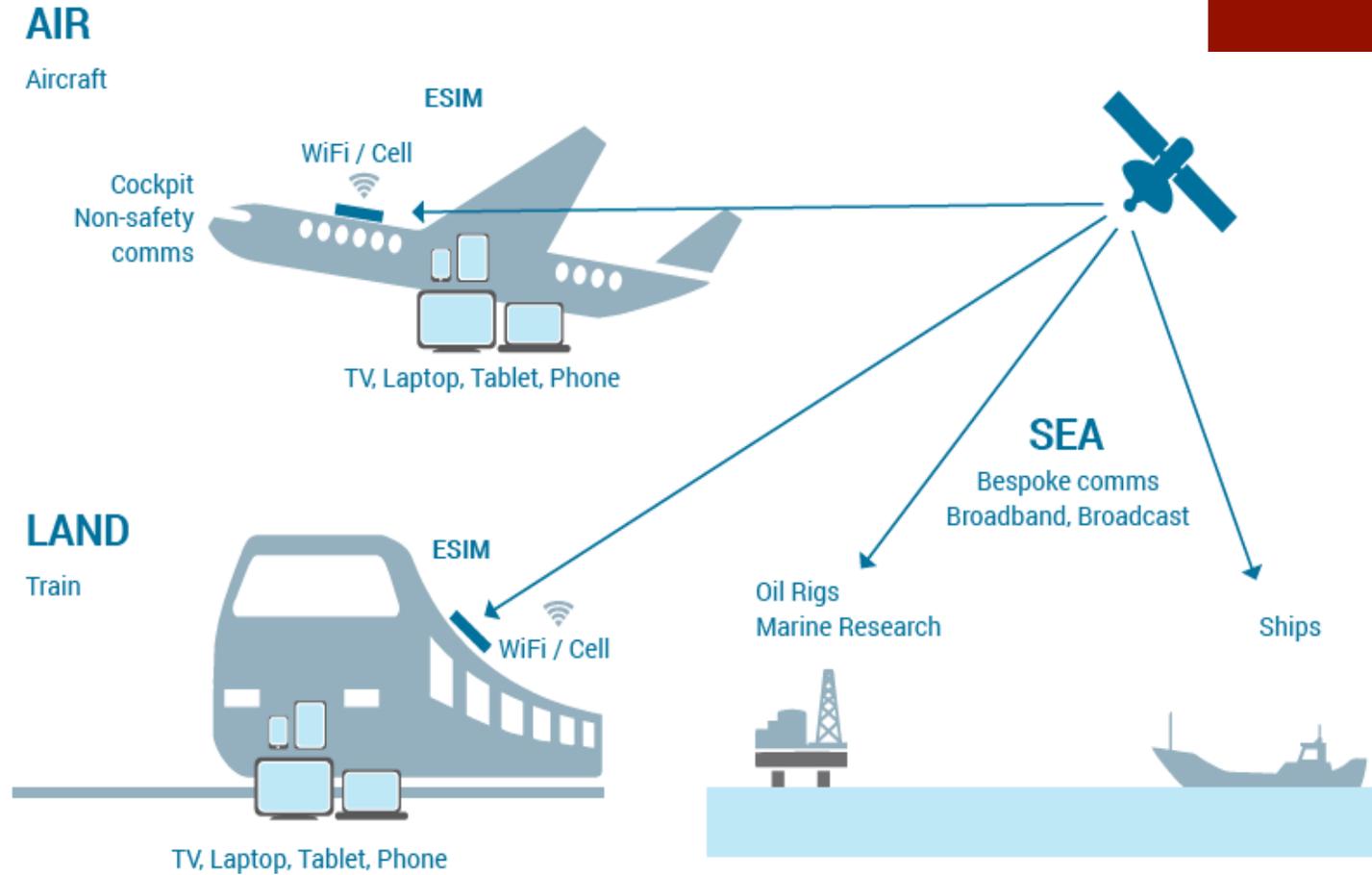


GSC Lunchtime Sessions

ATU

WRC-19 Agenda Items:
1.5, 1.13, 10, 9.1.7





**Optimizing the Use of Existing Satellite Spectrum
to meet growing demand for new satellite services**

Resolution 156
adopted at WRC-15
Recognizes the need for
global broadband mobile-
satellite communications

ESIMs
communicating
with FSS space
stations

AI 1.5 (Resolution 158)
Regulated operation of ESIMs
to meet increasing demand
for mobility applications

GSC Position:

Establish provisions for aeronautical, maritime, land ESIM operations within GSO FSS networks at 17.7-19.7 GHz & 27.5-29.5 GHz, with technical & regulatory protection mechanisms for the FSS, FS, MSS & EESS operations

2015



2016



2017



2018



2019



AI 1.5: ESIMs in the FSS Ka-Band

Demand for satellite mobility applications

Aeronautical Market:

- 100+ commercial airlines offer IFC = a \$40B opportunity for airlines by 2035
- 8200+ commercial aircraft connected
- Connecting passengers. Reducing fuel consumption & delays. Improving route planning.

Maritime Market:

- 20 000 VSAT enabled vessels (75000 by 2028)
- Drivers: crew & passenger connectivity, more sensors/applications for operational vessel monitoring, route planning & vessel tracking, autonomous vessels.

- ◆ **Proposals from regional groups: CITELE (doc 11); RCC (doc 12); CEPT (doc 16); APT (doc 24); ATU (doc 46); ASMG (doc 29) + various multi-country and individual country proposals**
- ◆ **Common elements:**
 - ⇒ General support for new Resolution to address ESIM in 17.7-19.7 GHz & 27.5-29.5 GHz
 - ⇒ Operation of ESIM within envelope of GSO FSS network characteristics & verification of compliance with envelope by BR (based on CR/C or notified network data)
 - ⇒ 70km off-shore distance for maritime ESIM in which prior agreement from coastal state is needed to operate
 - ⇒ Sharing between GSO ESIMs & non-GSO FSS or non-GSO MSS feeder links to be based on existing coordination procedures



Some elements still need to be resolved

1/ Technical requirements for A-ESIM (pfd limit values, possible altitude limit)

- ◆ GSC supports “Option 1” pfd limits (based on results of sharing studies with terrestrial services, including 5G)
- ◆ Altitude limit is not necessary, provided Option 1 pfd limits are adopted & notifying administrations provide a commitment of compliance.
- ◆ **GSC has major concerns with feasibility for BR to run compliance check with pfd limit. Compliance should be a condition of ESIM authorization.**

2/ Reference bandwidth for ESIM EIRP limits (1 MHz reference bandwidth or 14 MHz reference bandwidth)

- ◆ GSC supports 14 MHz reference bandwidth: smallest bandwidth for terrestrial service receivers. Hence the EIRP limit towards the horizon for M-ESIM is 24.44 dB(W/14 MHz). A-ESIM pfd limit should be expressed in 14 MHz reference bandwidth to avoid unnecessarily restrictive limits on A-ESIM operation.

3/ Conditions for sharing with non-GSO FSS and non-GSO MSS feeder links

- ◆ GSC supports inclusion ESIM power limits only in 27.5-28.6 GHz, coordination under 9.11A in 28.6-29.5 GHz

4/ Annex 3 guidelines (possible inclusion of guidelines to the Resolution)

- ◆ Annex 3 is unnecessary: ideas already clearly defined in main body of Resolution.

5/ Status of the protection limits for terrestrial services (Annex 2 of the Resolution)

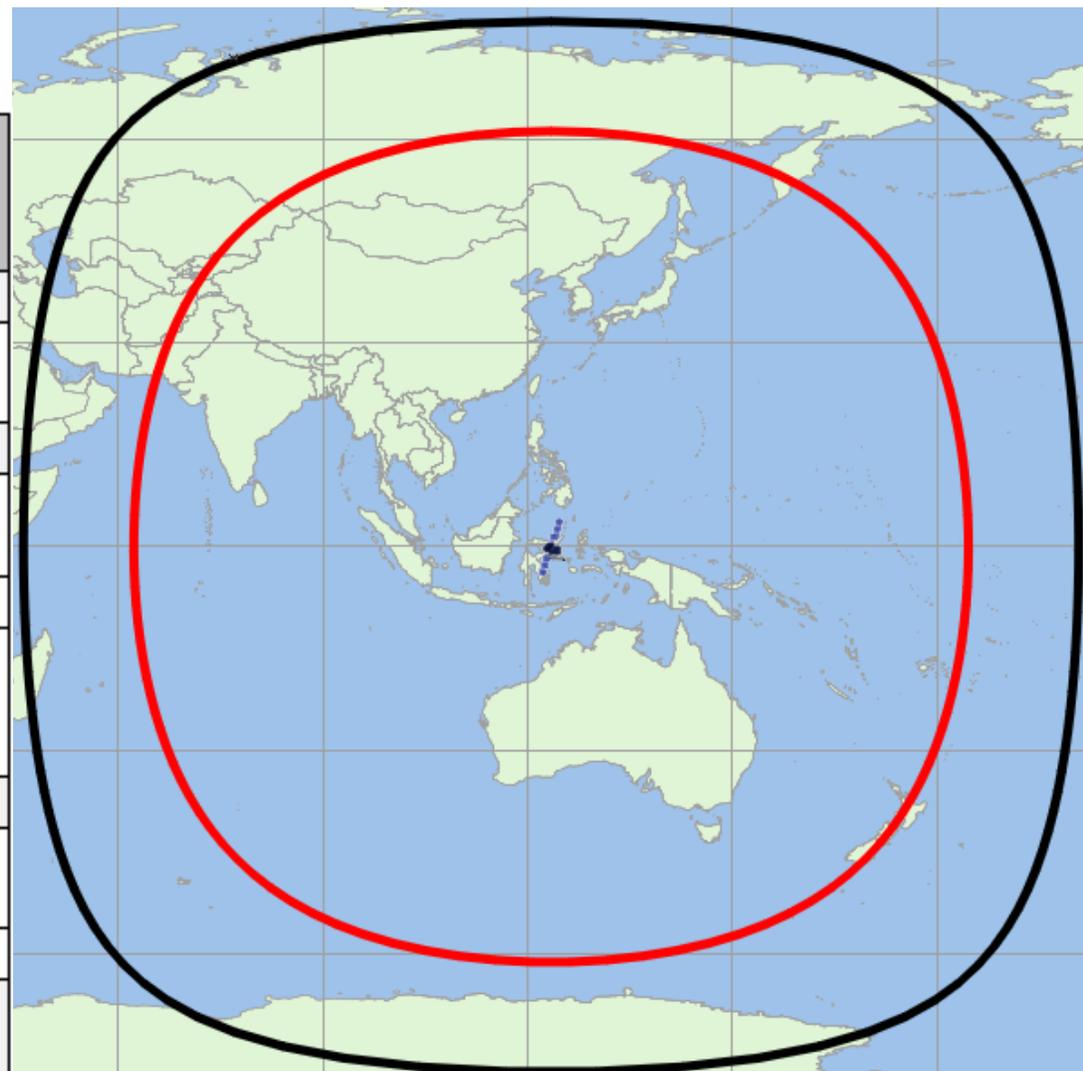
- ◆ Maritime & aeronautical ESIMs meet pfd limits/minimum off-shore distance, to avoid unacceptable interference to the terrestrial services operating in accordance with the Radio Regulations within line-of-sight and on a co-frequency basis
- ◆ Compliance with these limits should be a necessary and sufficient condition for ESIM to meet its requirements with respect to terrestrial services

STUDY ASSUMPTIONS:

AI 1.13 in 26 GHz vs ESIM in 28 GHz

AI 1.13 26 GHz STUDIES MS INTERFERENCE INTO FSS		AI 1.5 OPTION 2 PFD MASK ESIM (FSS) INTO MS
Methodology		
Type of interference evaluation method	Statistical (Monte Carlo) ITU-R M.2101	Worst-case (deterministic)
Technical and operational characteristics		
Network loading factor	20%	ESIM duty cycle not considered
TDD activity factor	BS:80%, UE:20%	
UE body loss	4 dB	Not considered
Antenna pointing	BS antenna beam not pointed toward the horizon	BS antenna beam pointed towards horizon
Propagation model		
Clutter loss	ITU-R P.2108 (up to 20-30 dB)	0 dB clutter loss
Polarisation loss	3 dB	0 dB
TOTAL INTERFERENCE REDUCTION CONSIDERED	>20 dB	>20 dB APPLICABLE, BUT NOT CONSIDERED

20 degree elevation limitation (red)



GSC Position

Agenda Item 1.13 - IMT

ISSUE



**Identification of frequency bands, among candidate bands listed in Resolution 238, for future development of IMT
... while preserving access to satellite spectrum for existing & future users**

Additional spectrum for IMT

Frequency band(s)	Band(s) CPM Report
24.25-27.5 GHz	A
31.8-33.4 GHz	B
37-40.5 GHz	C
40.5-43.5 GHz	D & E
45.5-47.2 GHz	F & G
47.2-50.2 GHz & 50.4-52.6 GHz	H & I
66-71 GHz	J
71-76 GHz & 81-86 GHz	K & L
Total: 33.25 GHz	

- ◆ A huge amount of spectrum has been studied
- ◆ More than enough to find 'more spectrum' for IMT
- ◆ New identifications should only be made against certain key principles

GSC Principles

- ◆ Consider ONLY bands of Res. 238 (WRC-15)
- ◆ Harmonisation of spectrum is key
- ◆ IMT identification with reasonable sharing conditions between IMT & satellite services

The GSC recommends IMT identifications at WRC-19 stay within:

- ◆ **26 GHz:** 24.25-27.5 GHz globally (3.25 GHz)
- ◆ **40 GHz:** 37-40 GHz in Region 2 and 40.5-43.5 GHz in Regions 1 and 3 (3 GHz)
- ◆ **66 GHz:** 66-71 GHz globally (5 GHz)

⇒ with reasonable sharing conditions & measures to ensure co-existence between IMT & satellite services:

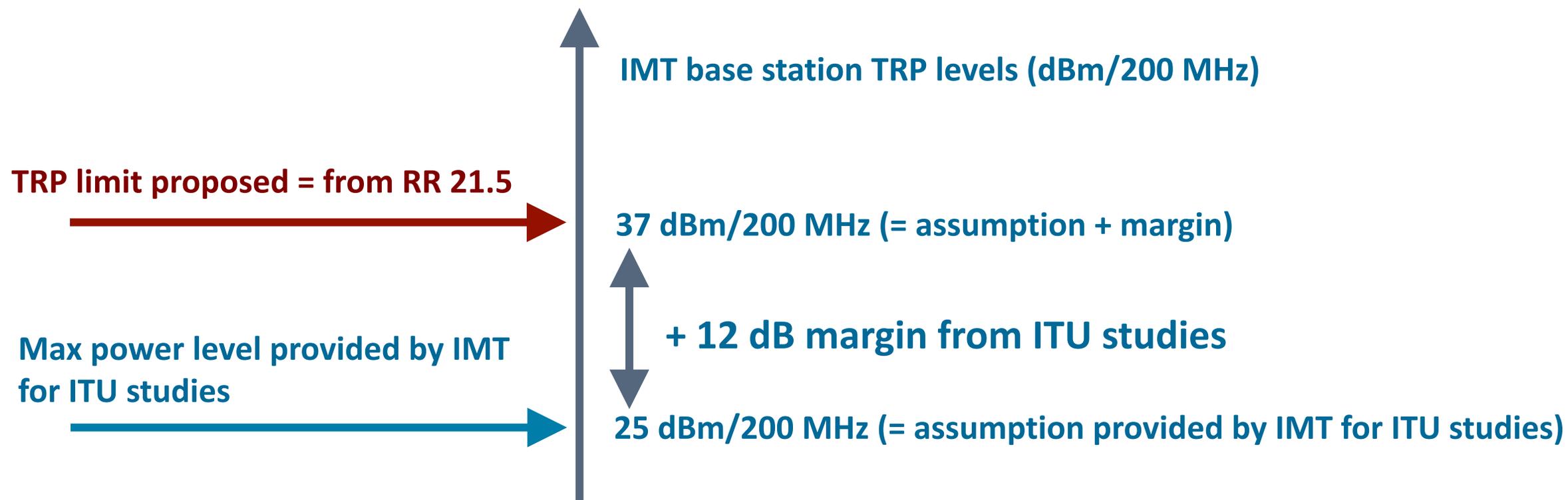
- Power / pointing conditions on IMT base stations to protect FSS receivers, with no undue constraints on IMT
- Assistance to administrations in defining measures for future FSS earth station deployment

 **11.25 GHz above 24 GHz for IMT in each ITU-R Region**



Proposed power and pointing conditions for IMT base stations do not put undue constraints on IMT

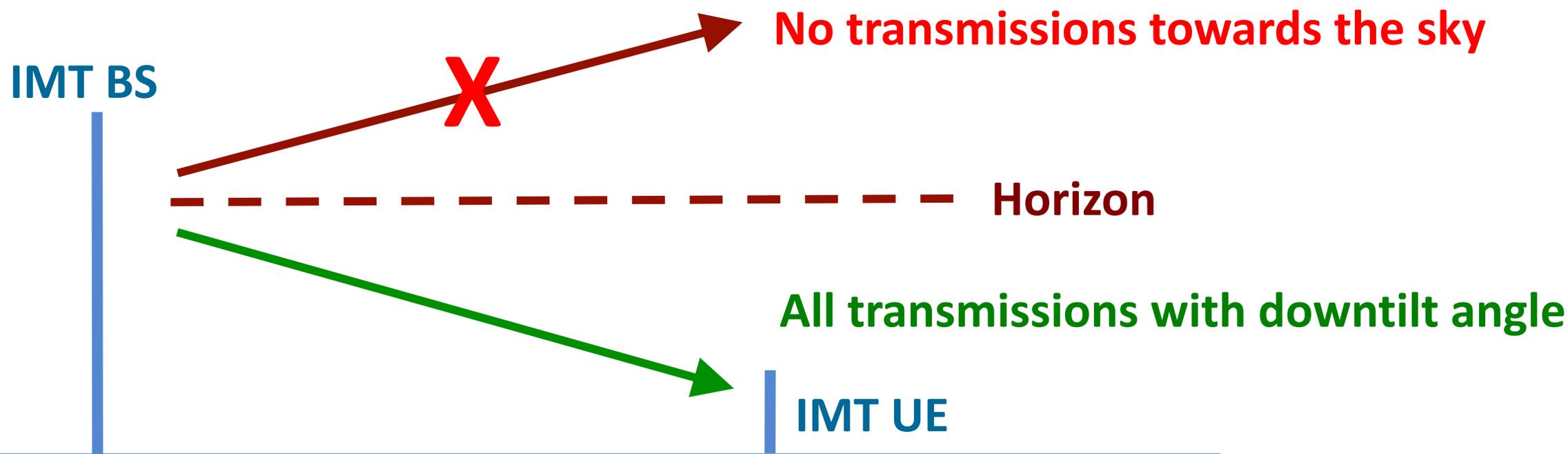
Max power level provided by IMT, TRP limit proposed and RR 21.5





Proposed power + pointing conditions for IMT base stations do not put undue constraints on IMT

IMT base stations all transmit below horizon, with a downtilt angle



AI 1.13: Additional spectrum for IMT

	37-39.5 GHz	39.5-40 GHz	40-40.5 GHz	40.5-42 GHz	42-43.5 GHz
Region 1		HDFSS			
Region 2			HDFSS		
Region 3			HDFSS		
	37-39.5 GHz	39.5-40 GHz	40-40.5 GHz	40.5-42 GHz	42-43.5 GHz
Region 1	No Change			IMT	
Region 2	IMT		No Change		
Region 3	No Change			IMT	

- ⇒ Bands should not be identified for IMT in a Region where it is not intended for use by IMT
- ⇒ Global economies of scale for IMT equipment can be achieved through identification of 3 GHz of spectrum for IMT in each ITU Region
- ⇒ There is no need for a global 6 GHz wide band for IMT

 Handsets used today are can already support multiple frequency bands AND can accommodate regional band differences

GSC Position Agenda Item 10 (C-Band)

Crucial Issue

- ◆ Can IMT replace the services that will be displaced?
- ◆ Do alternatives exist to provide these services?

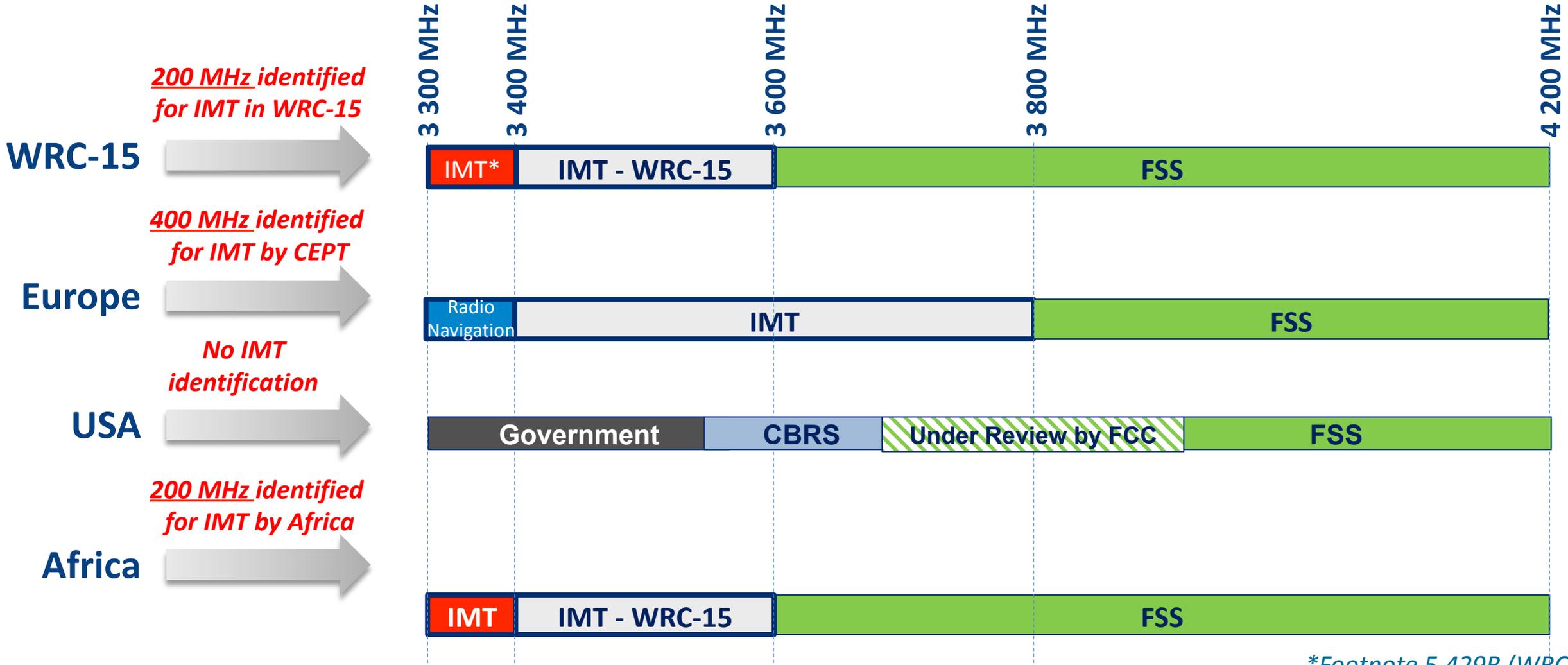
Sub-Saharan Africa Population: 1.061 Billion (2017)



Source: NSR & Euroconsult

There is no substitute for C-band Satellite Services in Africa

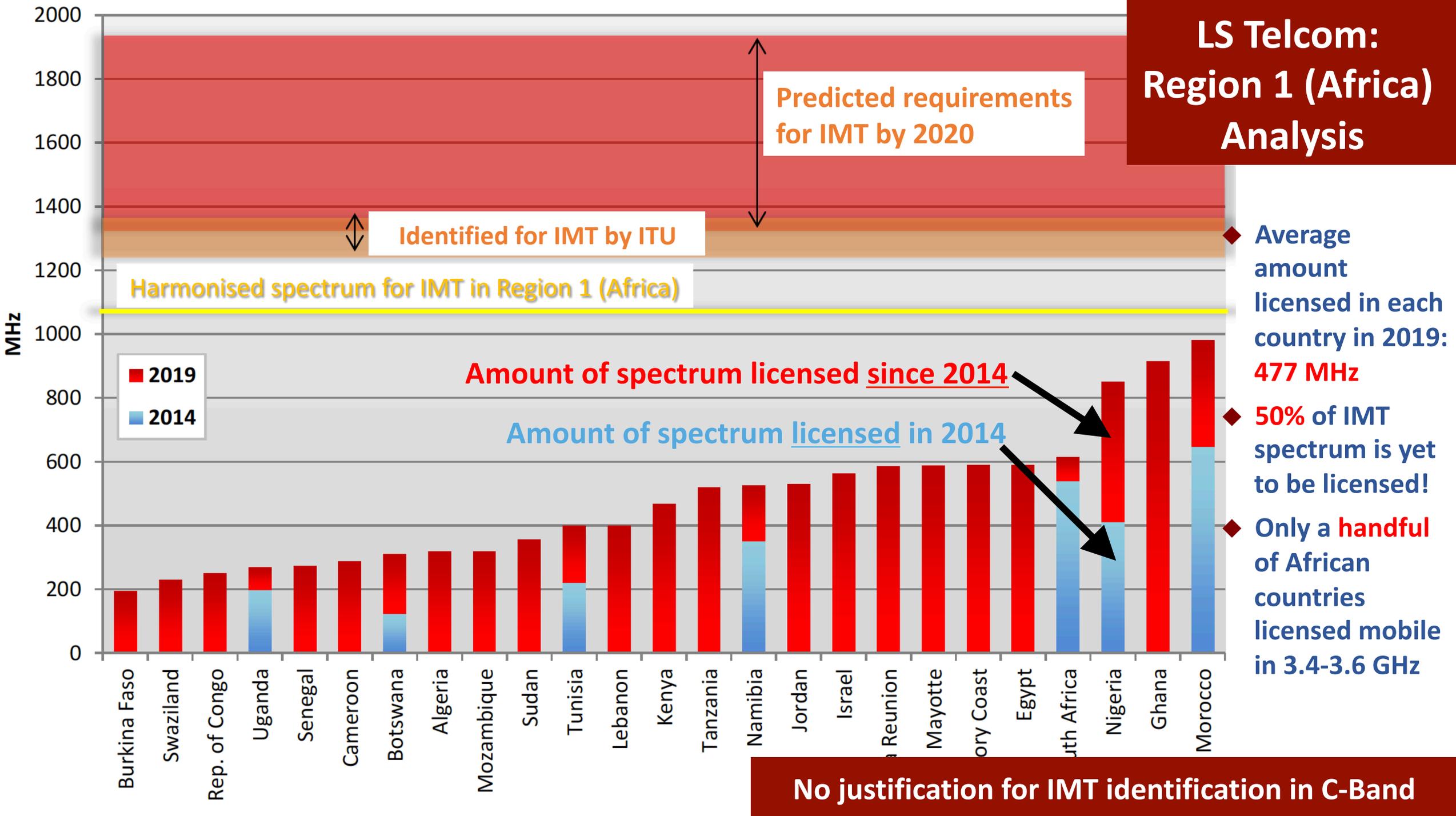
C-band usage varies around the world



*Footnote 5.429B (WRC-15)

Every region has unique needs ⇒ One size does not fit all

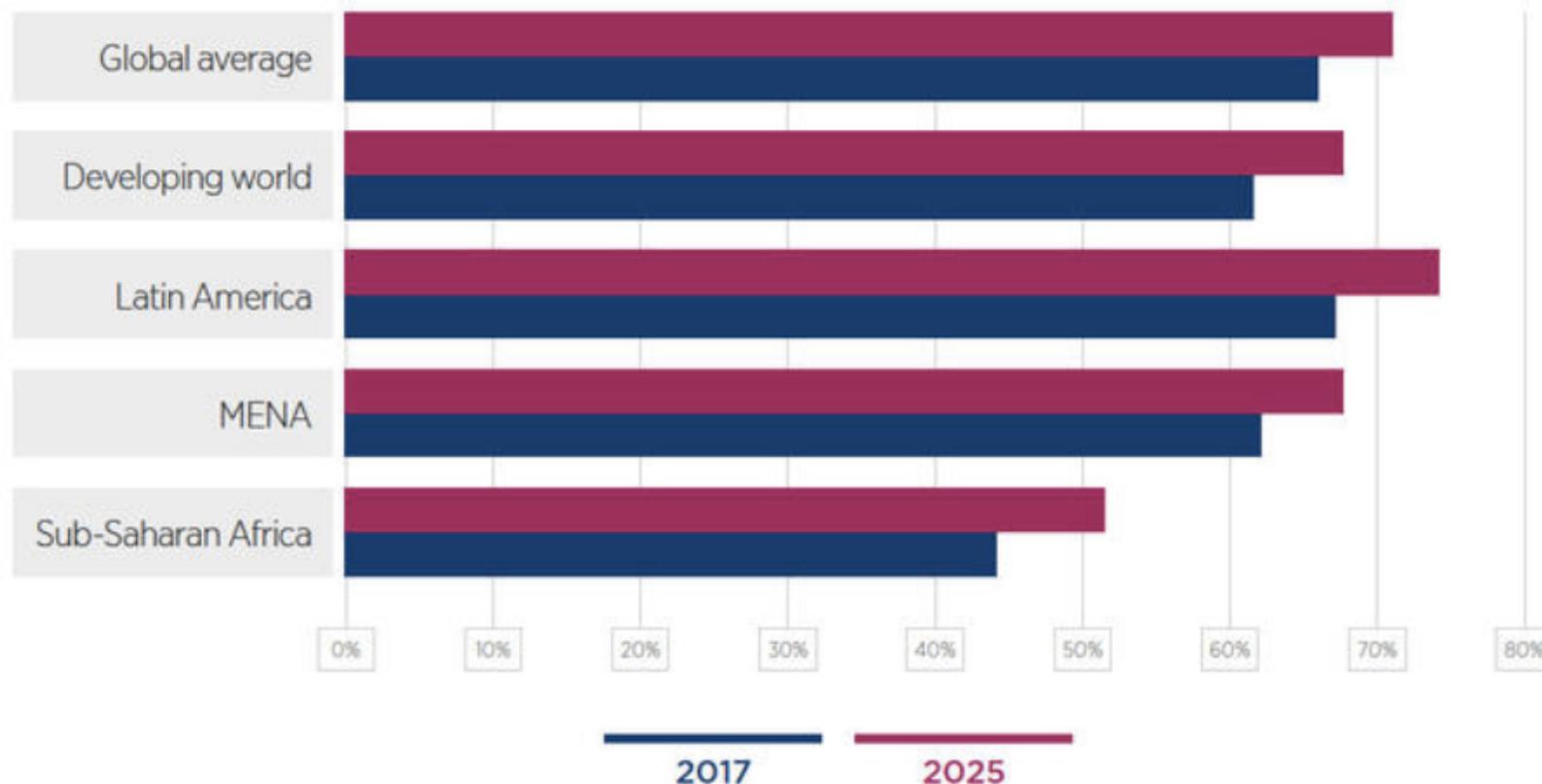
LS Telcom: Region 1 (Africa) Analysis



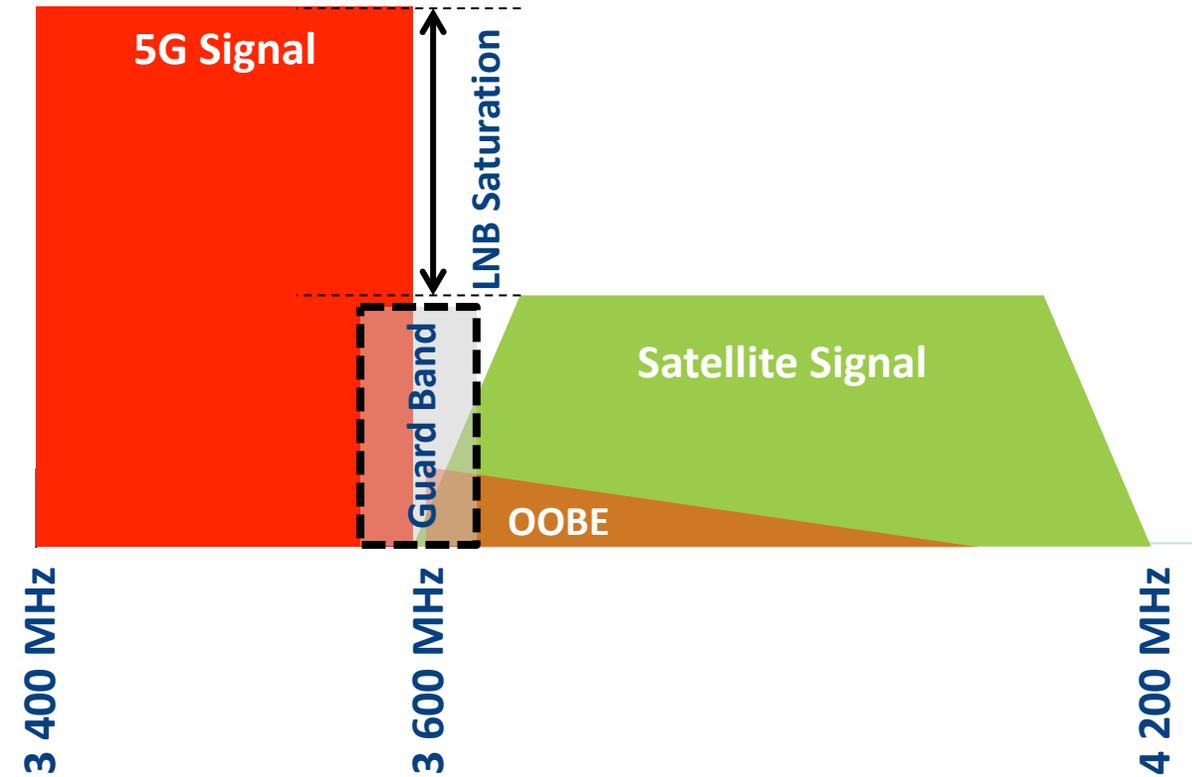
The Challenge in Africa is Coverage

- ◆ Mobile subscriber penetration in Africa is 44% (2017)
- ◆ 50% of mobile networks are still using 2G
- ◆ By 2025, 3G will account for 60% of all mobile connections
- ◆ 400 million people have no access to mobile broadband
- ◆ C-band & mmWave are capacity bands (not coverage bands)
- ◆ Focus should be on digital dividend bands (700/800/900 MHz bands)

Subscriber Penetration:



Co-existence between FSS and 5G in adjacent bands must be carefully managed



- ◆ Satellite earth stations are very sensitive to terrestrial interference
- ◆ 5G signals can interfere with FSS receive earth stations in two ways:
 - Saturate the LNB of the earth station, even if the 5G signal is adjacent to the satellite signal
 - Out-of-Band-Emissions (OOBE) and Spurious Emissions (SE) of the 5G signal can cause in-band interference to FSS signals
- ◆ OOBE levels specified in 3GPP standards do not protect FSS signals in adjacent bands

GSC Position Agenda Item 10 (6-24 GHz)

Issue

- ◆ Can IMT replace the services that will be displaced?
- ◆ 33 GHz has just been studied, should even more spectrum for IMT really be studied?

The GSC is of the view that there is **no need** for any additional spectrum to be identified for IMT:

- ◆ WRC-19, under AI 1.13, is expected to identify **many GHz** of new spectrum for IMT
- ◆ **Significant** amount of unlicensed or unused spectrum is **already** identified for IMT –
 - ⇒ Around the world, less than 50% of available spectrum is licensed
- ◆ **6-24 GHz range covers core bands for the satellite industry:** C-, X, Ku- and Ka-band
 - ⇒ Many satellites operate in these bands => heavily used for applications e.g. broadcasting DTH, VSAT, SNG, broadband, security, etc.

Any identification of IMT in the 6-24 GHz range will:

- Interfere with existing satellite services
- Negatively impact existing investments
- Harm competition by limiting the ability of satellite operators to meet the growing demands of satellite users, including government

GSC Position

Agenda Item 9.1.7

- Unauthorized Earth Stations -

ISSUE

To address concerns raised with unauthorised earth stations while preserving regulatory certainty & flexibility



The GSC recognizes the concerns of administrations affected by unauthorized operation of earth stations terminals:

- ◆ Re Issue 2a (Annex to Resolution 958 WRC-15): GSC supports Option 1 **NO CHANGE to Radio Regulations** (international regulatory measures already addressed appropriately with Art 18)
- ◆ Additional **Regulatory Measures will not resolve this problem** of illegal transmissions
- ◆ Re Issue 2b (Annex to Resolution 958 WRC-15): GSC supports **ITU-R studies on best practices** in training & monitoring and development of **ITU reports/handbooks/capacity building** to help administrations to prevent use of & locate unauthorized uplink earth terminals

Thank you!

