



---

# **Developing Spectrum Roadmap in SATRC Countries for Future MobSat Broadband Services**

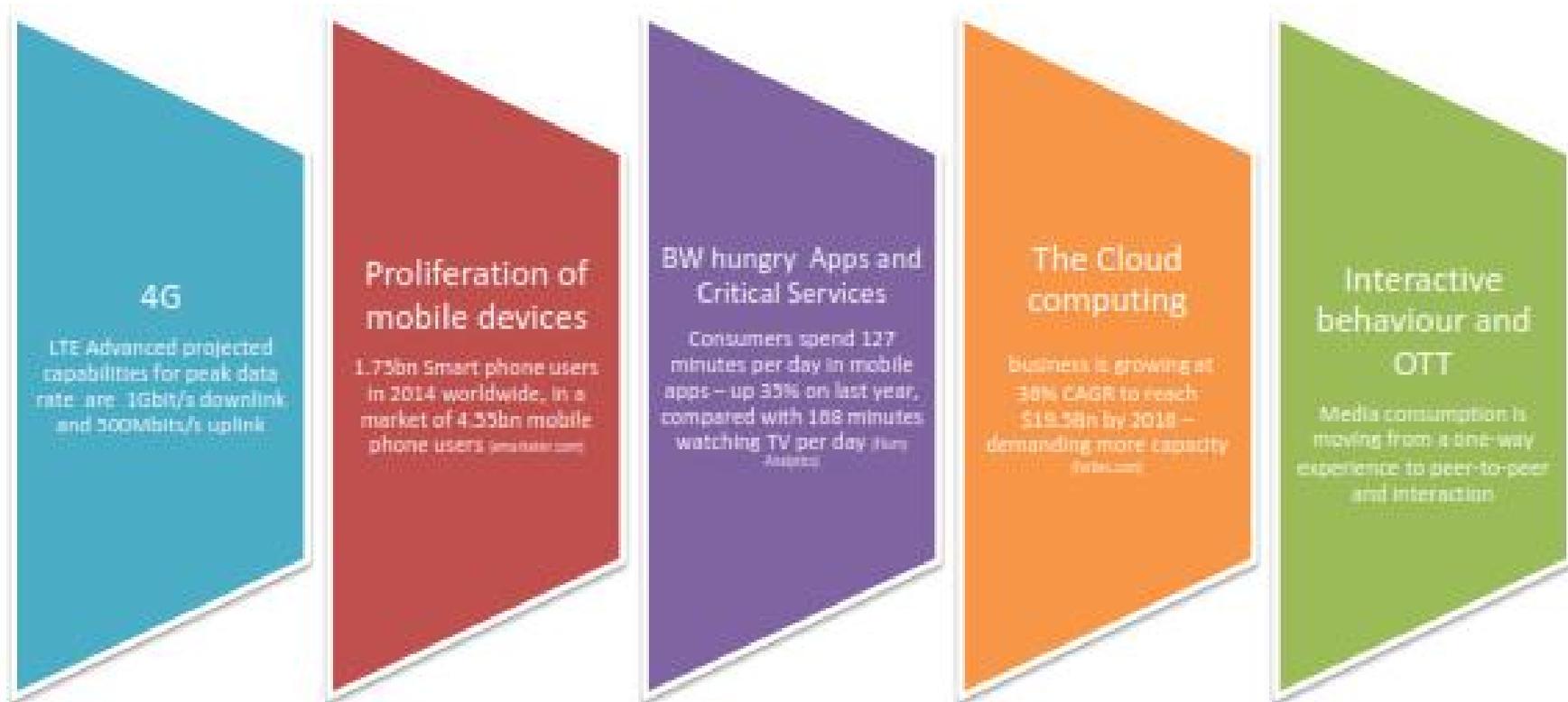
Satellite Industry Perspective

SATRC Spectrum Workshop 16-18 August 2017  
Islamabad



# The Digital Connected Society

Spectrum strategies need to adapt to the growing end user expectations



high speed access to anything, from any device, anywhere, anytime





# SATRC Strategic approach

---

## **Growing Need to Harmonised Spectrum and Licensing Framework for Future MobSat Broadband Services**



---

# **Spectrum Considerations For Future Roadmap**

# WRC-15 Outcome: C-Band

## C-Band

- **Vital + valuable for Asia**
  - **Conventional C-Band mostly preserved at WRC-15**
- 
- ◆ **3400 - 3600 MHz almost global identification for IMT**
  - ◆ **3600 - 3700 MHz identified for IMT in 4 CITEEL countries only**
  - ◆ **3700 - 4200 MHz preserved for FSS globally**
  - ◆ **Mobile services remain secondary in 3800 - 4200 MHz globally**
- 
- **Mobile industry now has 200 MHz of globally identified spectrum for IMT**
  - **APT Region was instrumental in preserving C-band, allowing vital continuity and growth of C-Band services in Asia**

# 4 simple reasons for **NOT** implementing 5G above 3600 MHz

---

1. **5G characteristics are different to 4G + will cause harmful interference + impede existing services**
2. **Interference will prevent emergency/humanitarian services that rely on C-band**
3. **Hundreds of millions of people worldwide depend on C band for broadcasting news, sports + entertainment**
4. **C-band is the most reliable signal during heavy rainfall**

**“Sharing the band from 3400 - 4200 MHz is not feasible due to the size of the needed exclusion zones, up to an area of over 865 000 square km, and the large number of FSS earth stations that would need to be protected”**

**Conclusion of sharing studies between IMT and FSS ITU-R S.2368-0**

# Why C-Band Remains a Mainstay?

---

## ◆ Wide coverage

- ❖ Large beams allow economically viable coverage in low density areas for intercontinental + global communications

## ◆ Propagation characteristics

- ❖ High availability even in high-rain zones

## ◆ Availability

- ❖ Over 180 satellite deployed globally + NextGen satellites

## ◆ Reliability

- ❖ 99.9% reliability in Asia -v- fibre which is often at 80% in Asia

**Unique advantages of C-band cannot be replicated in other satellite bands or via terrestrial comms**

# Why Ka-Band should **NOT** be used for 5G

---

- ◆ ITU WRC-15 excluded Ka-Band (27.5-30 GHz) from 5G sharing studies
- ◆ 33GHz of other spectrum identified for study (ITU Res 238)
- ◆ Includes 26GHz - vital for Copernicus earth observation services for Asia
- ◆ MM wave bands can provide advantages for cellular connectivity but Ka-Band cannot

## Ka-Band

- High-Throughput Satellites increase bandwidth + capacity available for Asia
  - Ka-Band is a key growth band for higher capacity services via satellite
  - Alongside C- & Ku-Bands, Ka-Band is an effective way to bring mobile broadband to Asia's remotest communities
- ⇒ Ka-Band, V- + Q-Bands are all being developed by GSO + NGSO operators to meet Asia's increasing connectivity needs



# Future Roadmap for 5G Spectrum Planning

---

## Adopting an harmonised Spectrum Approach in the 5G Eco-System for MobSat Services



# 5GPPP vision ([www.5G-PPP.eu](http://www.5G-PPP.eu))



- **“5G wireless will support a heterogeneous set of integrated air interfaces:** from evolutions of current access schemes to brand new technologies. 5G networks will encompass cellular and satellite solutions. Seamless handover between heterogeneous wireless access technologies will be a native feature of 5G, as well as use of simultaneous radio access technologies to increase reliability and availability.”
- “To achieve the expected capacity, coverage, reliability, latency and improvements in energy consumption, the 5G architecture is expected to run over a converged optical-wireless-satellite infrastructure for network access, backhauling and front hauling with the possibility of transmitting digital and modulated signals over the physical connections.”





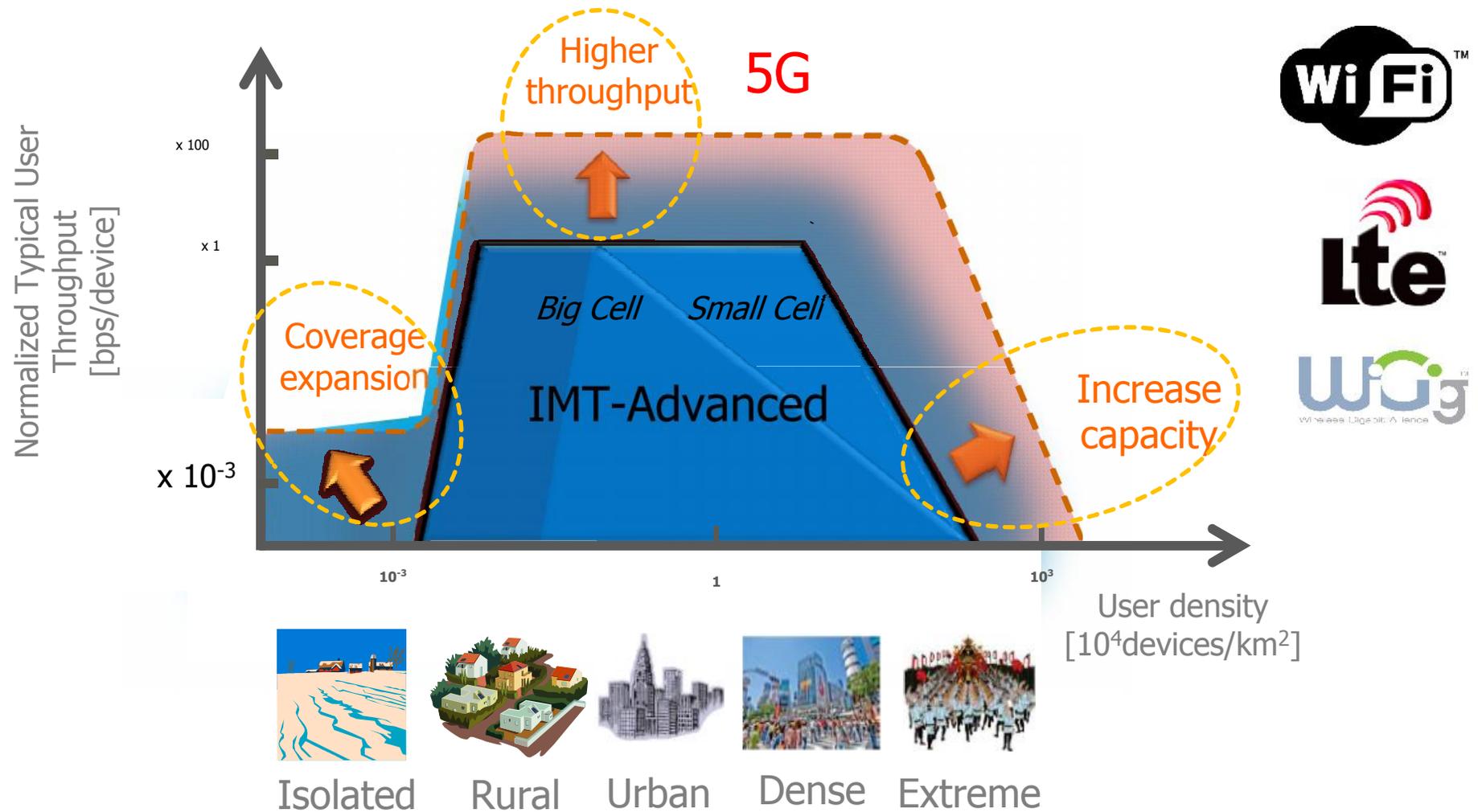
# 5G Ecosystem – Inclusive of multiple access technologies

## What 5G is about





# Framework of '5G' Ecosystem





# Mobile operators are Evolving

Globally, mobile operators top priorities are:

- ❖ to monetize their `hugh investments' in 3G/4G networks *and*
- ❖ Themselves introducing 4.5G LTE networks demonstrating 500Mbps in 2016 through “carrier aggregation”

## Vodafone Germany September 2016

- ◆ Launch of 4.5G technology
- ◆ **375Mbps**
- ◆ Across 30 cities
- ◆ Triple carrier aggregation: 800, 1800, 2600MHz bands

## TIM Italy December 2016

- ◆ Launch of 4.5G technology
- ◆ **500Mbps**
- ◆ Across 3 cities
- ◆ Quadruple carrier aggregation: 800, 1500, 1800, 2600MHz bands

Driven by ECONOMICS • Using EXISTING spectrum



# WiFi / WiGig Eco-System is Evolving

---

- ❖ 70-80% of all mobile data traffic being carried by **WiFi** networks
- ❖ **WiGig** (next generation WiFi) chips + devices at **60GHz & above** now becoming available: 2017: 200m radios shipped, 2020: >1bn
- ❖ **Same “high mm wave” bands usable for very high capacity cellular comms/IMT/5G:** perfect for high density indoor / near-indoor use

## Vodafone - Huawei July 2016

---

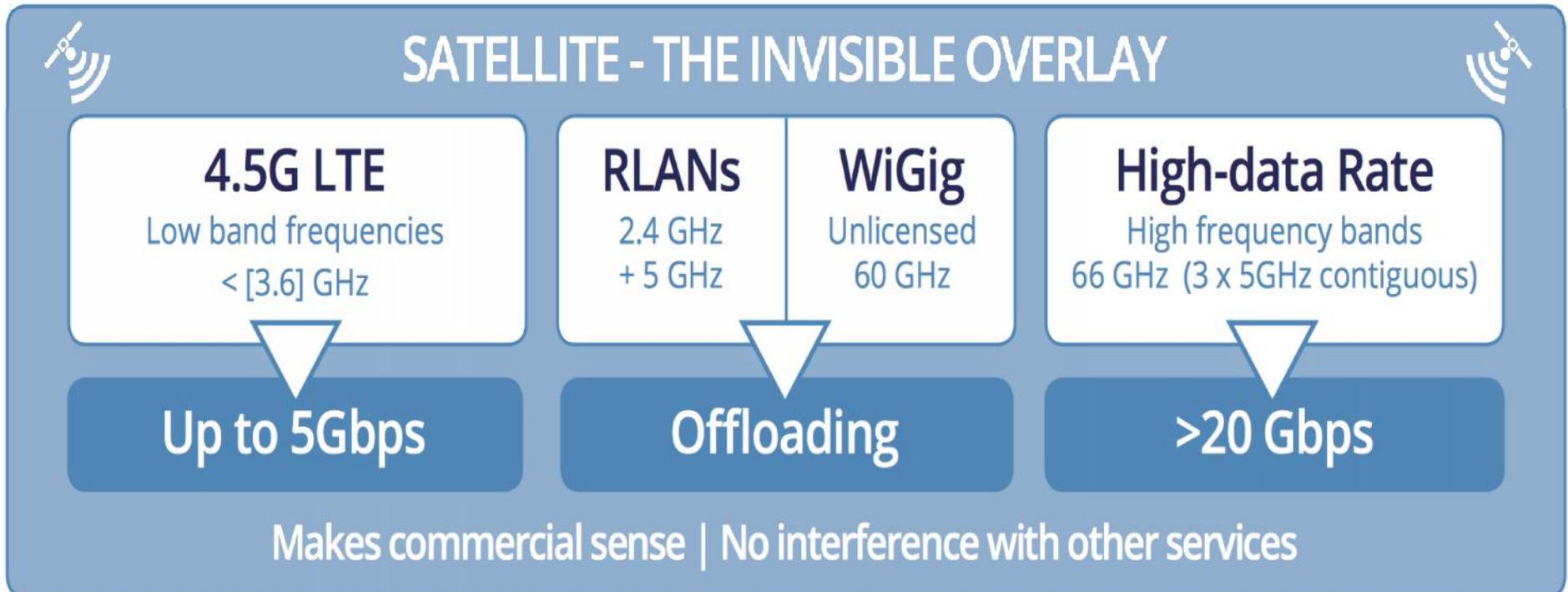
- Field test in UK • 70Ghz band • Data rates > **20Gbps** reached
- Use of contiguous available bandwidth in ‘high mm wave’ bands •

**Driven by ECONOMICS • Using EXISTING spectrum**

# Serving 5G - A System of Systems

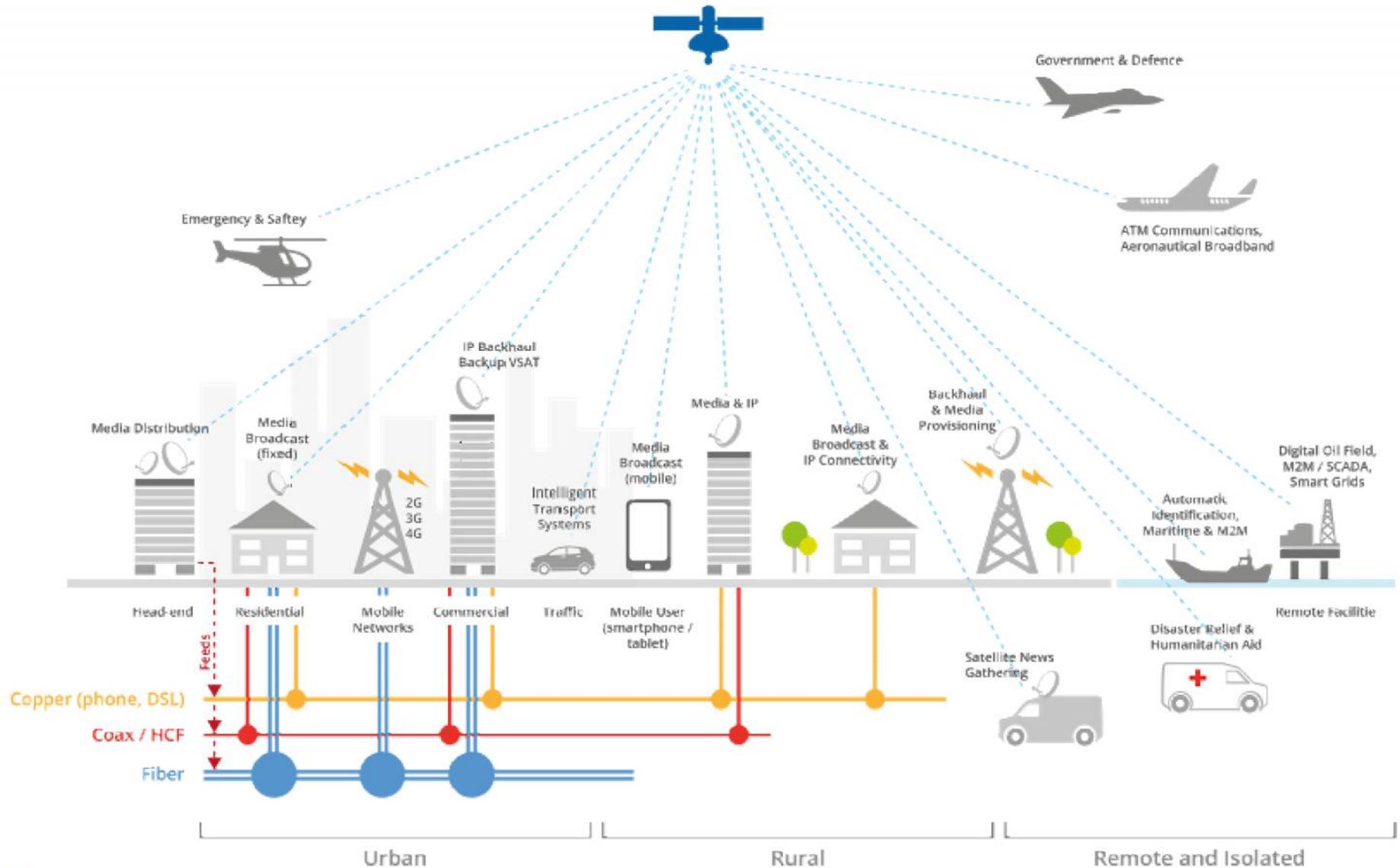
## Commercially & Technically Viable Solution

The 5G/IMT-2020 ecosystem will be dominated by 5G mobile devices using MULTIPLE RADIOS



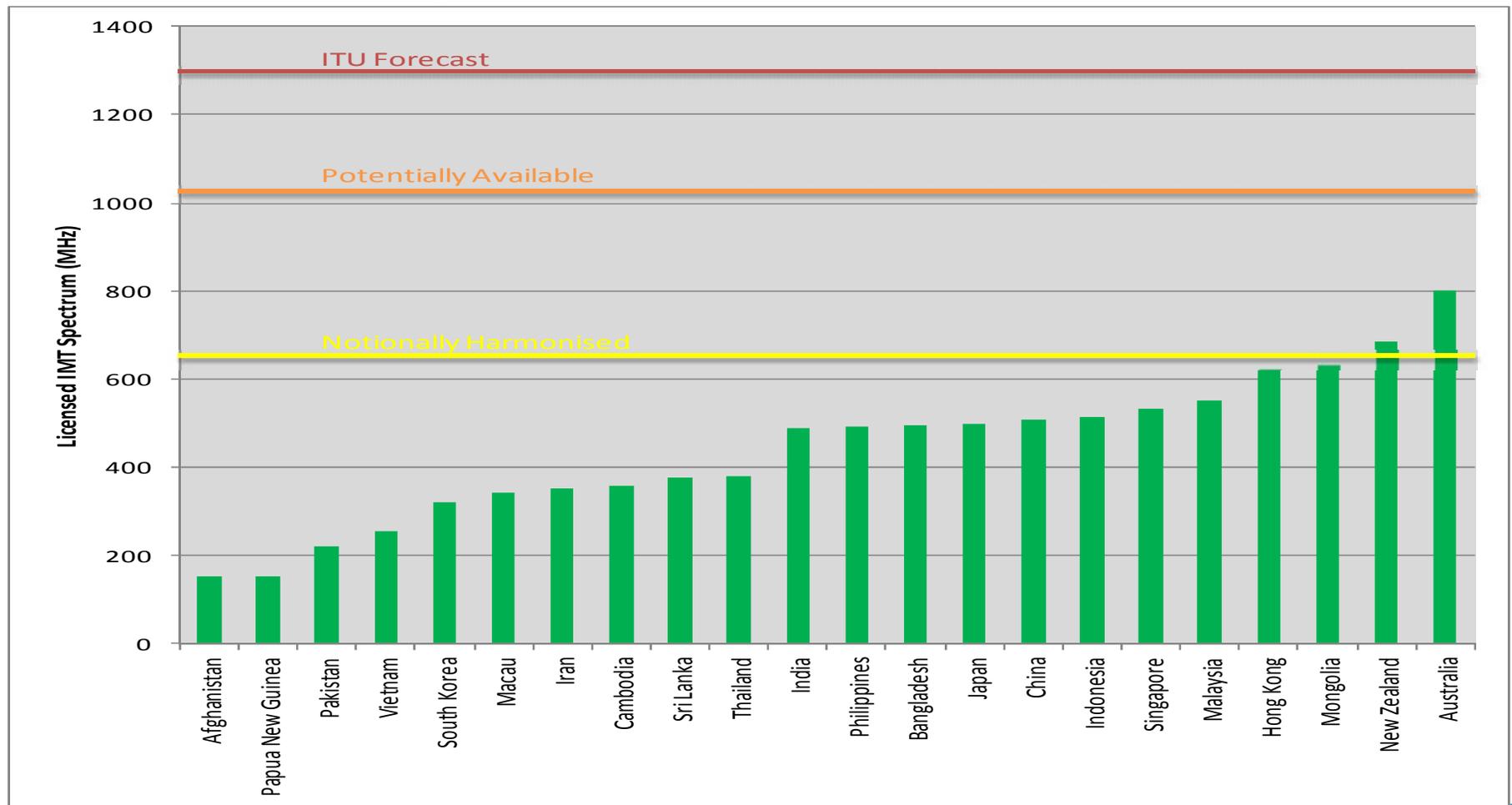


# Satellite Use Cases in 5G ecosystem



# What is the Real demand for Spectrum ?

- ◆ The amount of spectrum licensed to mobile operators in Australia/NZ is also high for the region
- ◆ But there is plenty more existing harmonised spectrum yet to be licensed (e.g. 700, 800, 2600 MHz)





# Spectrum Summary

---

## ◆ To summarise...

- Data usage is increasing in Asia
- Spectrum assignment to operators is ahead of regional / national requirements, but
- There is lots more ITU-harmonised spectrum available

## ◆ So is there a pressing need for further mobile spectrum until the existing allocations are fully utilised ?

## ◆ Some Asian countries are likely to be initial implementers of 5G

- In 700 MHz (due to be licensed soon)
- In existing 3.5 GHz spectrum (3.4 - 3.6 is already licensed)
- and mmWave bands,

## ◆ Some Asian countries are a strong supporter of 5G together with possible satellite integrated solutions

- To reach out to tens of millions beyond the reach of fibre and especially for rural/remote communities and small islands communities
- And should consider 5G spectrum without interfering with C-band/Ka-band aimed at Satellite services needed for providing broadband connectivity in various areas



**Thank you!**