

Mobile Broadband: The path to 5G

ITU/SPBPU SEMINAR FOR CIS AND EUROPE

“DEVELOPMENT OF THE MODERN RADIOCOMMUNICATION ECOSYSTEMS”

6-8 June 2018, St. Petersburg

Andy Hudson – Head of Policy





About the GSMA

THE GSMA
WAS FOUNDED IN
1987

15 OFFICES
WORLDWIDE



SHANGHAI



SAN FRANCISCO



BEIJING



SAO PAULO



NAIROBI



NEW DELHI



LONDON



DUBAI



ATLANTA



BRUSSELS



BARCELONA



HONG KONG



BRASILIA



BUENOS AIRES

Connecting everyone and everything to a #betterfuture



The mobile industry is the first to formally commit to the UN Sustainable Development Goals



The GSMA represents the interests of mobile operators worldwide



UNITING NEARLY
800
MOBILE OPERATORS



WITH ALMOST
300
COMPANIES
in the broader mobile ecosystem



The world's leading mobile industry events, Mobile World Congress and Mobile World Congress Shanghai, together attract

160,000+
people from across the globe each year

The GSMA works to deliver a regulatory environment that creates value for consumers by engaging regularly with:



MINISTRIES OF TELECOMS



TELECOMS REGULATORY AUTHORITIES



INTERNATIONAL & NON-GOVERNMENTAL ORGANISATIONS



CONNECTING
23,000+
Industry Experts

Exclusively for GSMA Members, InfoCentre² is your place to connect with a global community of industry experts

GSMA Working Groups provide frameworks and standards in commercial, operational and technical matters that help maintain and advance mobile industry ecosystems

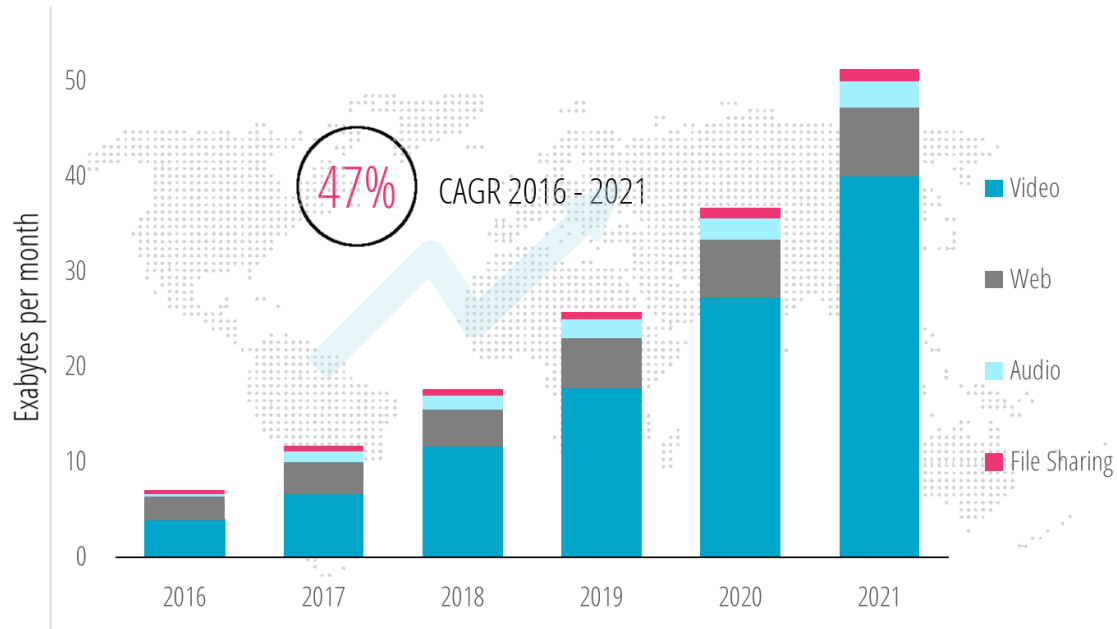


8.1 BILLION+

MOBILE CONNECTIONS
WORLDWIDE



Relentless growth in mobile data



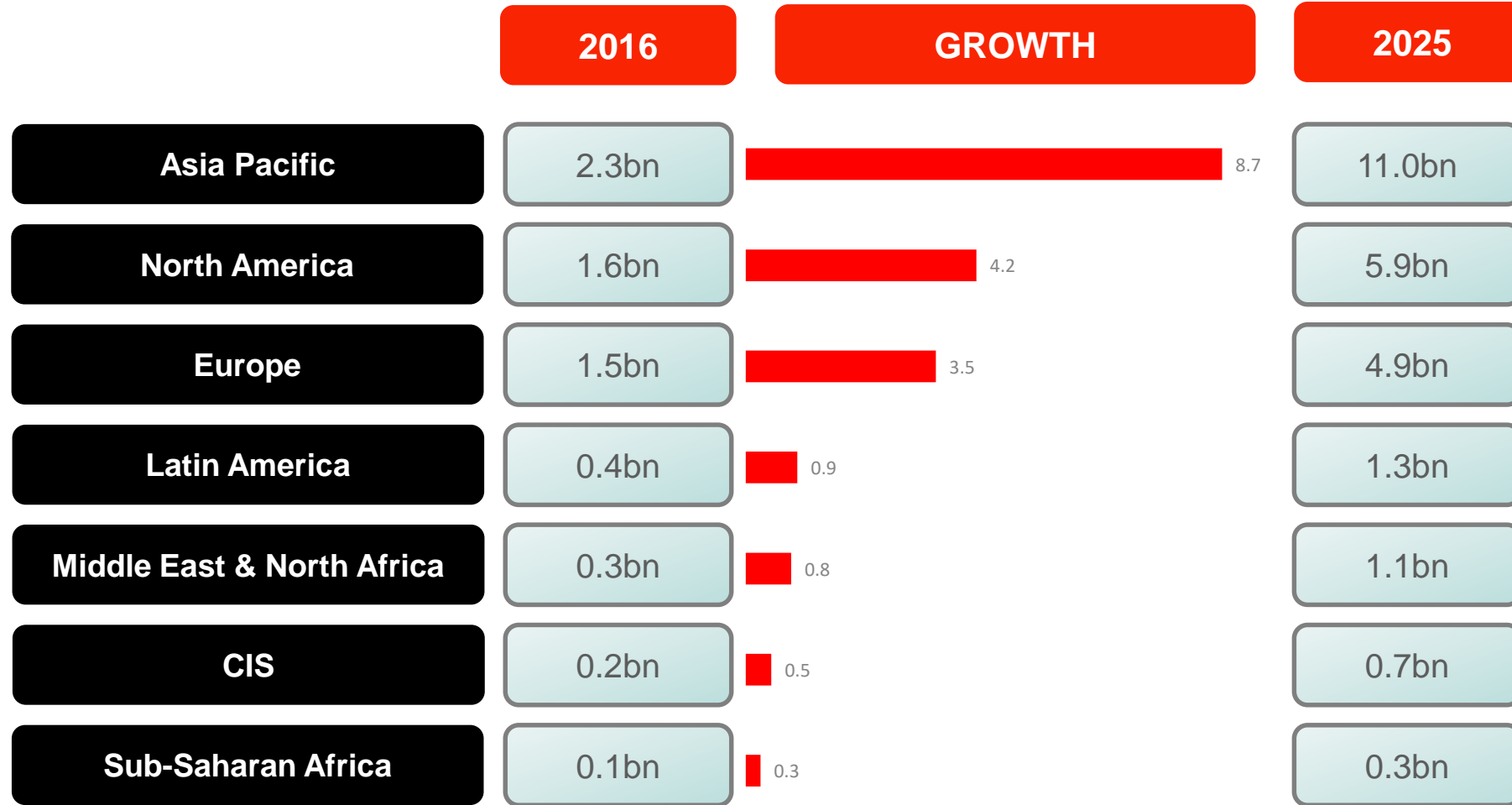
Graphics: GSMA | Source: Cisco VNI 2017

Data usage continues to grow

- Consumers appetite for data, especially video still on the rise
- Millions of “things” also expected to add to mobile data traffic
- Some estimations suggest that capacity of mobile networks will need to grow by a factor of 1,000,000



...and IoT is gaining momentum



Source: GSMA Intelligence



Mobile technology: Ideal solution for low power wide area (LPWA)







KEY FEATURES	KEY BENEFITS	CHOICE OF TECHNOLOGIES
Low Cost Module	3GPP Standards	LTE-M
Better Coverage	Global Coverage	NB-IoT
Long Battery Life	Secure	
Low Data Needs	Scalable	
2-Way Communication		



Mobile IoT Popular Applications




UTILITIES

-  Smart Grid
-  Power Meters
-  Water Meters
-  Smart Gas






LOGISTIC

-  Logistic Tracking
-  Pallet Tracking

INDUSTRIAL

-  Smart screwdriver
-  Smart shelving
-  Safety shoes






SMART CITIES

-  Smart Lighting
-  Waste Management
-  Smart Parking
-  Electric car charging station
-  Smart Bikes




AGRICULTURE & ENVIRONMENT

-  Water quality
-  Compost monitoring
-  Irrigation monitoring
-  Environmental monitoring
-  Live stock monitoring

CONSUMER

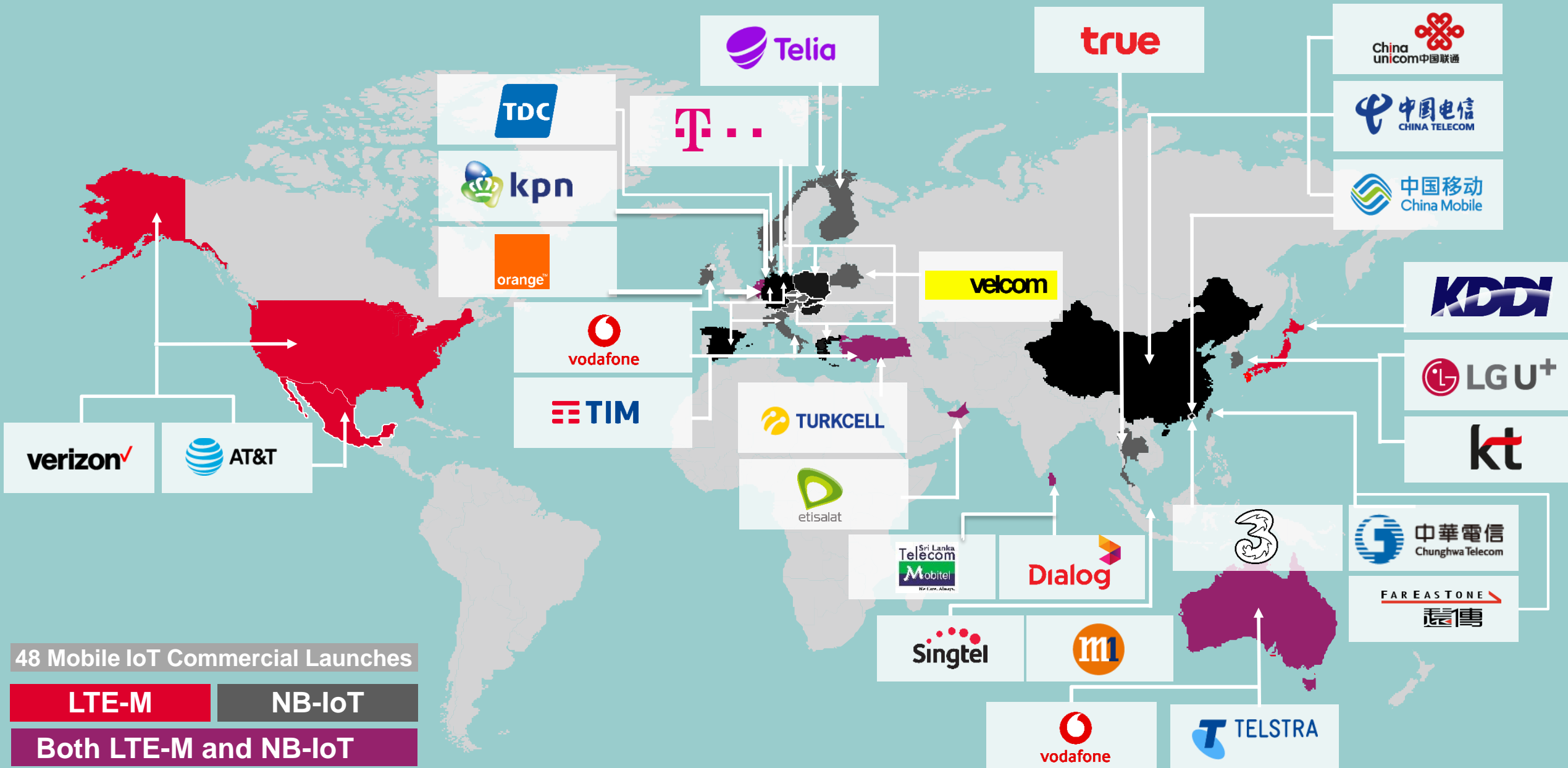
-  IoT button
-  General purpose tracker
-  Safety jackets
-  Wearable
-  Pet tracker

SMART BUILDING

-  Alarms
-  Smoke detectors
-  Flood detectors



MIoTT Global Coverage



48 Mobile IoT Commercial Launches

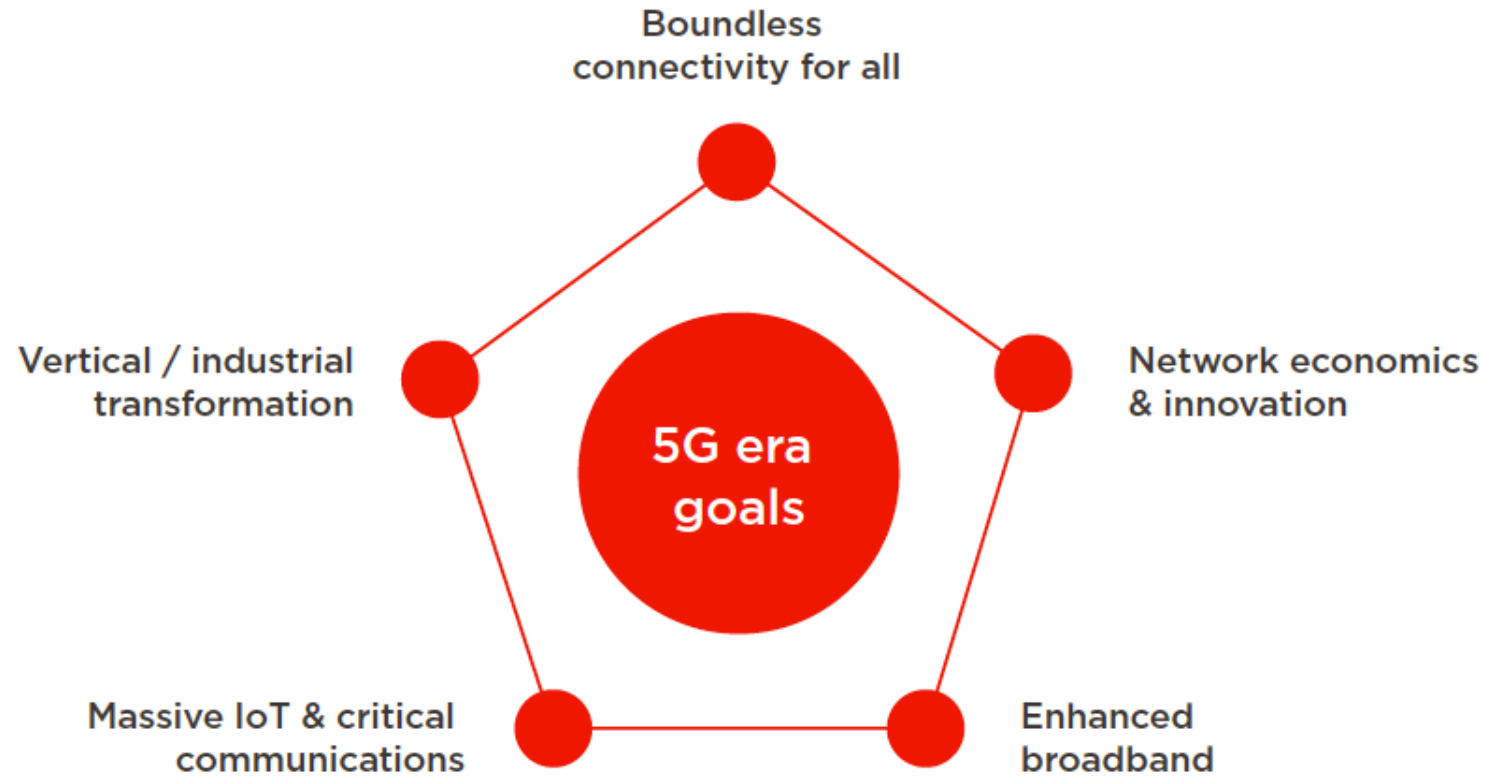
LTE-M

NB-IoT

Both LTE-M and NB-IoT



Five mobile industry goals with 5G





Mobile operators are getting ready for 5G

South Korea – KT has announced it will launch commercial services in 2019

China – China Mobile plans to deploy 10,000 base stations by 2020

Japan – NTT DoCoMo has announced it will launch commercial services in 2020



Europe – in July 2016, the major operators published a 5G manifesto, which indicated a target of launching 5G in at least one city in each of the member states by 2020

US – operators have been testing and developing fixed-wireless solutions using mmW technologies, and are expected to be among the first to launch commercial services

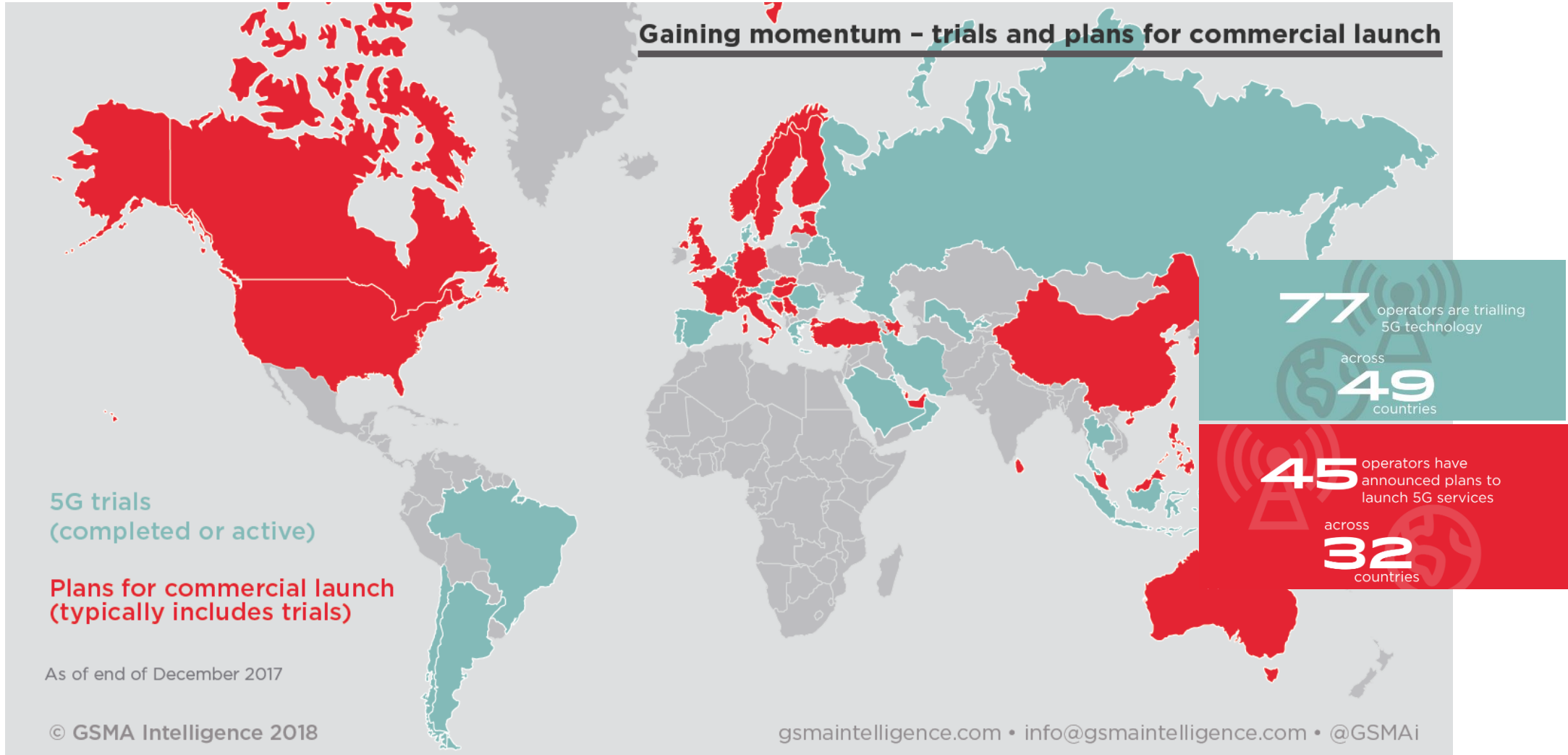
Middle East – Etisalat has indicated that it will launch a nationwide 5G network in time for Expo 2020 in the UAE

Source: GSMA Intelligence



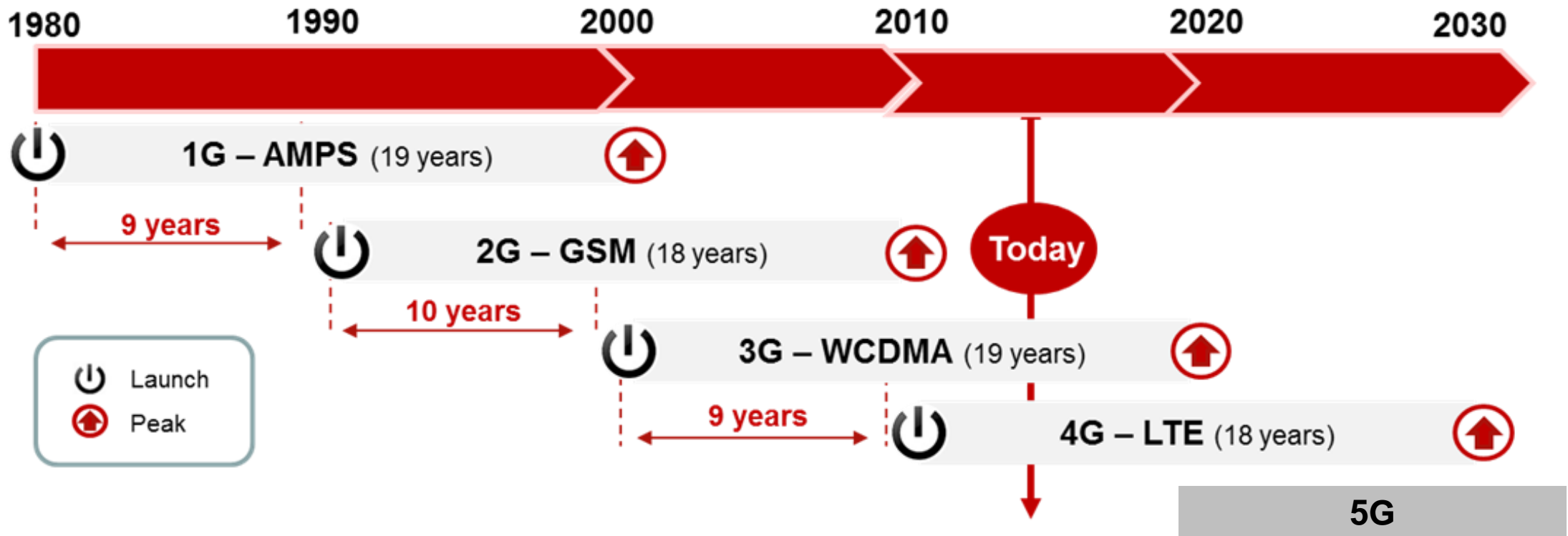
5G around the World

Gaining momentum - trials and plans for commercial launch



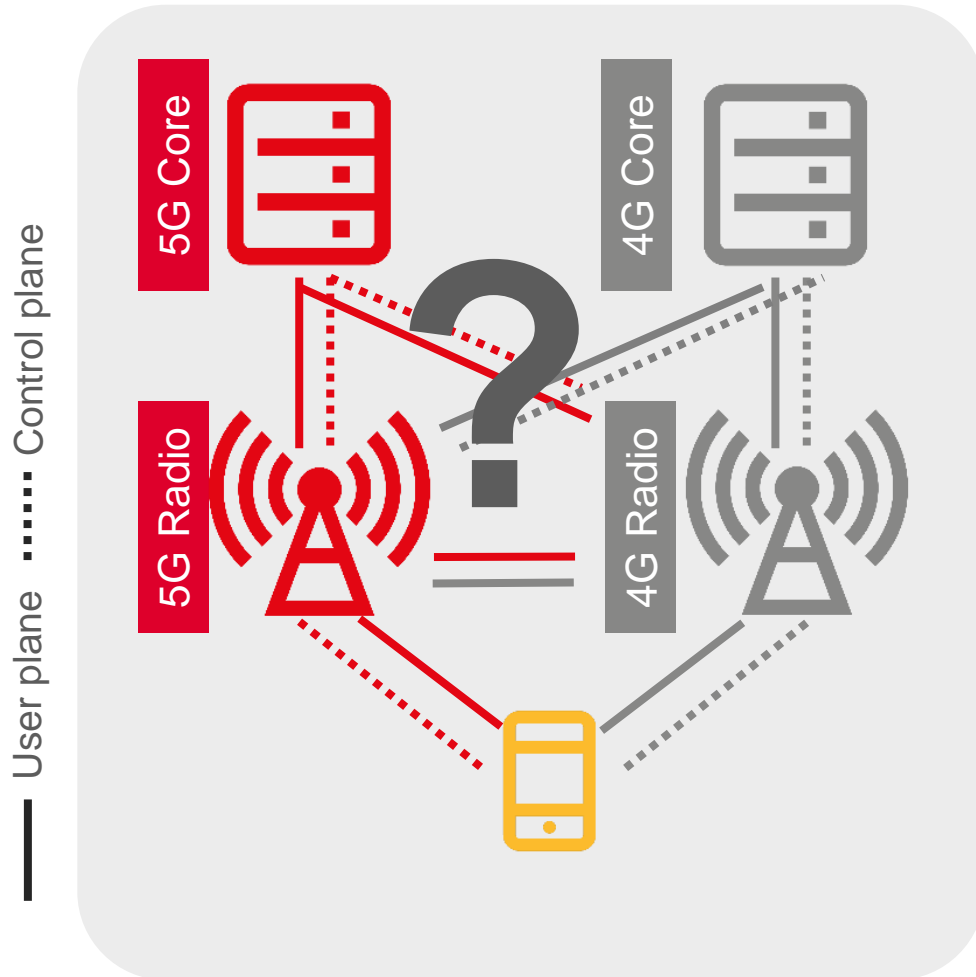


Investment cycle for 5G



“Intra-generation” evolution more significant than generational leap

Evolution or Revolution?



5G and 4G are expected to work together

- 3GPP specified in December 2017 a new 5G access network (NR) and by June 2018 will specify a new 5G core network (5GC)
- Operators will have several alternatives for introducing these two new components alongside their existing 4G infrastructure consisting of 4G radio (LTE) and 4G core (EPC)
- The “hybrid” configurations using both 5G and 4G elements are referred to as non-standalone

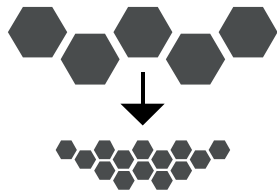
Mobile technologies that will impact 5G

Antenna



- Massive MIMO
- Active Antenna
- Multiple antenna models
- Long range deep coverage

Densification



- Self backhauling
- Energy Efficiency
- Adapts to transport requirements

New Radio



Frequency Band

- Below 1 GHz: for IoT and mobile broadband
- 1 GHz to 6 GHz: for mobile broadband
- Above 6 GHz: extreme mobile broadband

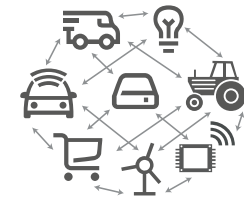
Virtualisation



NFV & SDN

- Virtualisation
- NFV and SDN to adapt the network
- Service enabler for network slicing

Massive Connectivity



- Optimisation for millions of connected devices
- Multi-year battery life
- Massive connectivity



Coverage comparison

	RAT/Band	Illustrative coverage comparison	Scenario
> 6 GHz	NR mmWave		Local coverage Peak data rate: 10Gbps
< 6 GHz	NR 3.5GHz mMIMO LTE 1800		Reuse of 1800 grid possible for Downlink Peak data rate: 1Gbps
< 1 GHz	NR 700MHz LTE 800 MHz		Deep indoor penetration Peak data rate: 100Mbps

NR gNodeB LTE eNodeB

Notes

- LTE not suited for mmWave deployment
- Higher propagation loss at 3.5GHz compensated by
 - Massive MIMO
 - Beamforming
- Limited availability of spectrum below 1GHz limits performance



5G requires significant amounts of spectrum

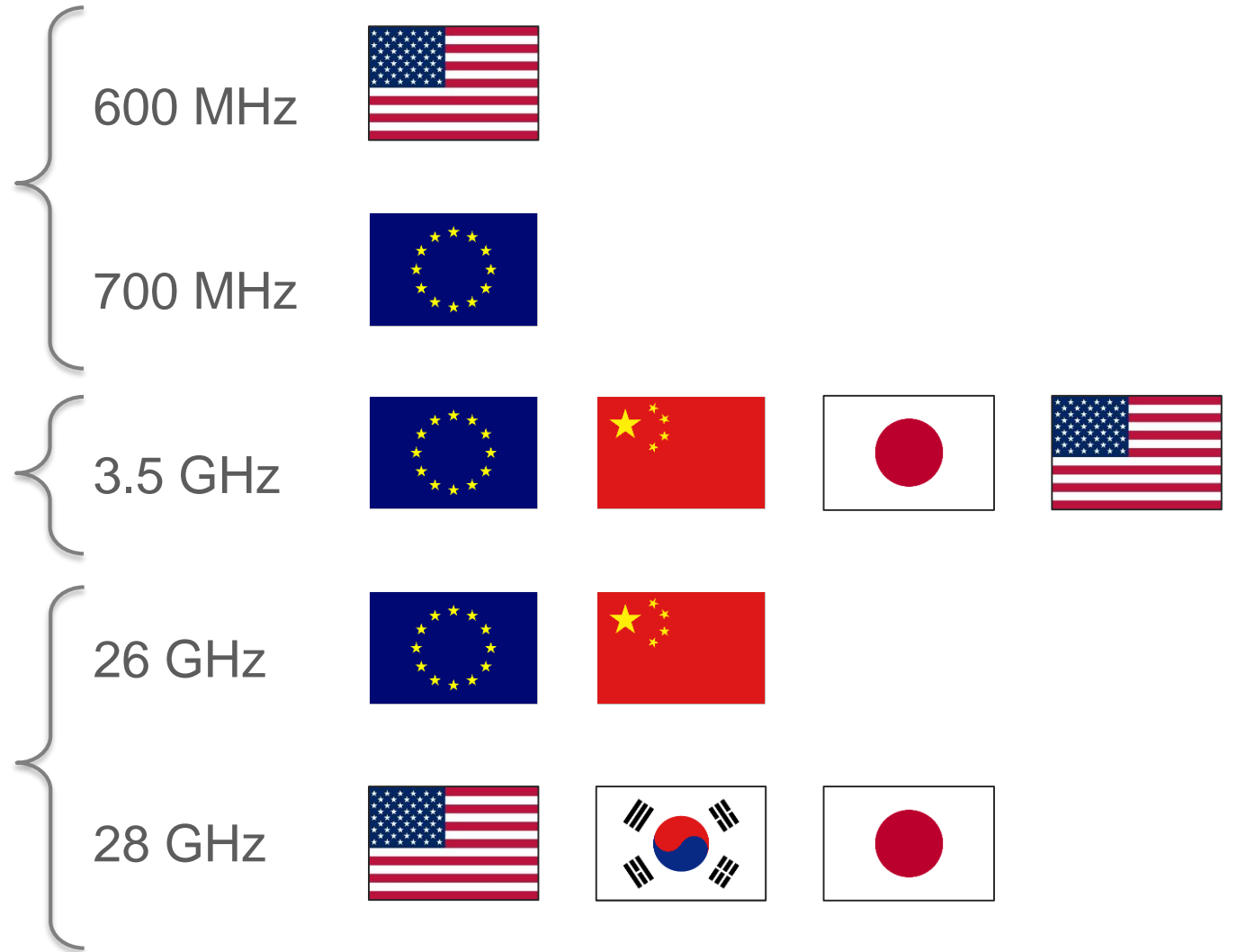
- Significant new **globally harmonised** mobile spectrum is needed to ensure 5G services meet future expectations and deliver on the full range of potential capabilities

- Spectrum blocks *per operator* need to be sufficiently wide to allow the data throughput needed for 5G
 - ~ 50 to 100 MHz in mid-band spectrum
 - ~ 500 MHz to 1 GHz in mmWave spectrum



5G spectrum – an international summary

- The **below 1 GHz** range will be characterised by reframing old GSM/LTE frequencies like the 900/800/700 and potentially the new 600 MHz in some markets
- The **1 GHz – 6 GHz** range will initially look predominantly at the C-Band
- **Above 6 GHz** frequencies are more fragmented globally in the 26 GHz and the 28 GHz bands, but tuning ranges could help to bridge the gap initially



WRC-19 AI 1.13 bands above 24 GHz

➔ 24.25-27.5 GHz

31.8-33.4 GHz

➔ 37-43.5 GHz

45.5-50.2 GHz

50.4-52.6 GHz

66-76 GHz

81-86 GHz



Millimetre wave spectrum is essential for the future of 5G

The road to success in four steps



Set modest reserve prices and annual fees, and rely on the market to set prices



License spectrum as soon as it is needed, and avoid artificial spectrum scarcity



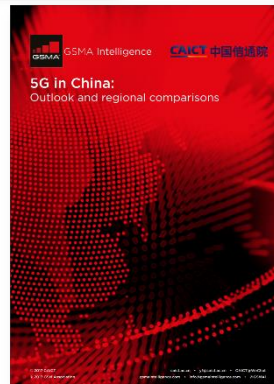
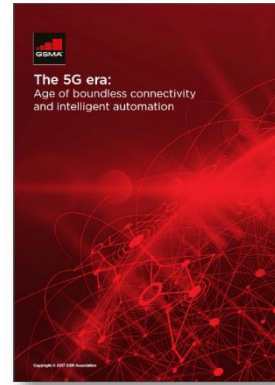
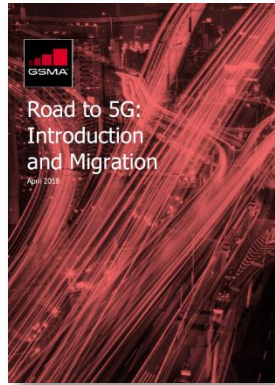
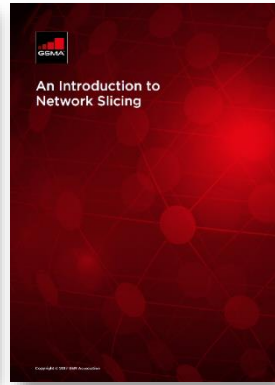
Avoid measures which increase risks for operators



Publish long-term spectrum award plans that prioritise welfare benefits over state revenues.

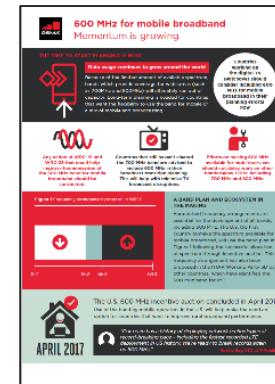
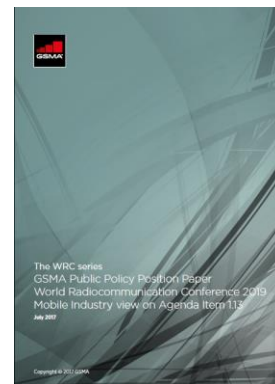
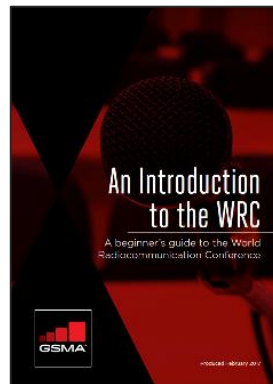


References: 5G





References: WRC-19



<https://www.gsma.com/spectrum/wrc-series>