Spectrum Preparation for 5G and IoT Era

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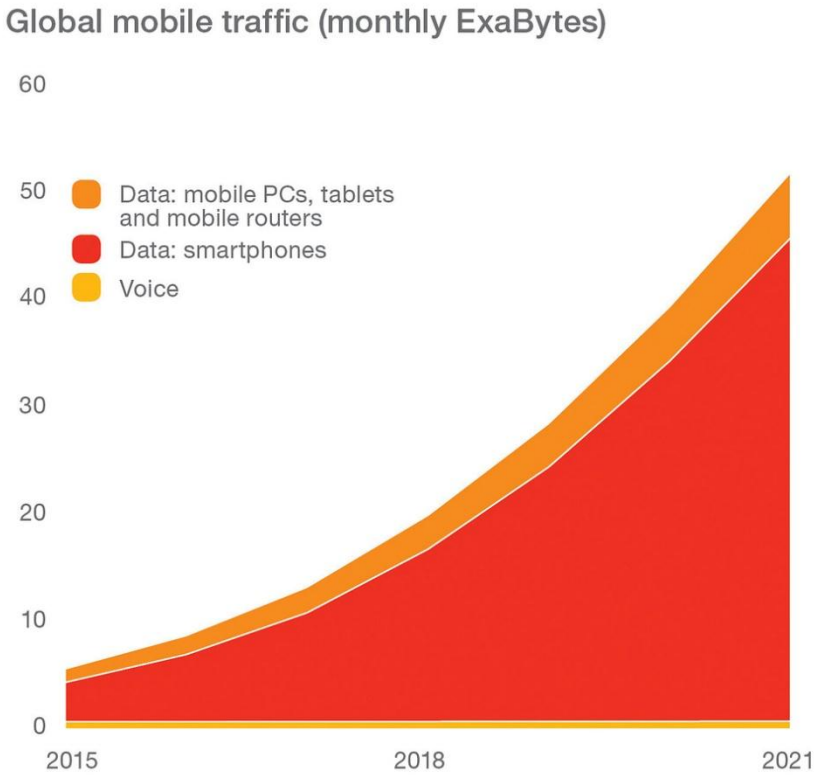
Outline

- **How the future could be**
- **New challenges arisen**
- **Viet Nam's preparation**

What The Future Could be

Data consumption grow fast



And it is mostly indoor

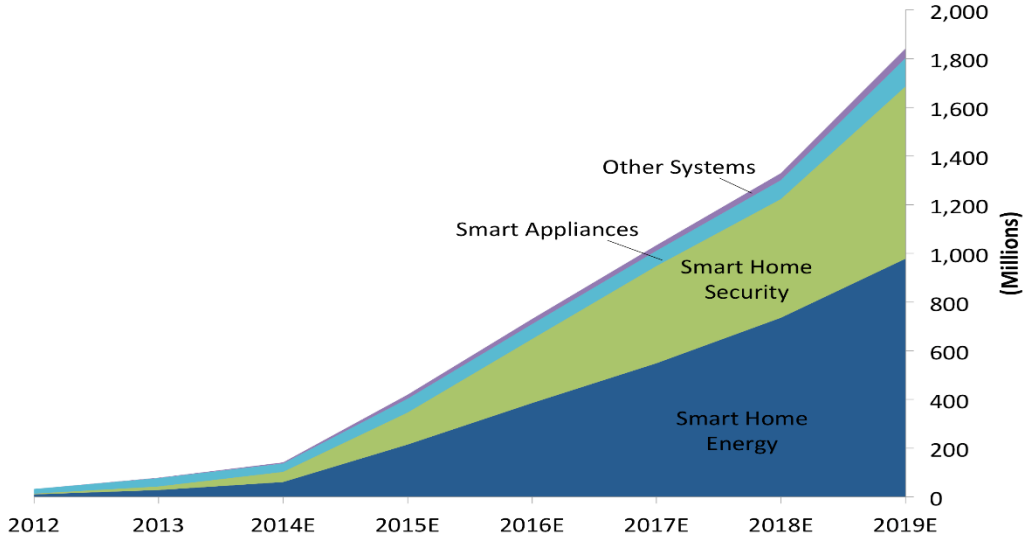
Time spent …

(Source: Strategy analytics)

- People spend **80-90%** of their time indoors
- Indoor: **80%** of data connections originate from indoors
- Outdoor: **20%**

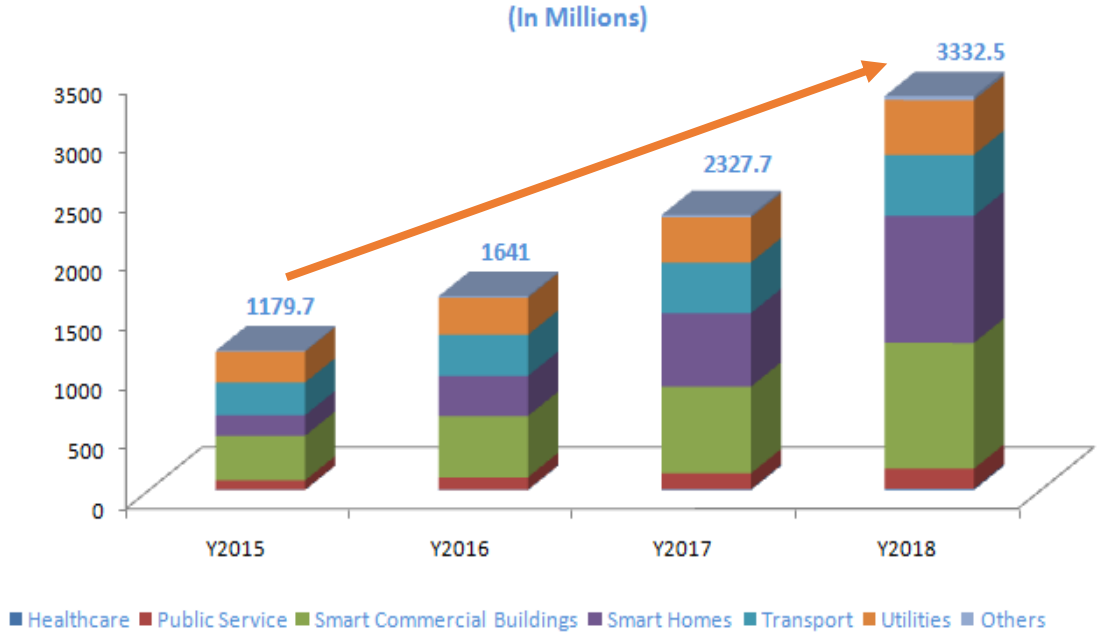
What The Future Could be

Things to be smart: Smart homes, smart cities, smart cars,…



Global connected home device shipments

Source: ABI Research, BI Intelligence

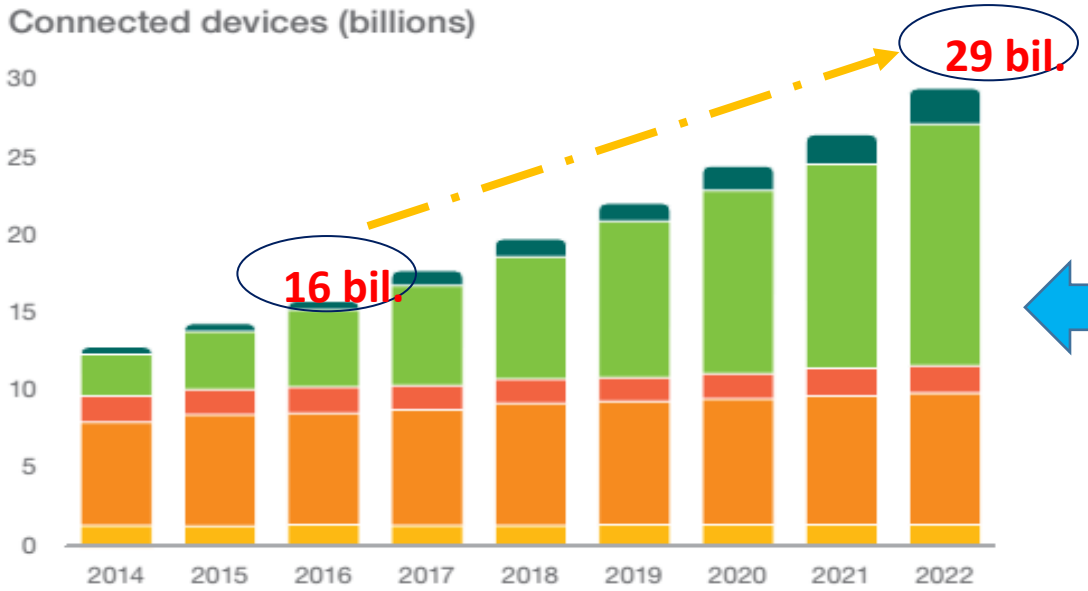


Connected things in smart cities 2015-2018

Source: Gartner

What The Future Could be

Devices more & more being connected



The connected devices growth from 2014-2022

	2016	2022	CAGR
Wide-area IoT	0.4	2.1	30%
Short-range IoT	5.2	16	20%
PC/laptop/tablet	1.6	1.7	0%
Mobile phones	7.3	8.6	3%
Fixed phones	1.4	1.3	0%
	16 billion	29 billion	10%

Source: Ericson, 2016

IoT connections:

- **2016: 35%**
- **2022: 63%, increased by13 mil IoT connections**

What The Future Could be

Last meter connections through wireless

Millions connections/km²

Spectrum Challenges Arisen For Such Future

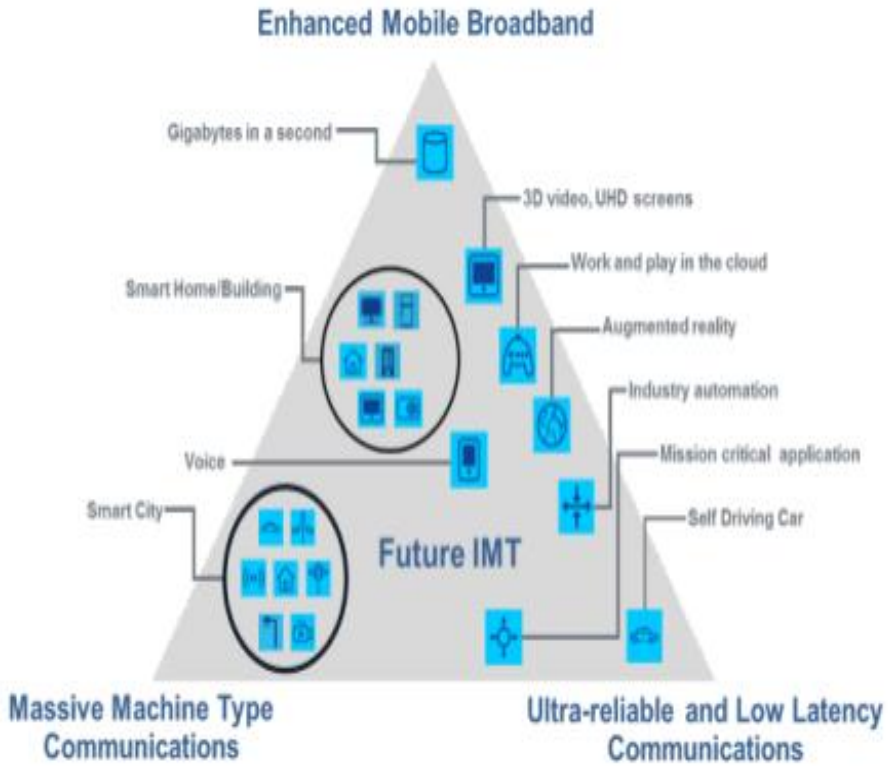
to satisfy data consumption demand

- **More spectrum for high data rate**
  - **High bands, larger bandwidths, low power, easily-reused for indoor**
  - **Lower bands, beamforming for outdoor and coverage**
- **Spectrum pricing not impose burden as more bandwidth to be consumpted**

Spectrum Challenges Arisen For Such Future

Things to be smart, devices to be connected

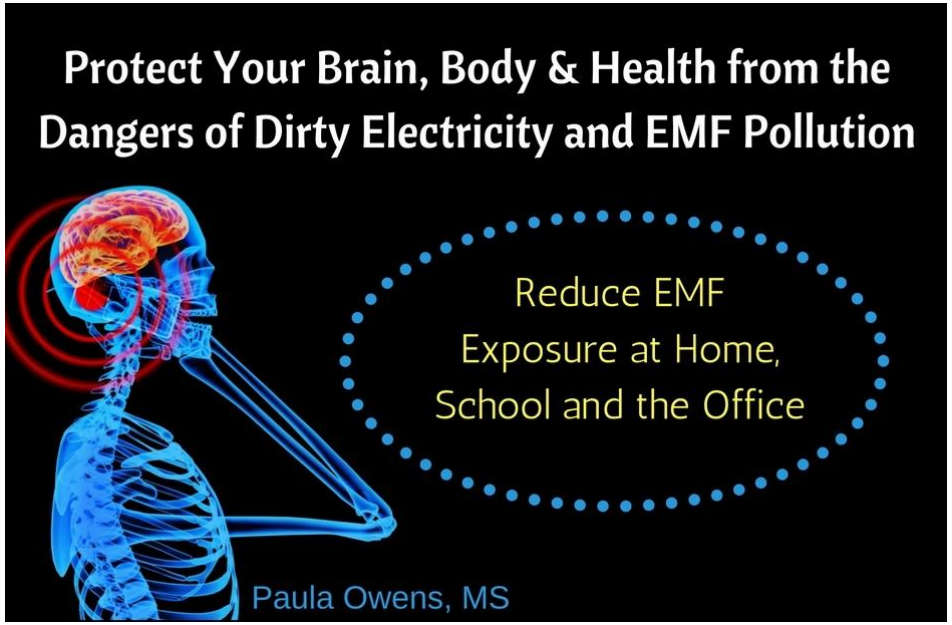
- **5G or 5G + others? → One size can't fit all**
  - **Spectrum should be prepared for both 5G and others**
- **Dedicated or unlicensed?**
  - **Both licensed and unlicensed spectrum needed**
- **More flexible licensing scheme also needed**



Spectrum Challenges Arisen For Such Future

Things to be smart, devices to be connected

EMC, EMF become more challenges and more efforts needed



Viet Nam's Preparation

for data growing era

- **Technology neutrality to allow refarming to new technologies**

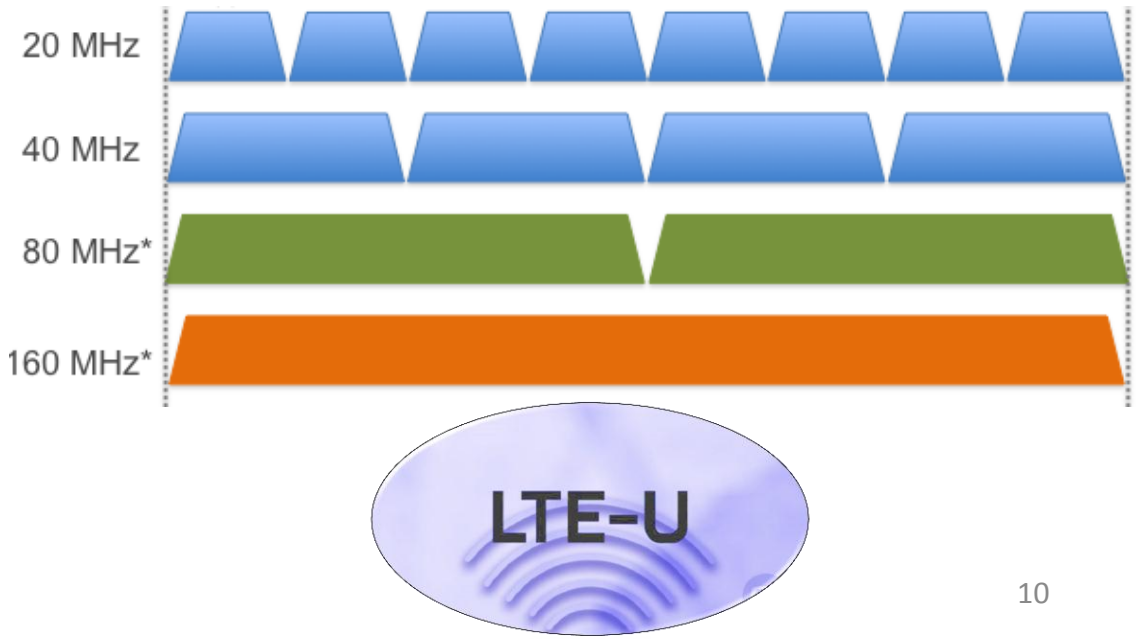
900 MHz: GSM, HSPA, LTE

1800 MHz: HSPA, LTE

2100 MHz: HSPA, LTE

50% spectrum charge reduction in 2.6 GHz

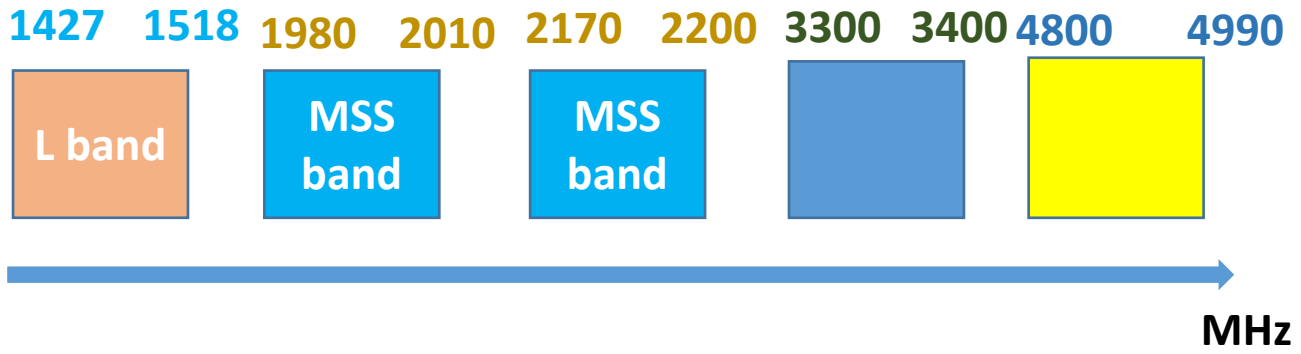
- **Wifi, unlicensed LTE in 5GHz**



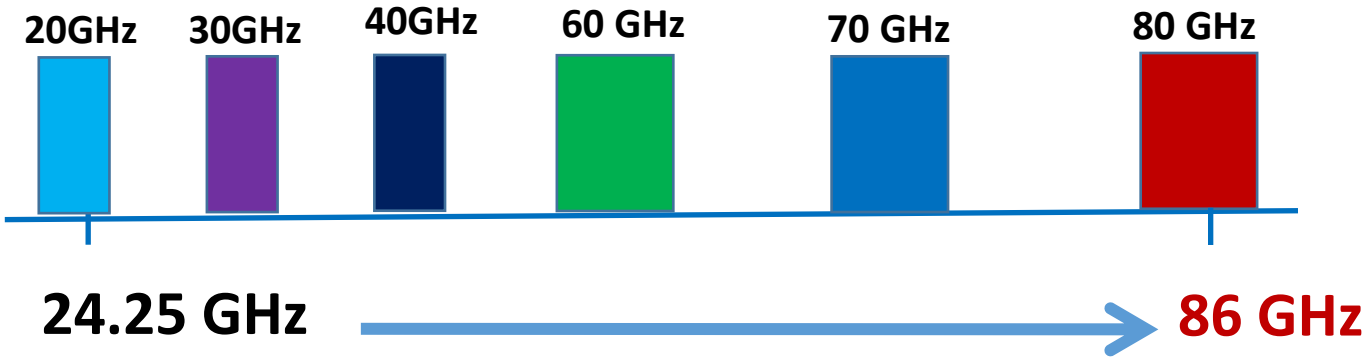
Viet Nam's Preparation

for data growing era

- **Adding more bands to IMT basket after WRC-2015**



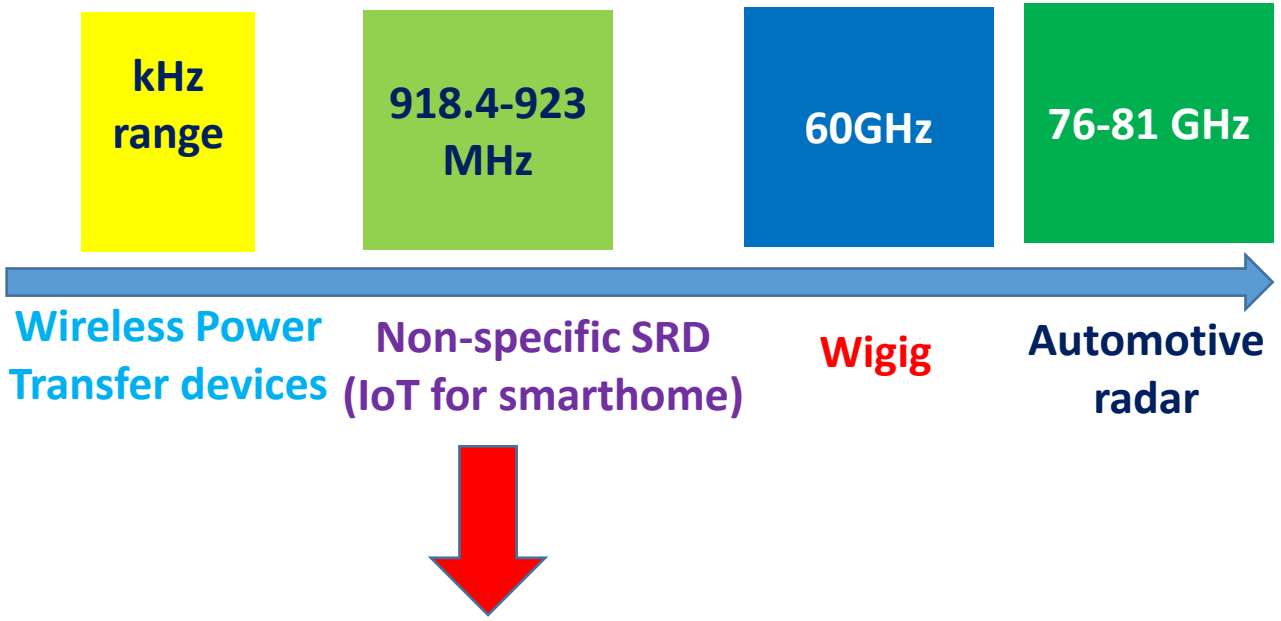
- **More bands for IMT under WRC-19 agenda**
  - **24 GHz is on focus**



Viet Nam's Preparation

for connected era

- **Adding spectrum/ regulation for Wigig**
- **Spectrum WPT, car radar, UWB**
- **IoT in 900 MHz + trial with Viettel for future regulation**



- **Trial tests needed to assess compatibility between high power IoT devices and cellular network**

Viet Nam' preparation for WRC-19

- 1 Chairman (WP5:Maritime, aeronautical and amateur services)
- 2-3 Drafting chairs

Viet Nam's participation:

- Vice-Chairman -Study Group 1
- Vice-Chairman - Study Group 5

Thank you for your attention !