

Demystifying 5G

RIPE NCC – Menog 16

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Agenda

- Defining what 5G is
- Key Drivers / Technology Requirements
- Use Cases
- What 5G isn't
- Implications of 5G on Mobile Operators

- The IoT business background
- The IoT Ecosystem
- The IoT Data Flow

- Roadmap
- Define the major players
- Where do we stand from all of this?

IoT



Evolution beyond mobile Internet

Generation	Primary services	Key differentiator	Weakness (addressed by subsequent generation)
1G	Analogue phone calls	Mobility	Poor spectral efficiency, major security issues
2G	Digital phone calls and messaging	Secure, mass adoption	Limited data rates - difficult to support demand for internet/e-mail
3G	Phone calls, messaging, data	Better internet experience	Real performance failed to match hype, failure of WAP for internet access
3.5G	Phone calls, messaging, broadband data	Broadband internet, applications	Tied to legacy, mobile specific architecture and protocols
4G	All-IP services (including voice, messaging)	Faster broadband internet, lower latency	?

Source: GSMA Intelligence

Two views of 5G exist today:

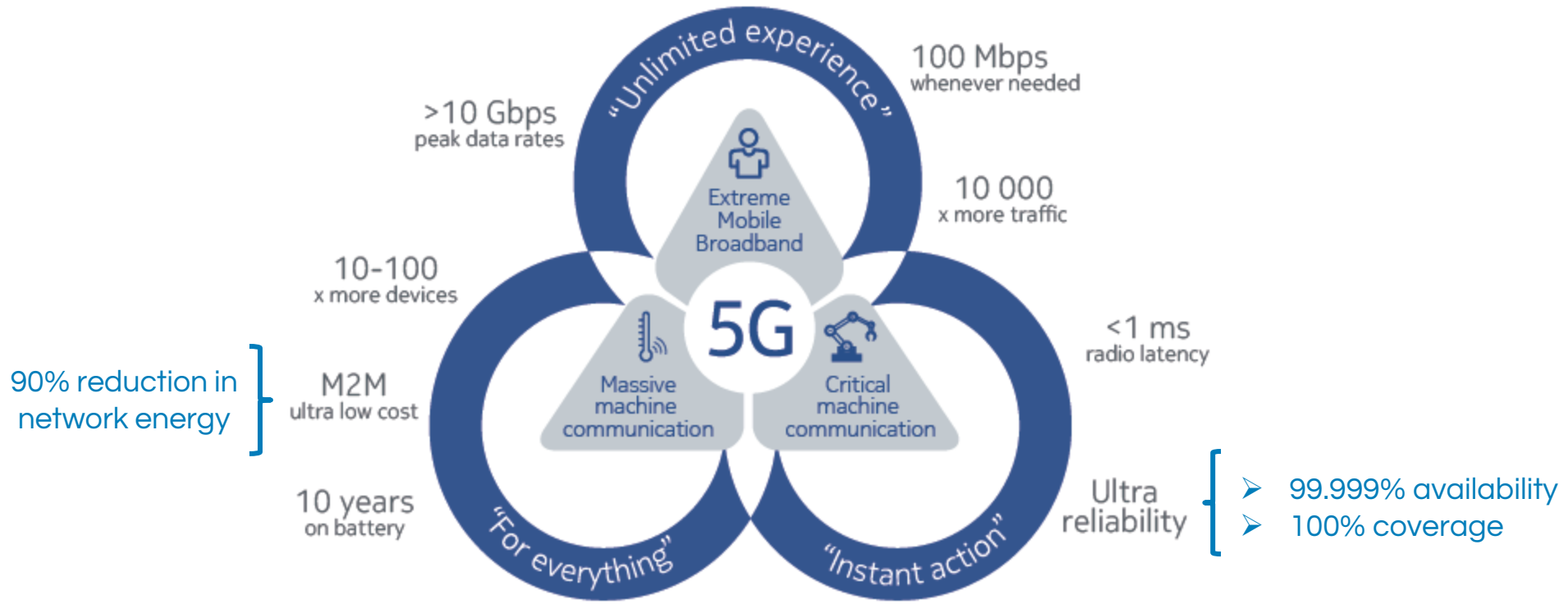
➤ View 1 / The hyper-connected vision

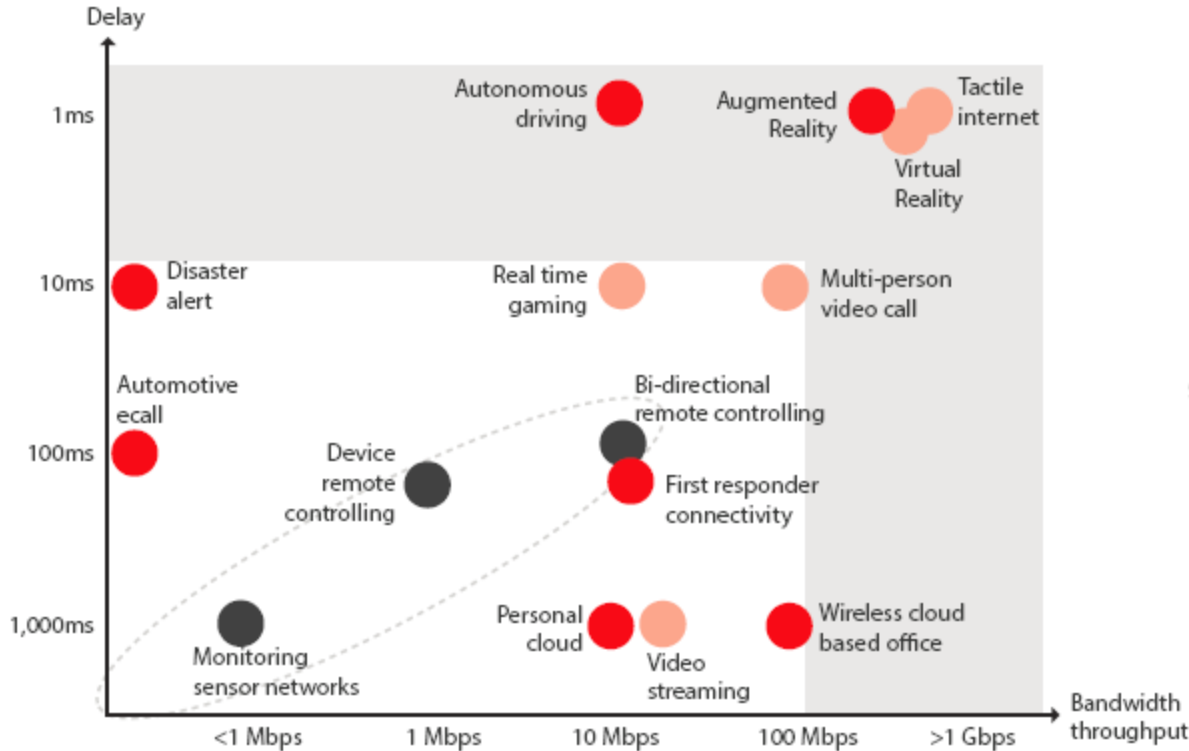
- Blend of pre-existing technologies (2/3/4G, WiFi, etc.) for higher coverage and availability
- Key differentiator being greater connectivity as an enabler for M2M and IoT
- May include a new radio technology to enable low power, low throughput field devices

➤ View 2 / Next-generation radio access technology

- More of a traditional 'generation-defining' view
- specific targets for data rates and latency being identified
- Easier determination of whether a technology is 5G or not

However, the two views described are regularly taken as a single set and hence views are grouped together





□ Services that can be delivered by legacy networks

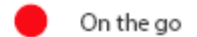
■ Services that could be enabled by 5G



Fixed



Nomadic



On the go



M2M connectivity

The rate of adoption of 5G and the ability of operators to monetize it will be a direct function of the new and unique use cases it unlocks

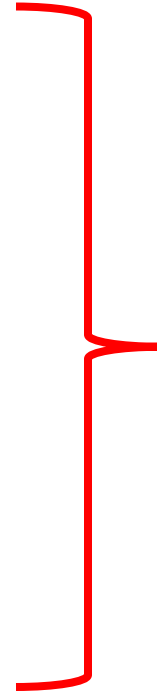
Source: GSMA Intelligence

- Virtual Reality/Augmented Reality/Immersive or Tactile Internet
- Machine-to-machine connectivity (M2M)
- Autonomous vehicles
- Remote Robotics / Surgeries
- Industry control / automation

What 5G isn't!!!

Some technologies deployments and infrastructure enhancements are being placed under the umbrella of 5G:

- LTE-Advanced technologies
- Network function virtualization (NFV)
- Software defined networks (SDN)
- Heterogeneous networks (HetNets)
- Low power, low throughput (LPLT) networks

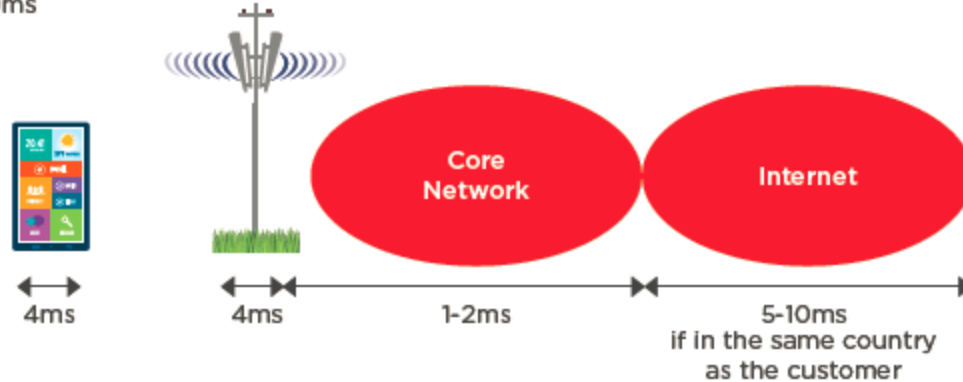


5G !!!

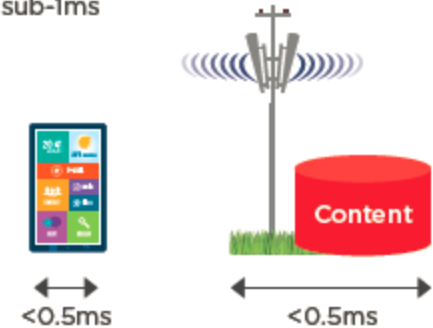
Operators need to overcome a series of challenges if the 5G benefits are to be realized

- 5G spectrum and coverage implications
- <1 millisecond latency

LTE - min 10ms



5G service sub-1ms



From a gadget...

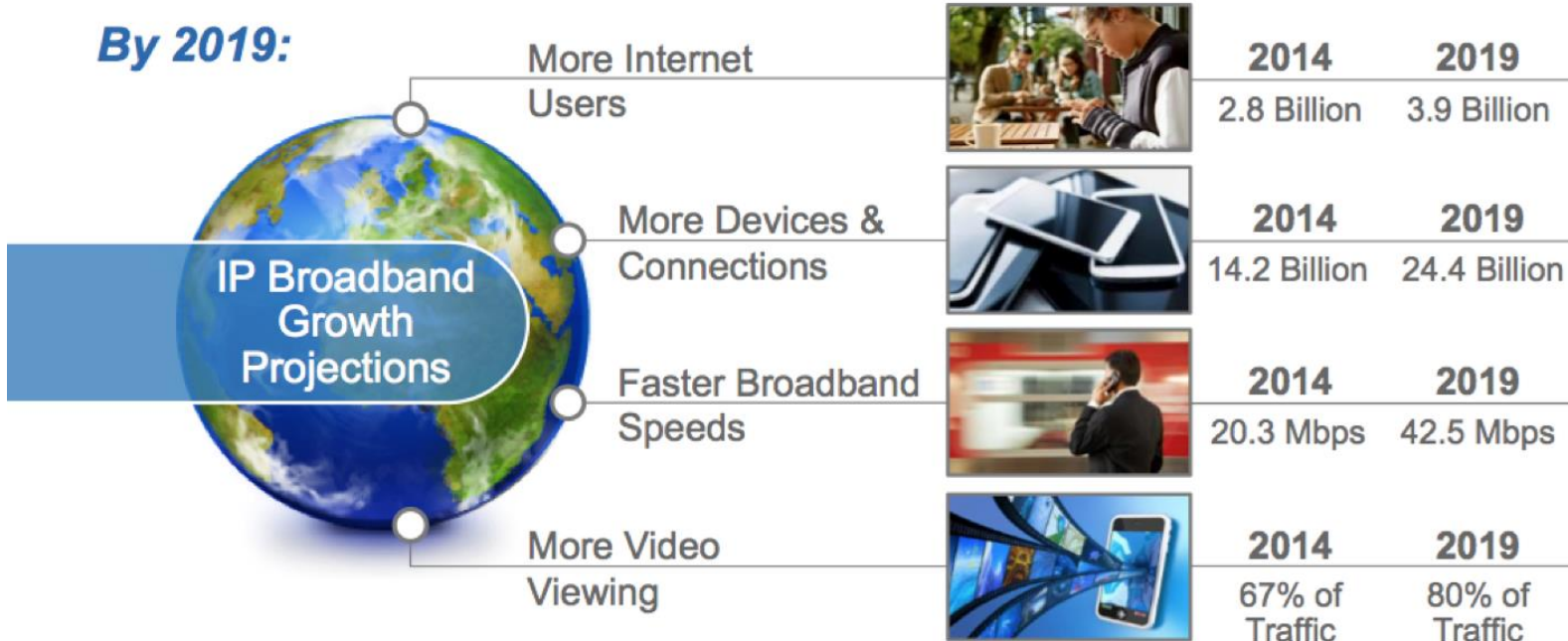
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Global IP Traffic & Service Adoption Drivers

By 2019:



2010



2015

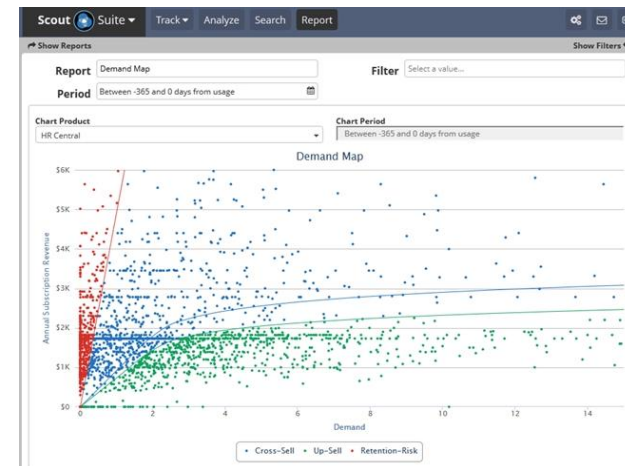
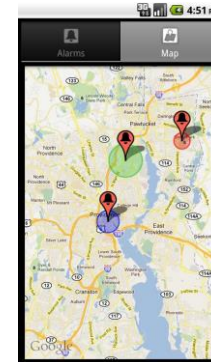
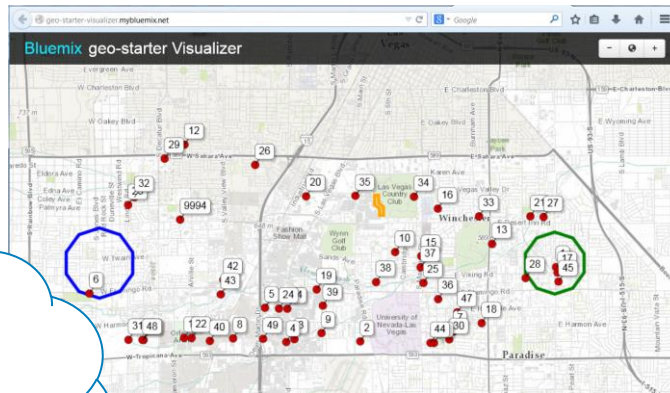


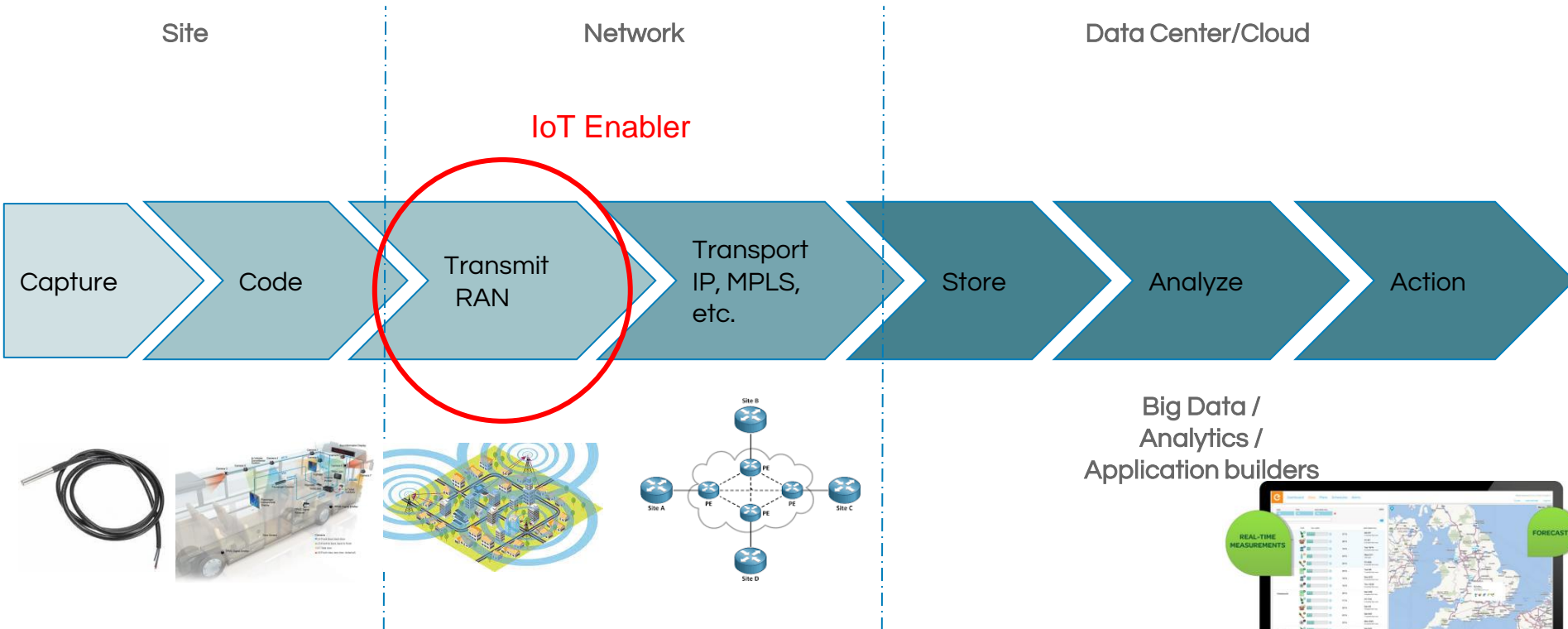
The IOT Paradigm

How do we get there?

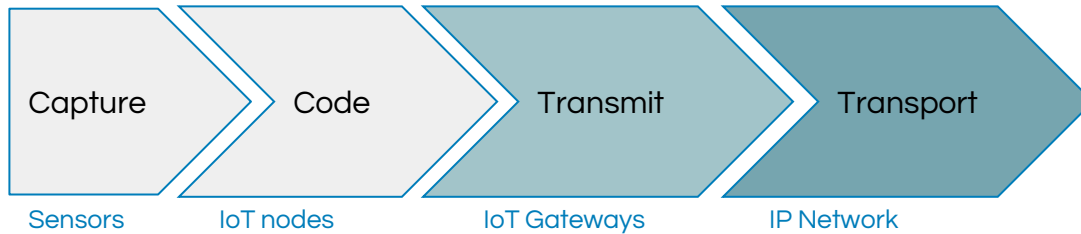


HOW?





Radio Access Network: Transmitting the M2M chatter

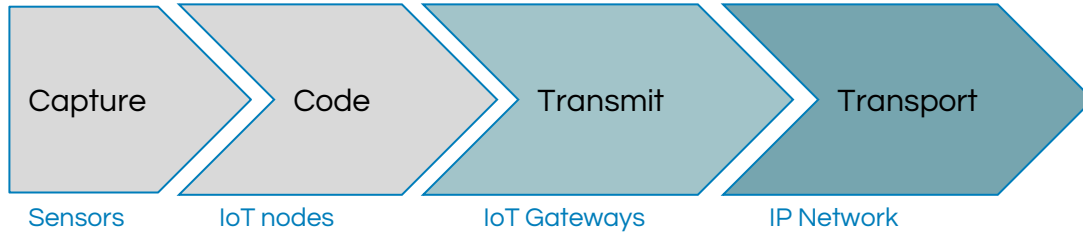


Collecting data on a massive scale while preserving the sensor battery life is a challenge;
Fierce competition for the Low Power Wide Area (LPWA) technology dominance;

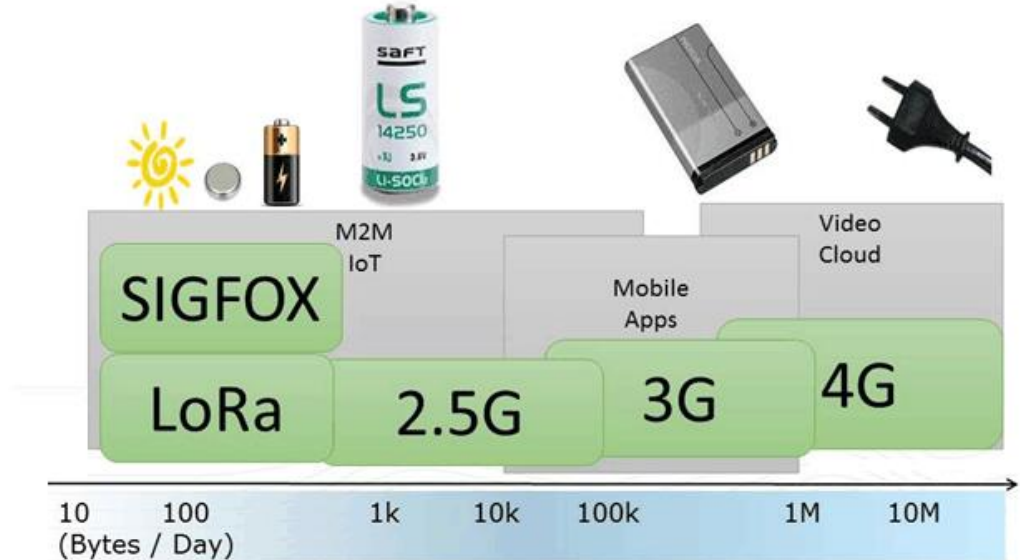
The "LPWAR": let's look at the market alternatives in this area:

- Sigfox
- LoRaWAN
- LTE-M
- Wifi + 3/4G
- Zigbee + 3/4 G

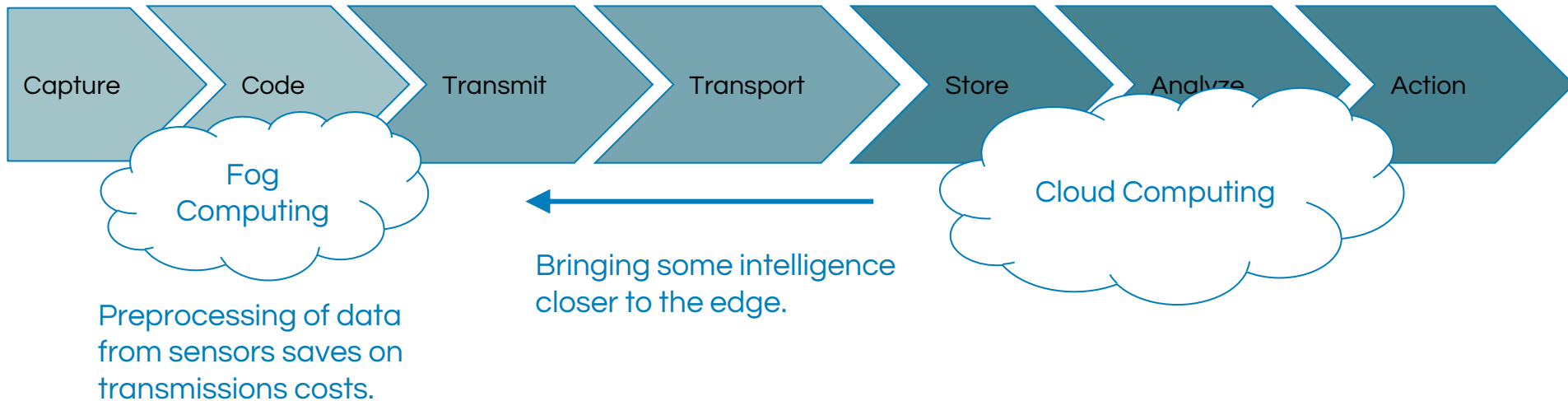
Transmitting the M2M chatter



Technology
decision factor



Eliminating the unnecessary chatter on the radio



However, this does not work every time, every where, on every application

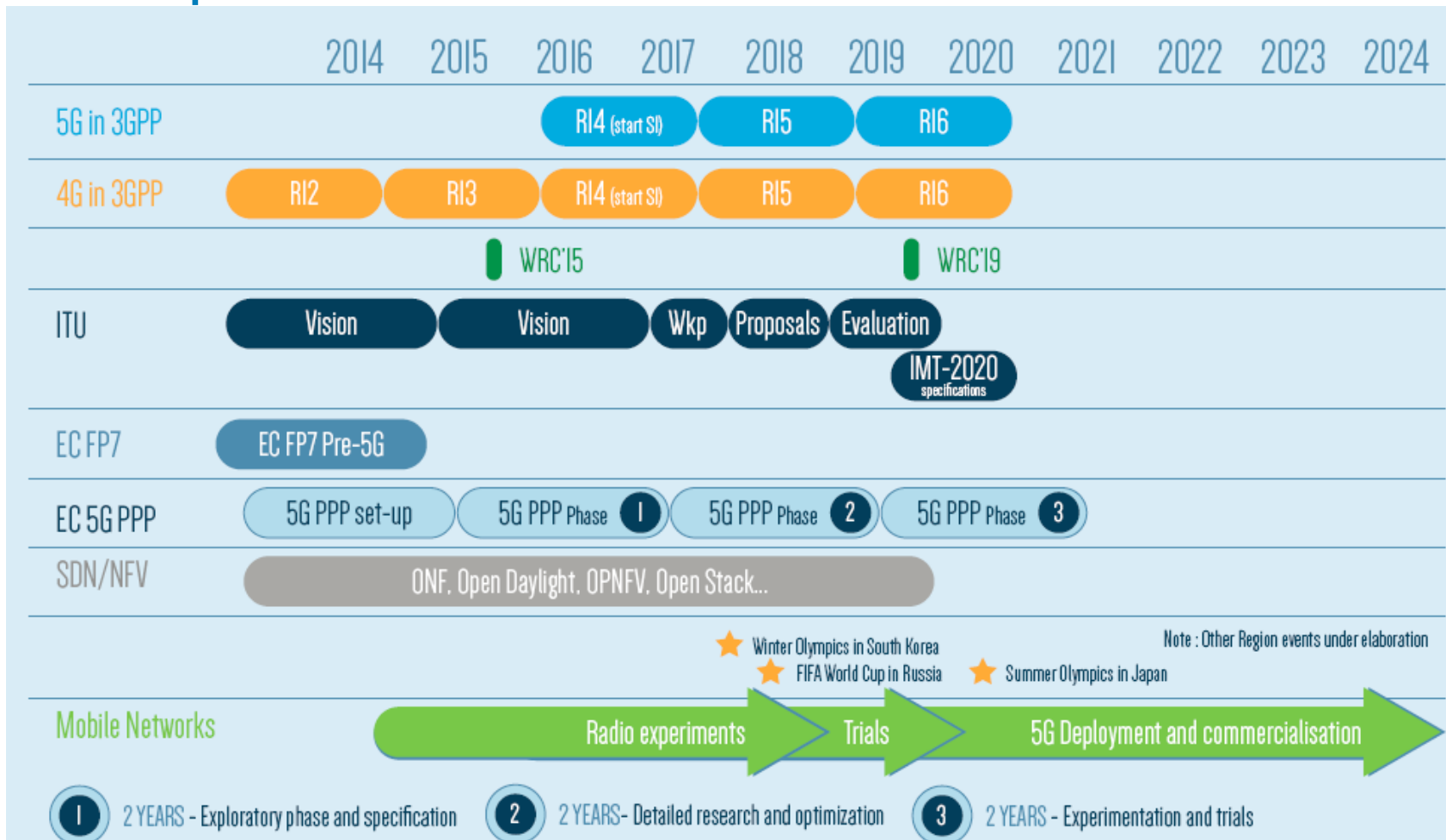
- Central decision applications
- Self Driving Cars

Finally



System Integration

- Operation technology & Low Current
- Radio Access
- Networking
- Data Integration, software
- Data science



- ITU Radiocommunication Sector (ITU-R)
- NGMN Alliance
- European Commission
- National governments
- Individual operators and vendors (AT&T already announced its plans for field trials)



Thank you!

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