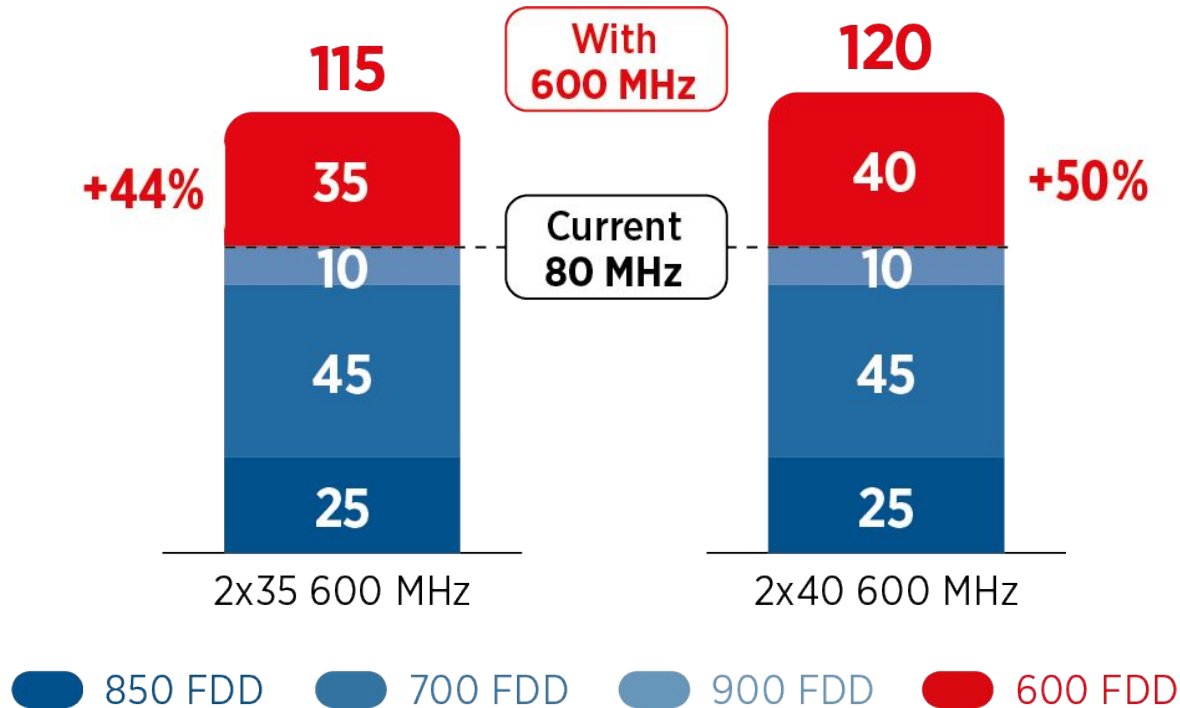
5G –Much More Spectrum: 20-50 MHz Channel

6G – Extremely High Spectrum: 200-400 MHz Channel

2030

These Channel sizes are not possible in the current IMT bands

Low Bands will still be critical for 6G Coverage

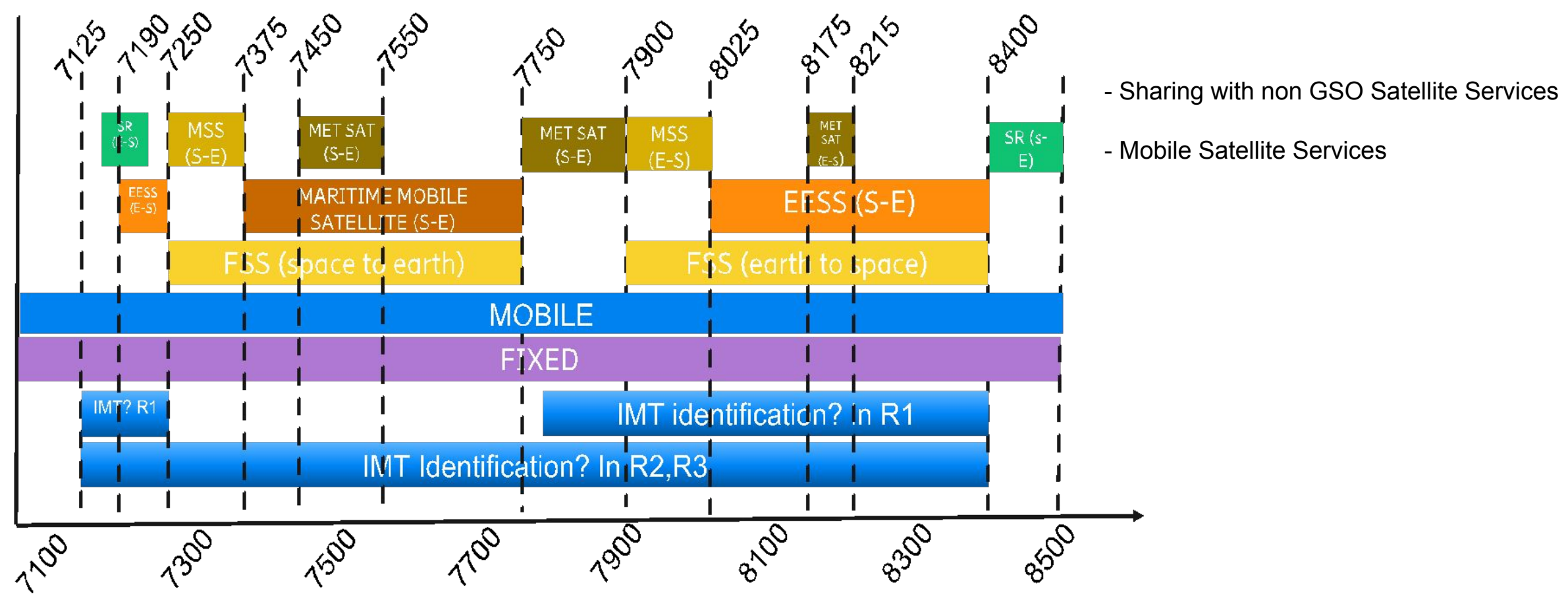


Spectrum below 1GHz could...

- Enable 6G coverage in rural areas
- Increase throughput
- Enhance digital inclusion
- Maximise spectral efficiency and cost-effectiveness with wider bands

WRC-27 studies for identification of new mid band Spectrum for 6G are ongoing

Many Existing services in 7 125-8 400 MHz need to be fully protected.



In summary :

Two New key Frequency Bands for meeting 6G overarching requirements

Ubiquitous Intelligence, Sustainability, Connecting the unconnected and security

6-8 GHz (6425-8400 MHz)

➡ Ubiquitous Intelligence

The Golden Band for 6G



600 MHz band (612-698 MHz)

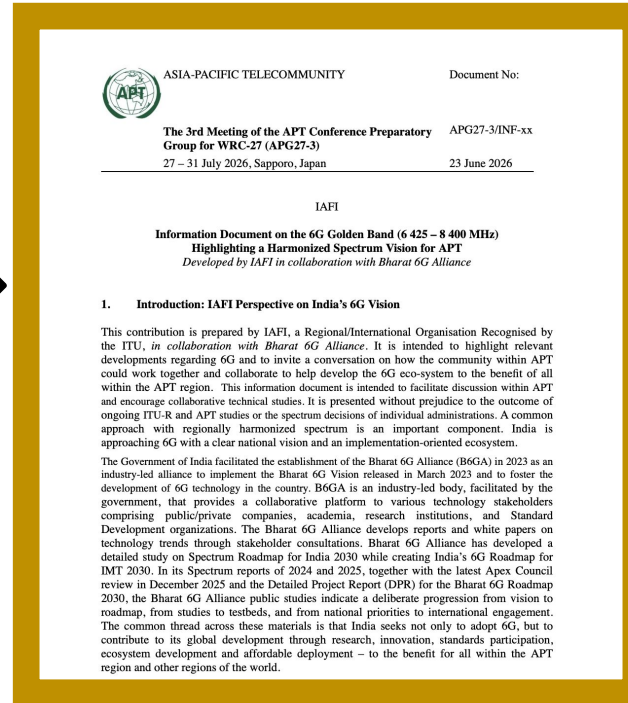
➡ Ubiquitous Coverage,



IAFI is Building Regional and Global Consensus ahead of WRC-27

IAFI submitted an invitation to other courtiers to support 6G Golden Band at the recent APT Preparatory group meeting for WRC-27

UAE Regulator TDRA recently published a white paper on 6G golden band





THANK YOU

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