

# Spectrum for 5G

**Hamid Reza KARIMI**

Standardisation & Industry Development  
Corporate Strategy  
2 October 2015

Dynamic Spectrum Access Networks (DySPAN 2015)

HUAWEI TECHNOLOGIES

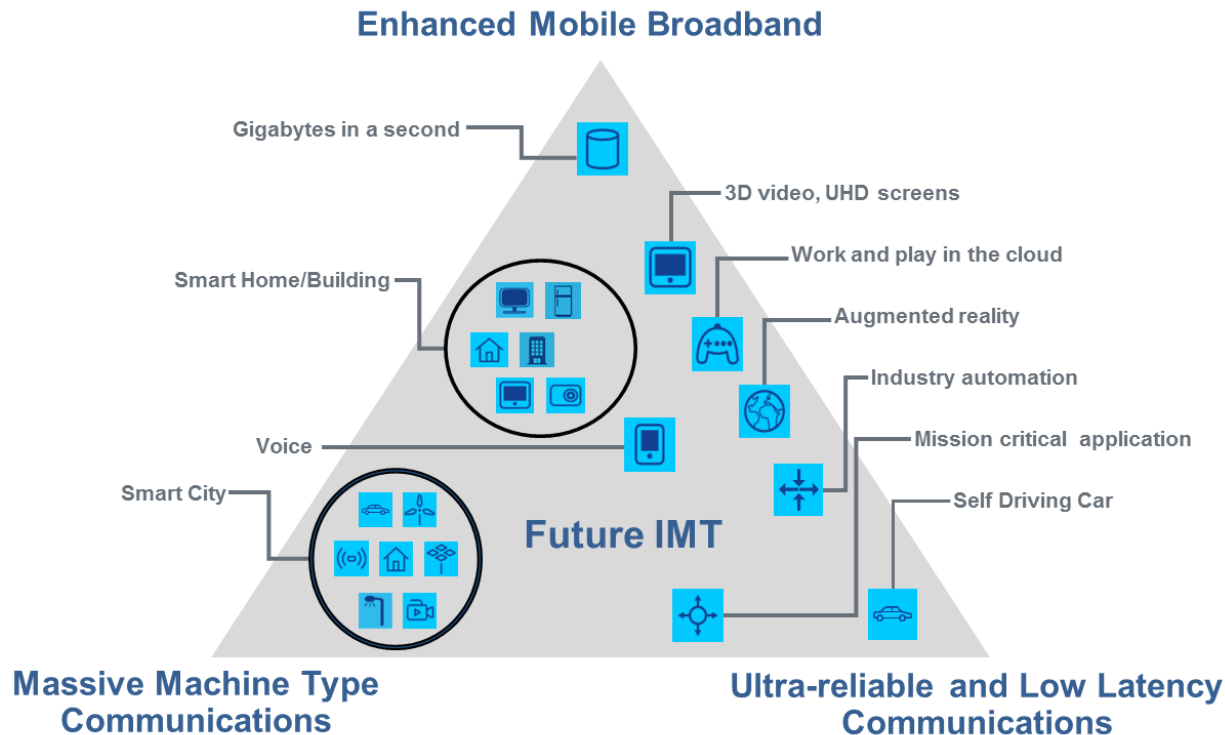


# 5th generation of mobile technology

Source: ITU-R<sup>1</sup>

- According to the ITU:

*“IMT for 2020 and beyond is envisaged to expand and support **diverse usage scenarios** and **applications** that will continue beyond the current IMT.”*



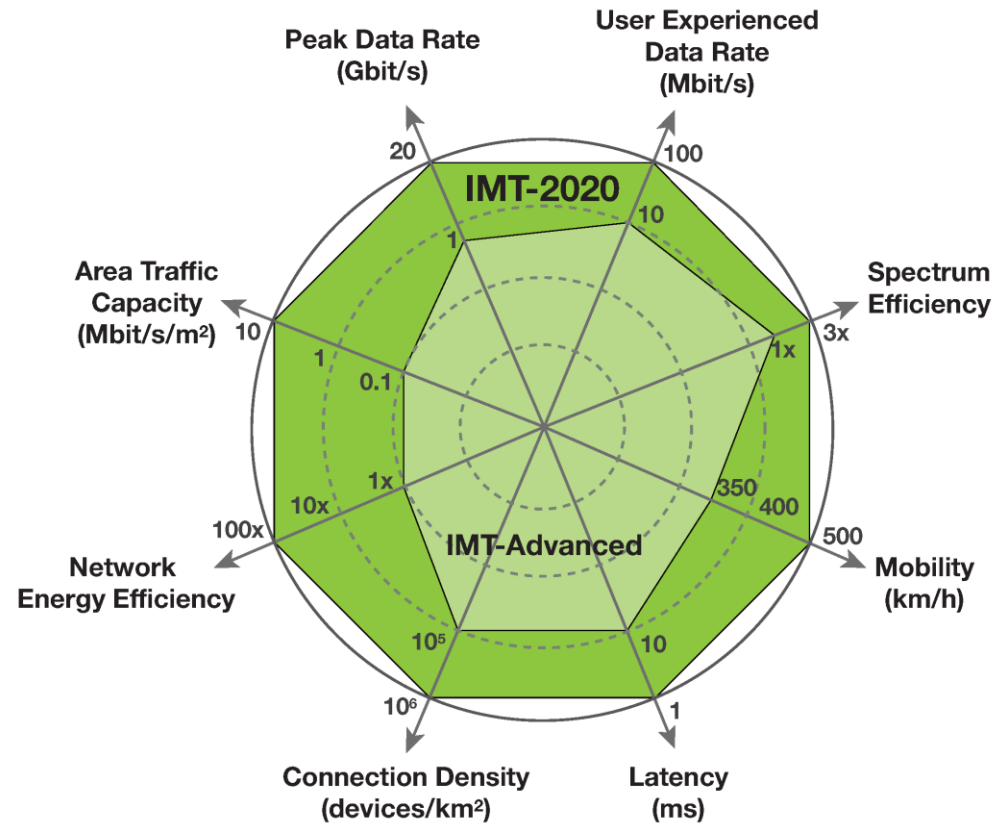
1 ITU WP-5D, “IMT Vision: Framework and overall objectives of the future development of IMT for 2020 and beyond,” June 2015.

# 5G capabilities

Source: ITU-R<sup>1</sup>

- Energy efficiency: 100× IMT-A
- Area traffic capacity: 10 Mbps/m<sup>2</sup>
- Mobility: 500 km/h
- Latency: 1 ms
- Connection density: 10<sup>6</sup> devices/km<sup>2</sup>
- User experienced data rate: 100-1000 Mbit/s
- Peak data rate: 20 Gbit/s
- Spectrum efficiency: 3× IMT-A





- 5G to be standardized at 3GPP from 2016.



<sup>1</sup> ITU WP-5D, "IMT Vision: Framework and overall objectives of the future development of IMT for 2020 and beyond," June 2015.

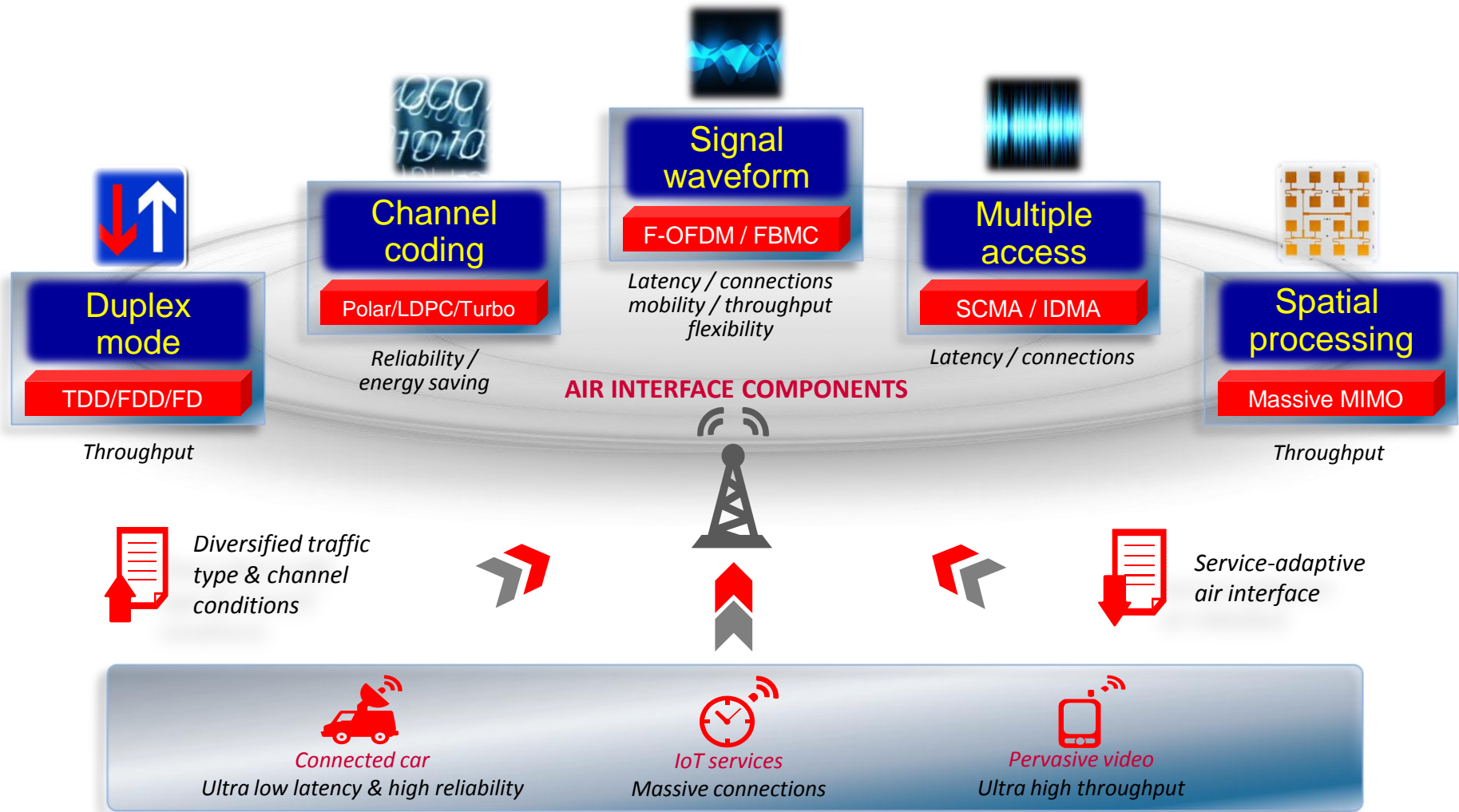
# Diverse challenges for 5G

## Summary

5G	Latency	Throughput	Connections	Mobility
	<b>1 ms</b> E2E Latency 	<b>20 Gbps</b> peak 	<b>1,000K</b> Connections /Km <sup>2</sup> 	<b>500 km/h</b> High-speed railway 
GAP	<b>10 x</b>	<b>20 x</b>	<b>10 x</b>	<b>1.5x</b>
LTE-A	<b>10 ms</b>	<b>1 Gbps</b>	<b>100K</b>	<b>350 Km/h</b>

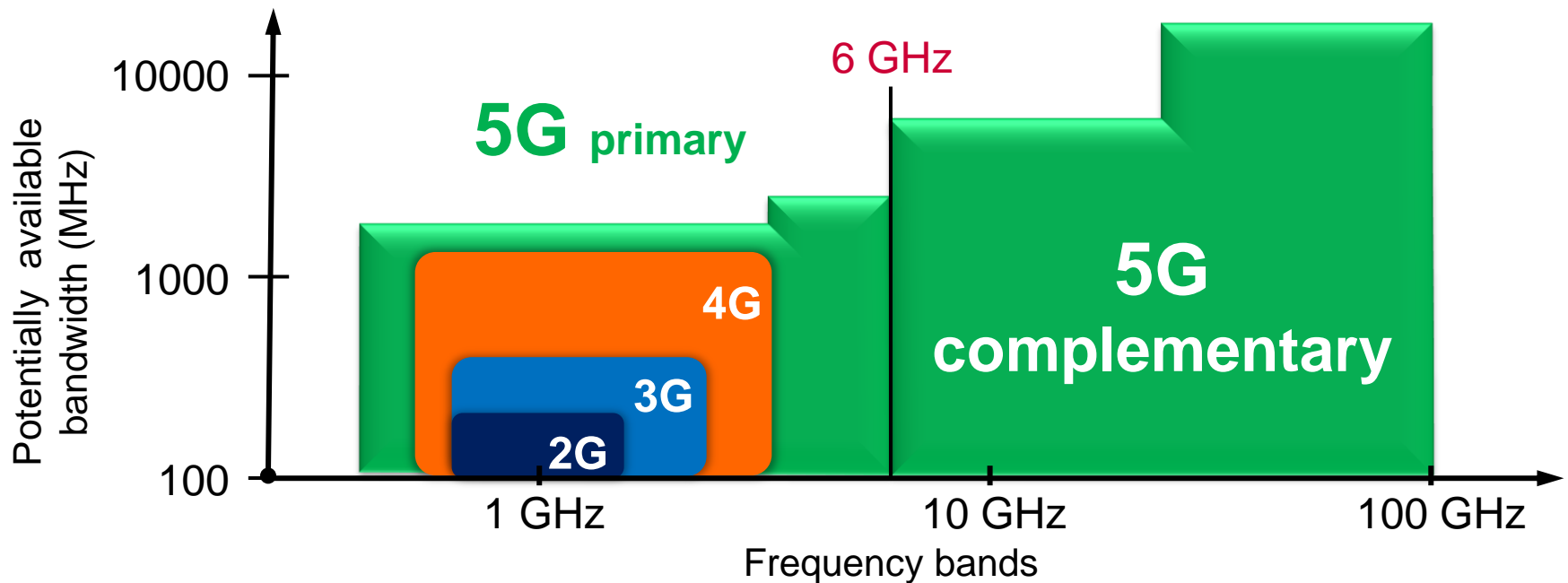
# A “new” air-interface

Sufficiently flexible to support a range of applications



# Spectrum landscape

- Spectrum **below 6 GHz** remains the **primary** range for IMT.
- Spectrum **above 6 GHz** is required for **larger bandwidths** to support demanding data rates expected from 5G.



# Conclusions (1)

- 5G is driven by the need to support a **variety** of **services**, from **enhanced MBB** (HD audio-visual content), to the **IoT** and machine type communications (e.g. for vertical industries).
- We encourage administrations to ensure availability of sufficient and suitable **5G** spectrum **below 6 GHz**. We consider **sub-700** and the **C-Band** to be important in this respect for **4G+** and **5G**.
- We encourage administrations to support the **study** of IMT designations in the **6-100 GHz** range, with the objective of ensuring **global harmonization**.

## Conclusions (2)

- We believe that the specific bands **above 6 GHz** to be considered for future **IMT** at **WRC-19** should consist of both **low** and **high** frequencies over the 6-100 GHz range.
- In particular, we believe that studies should include:
  - The **6-30 GHz** range, from the perspective of **superior propagation** characteristics.
  - The **E-Band** (71-76/81-86 GHz) from the perspective of the available **large** contiguous **bandwidths**.
- It is important for administrations to account for spectrum **sharing mechanisms** and **regulatory measures** to unlock spectrum on a shared basis. Availability of **information** on extent of existing use is paramount.



# Thank you

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