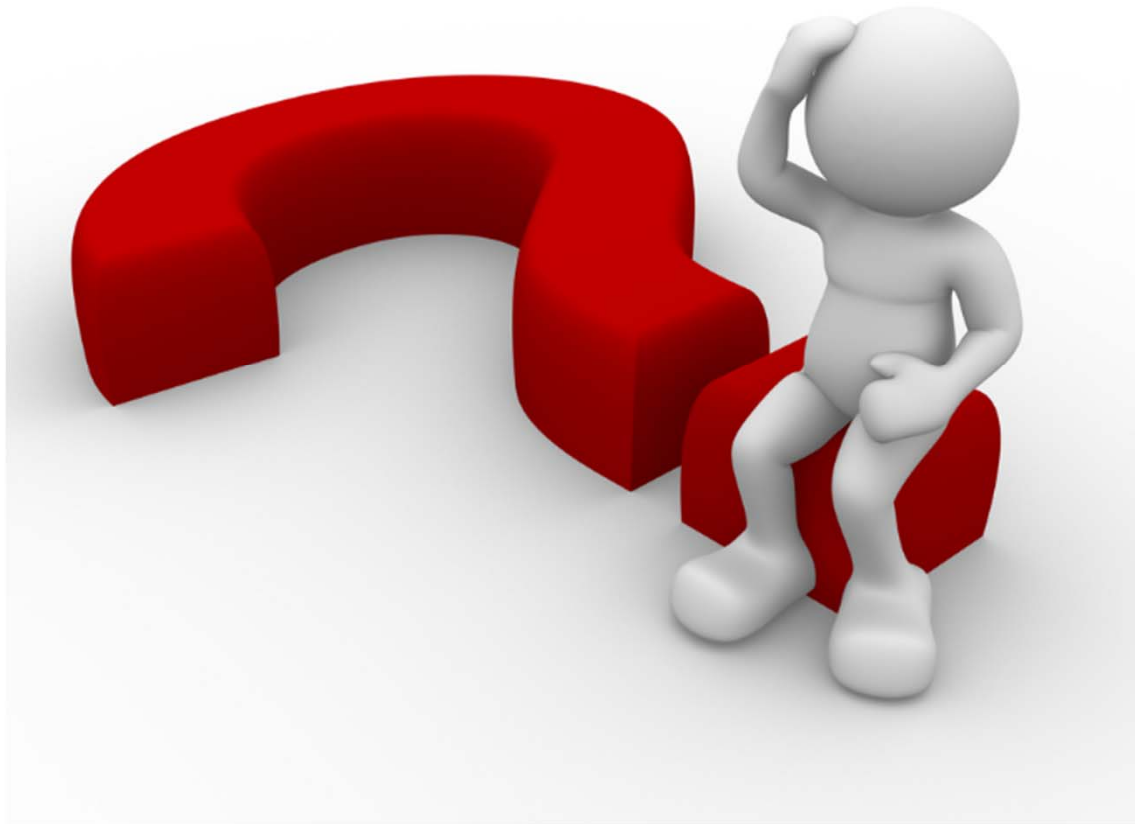




The why, when, where, what and how of 5G Standards

Adrian Scrase
Head of 3GPP Mobile Competence Centre

Why?



The Economic and Political needs for 5G



📶 OECD (Committee on Digital Economic Policy) has stated clear objectives for 5G:



- Increasing GDP
- Creating employment
- Digitizing the economy

📶 European Commission (Digital Single Market) also sets clear objectives for 5G:



- Digital Transformation of Industry
- Maximising economic growth

📶 Note: These aims will only be achievable if 5G is designed such that it meets the requirements of all industry sectors



The Technical Needs for 5G



- Existing 3GPP technologies are capable of meeting today's needs, but:
 - First LTE networks were deployed 8 years ago
 - Data consumption continues to grow as consumers make more use of mobile broadband services
 - The “Internet of Things” will result in billions of connected devices
 - New (and unforeseen) users of 3GPP technologies continue to emerge (e.g., public safety and automotive)
 - There is a constant demand to improve spectrum and energy efficiency and to leverage the benefits of modern research
- It takes several years to design and build a next generation system (and even longer to obtain spectrum)

Key takeaways

There are economic, political *and* technical needs for 5G

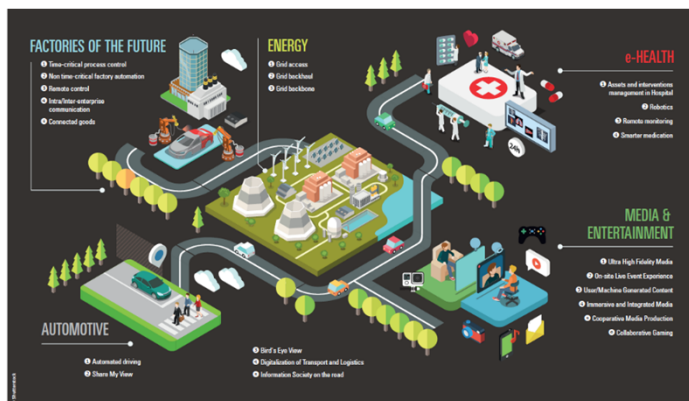
Existing technologies are capable of satisfying today's requirements but not those of tomorrow

It takes a long time to design and build a next generation system

What?



Much more than just people...



Transport Healthcare
Utilities,
Agriculture
Aviation
Education Entertainment
Factory automation
etc

Key takeaways

5G:

- has widely varying use cases
- has widely varying performance requirements
- is not really about connecting *people*, but more about connecting *things*

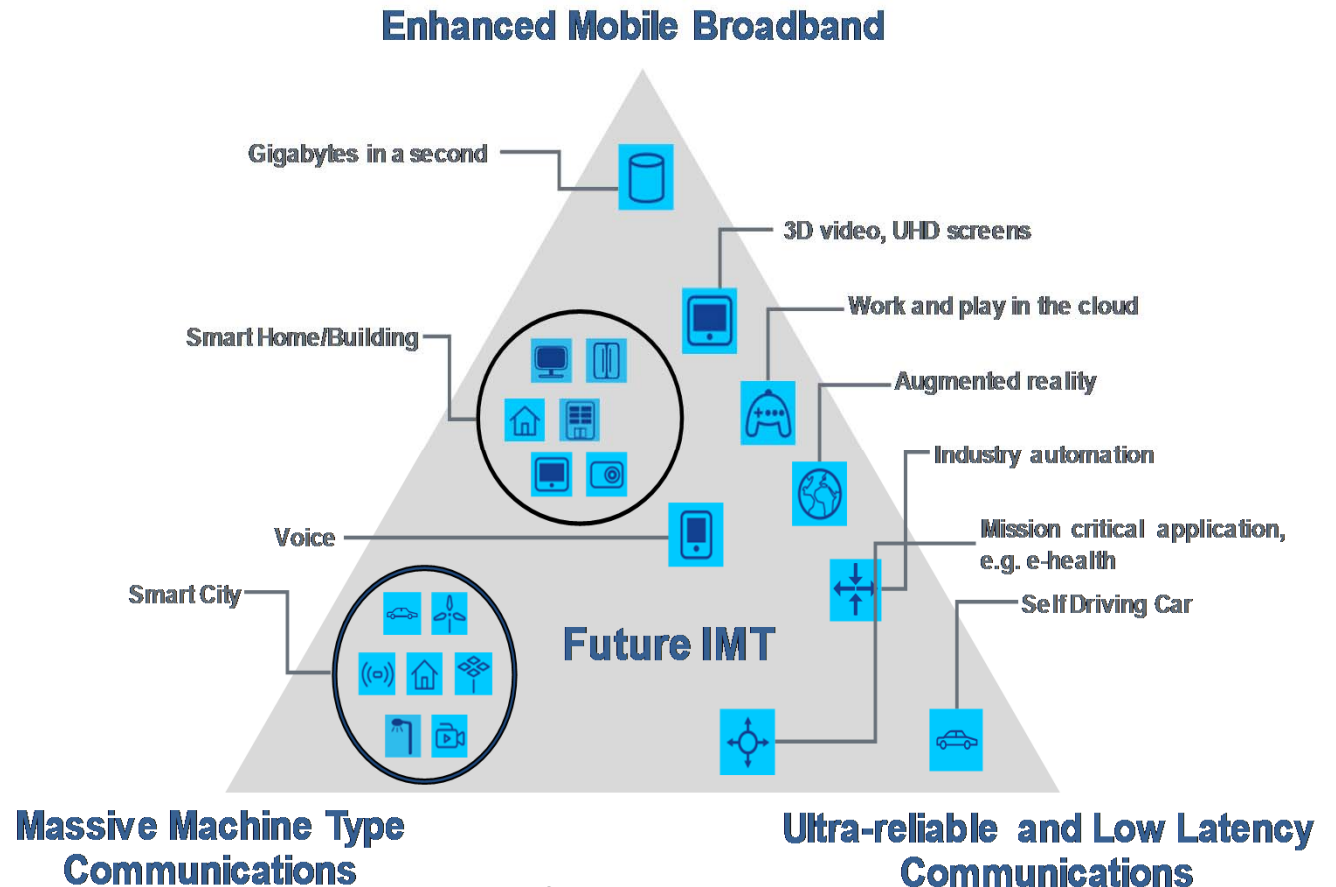
No single technology will satisfy all of these requirements

These requirements will not all be met at the same point in time

The three high level 5G use case families

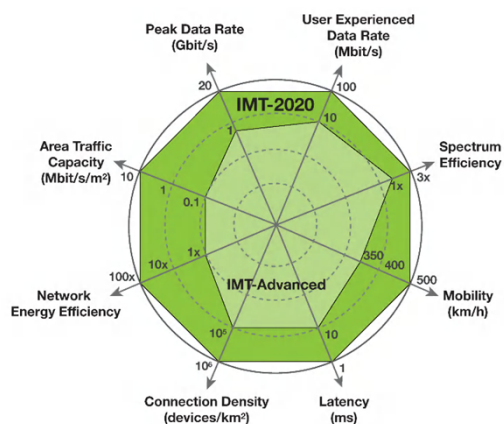


- Enhanced Mobile Broadband
- Massive Machine Type Communications
- Ultra Reliable and Low Latency Communications

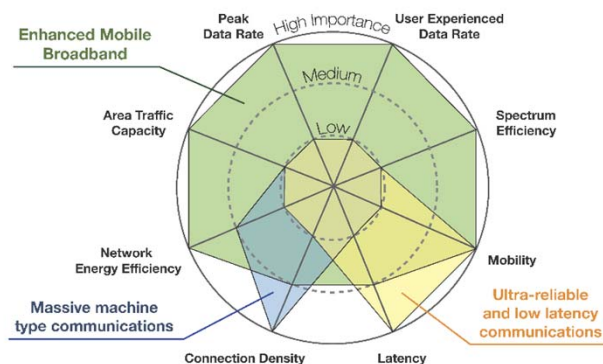


Source: ITU-R

Performance Requirements



Enhancement of key capabilities from IMT-Advanced to IMT-2020



The importance of key capabilities in different usage scenarios

Source: ITU-R M.2083

Key takeaways

To meet these requirements, 3GPP will specify:

- a new radio interface (NR)
- an evolved LTE radio interface
- a new core network (NextGen)
- An evolved LTE core network (EPC)

Use Case order of priority:

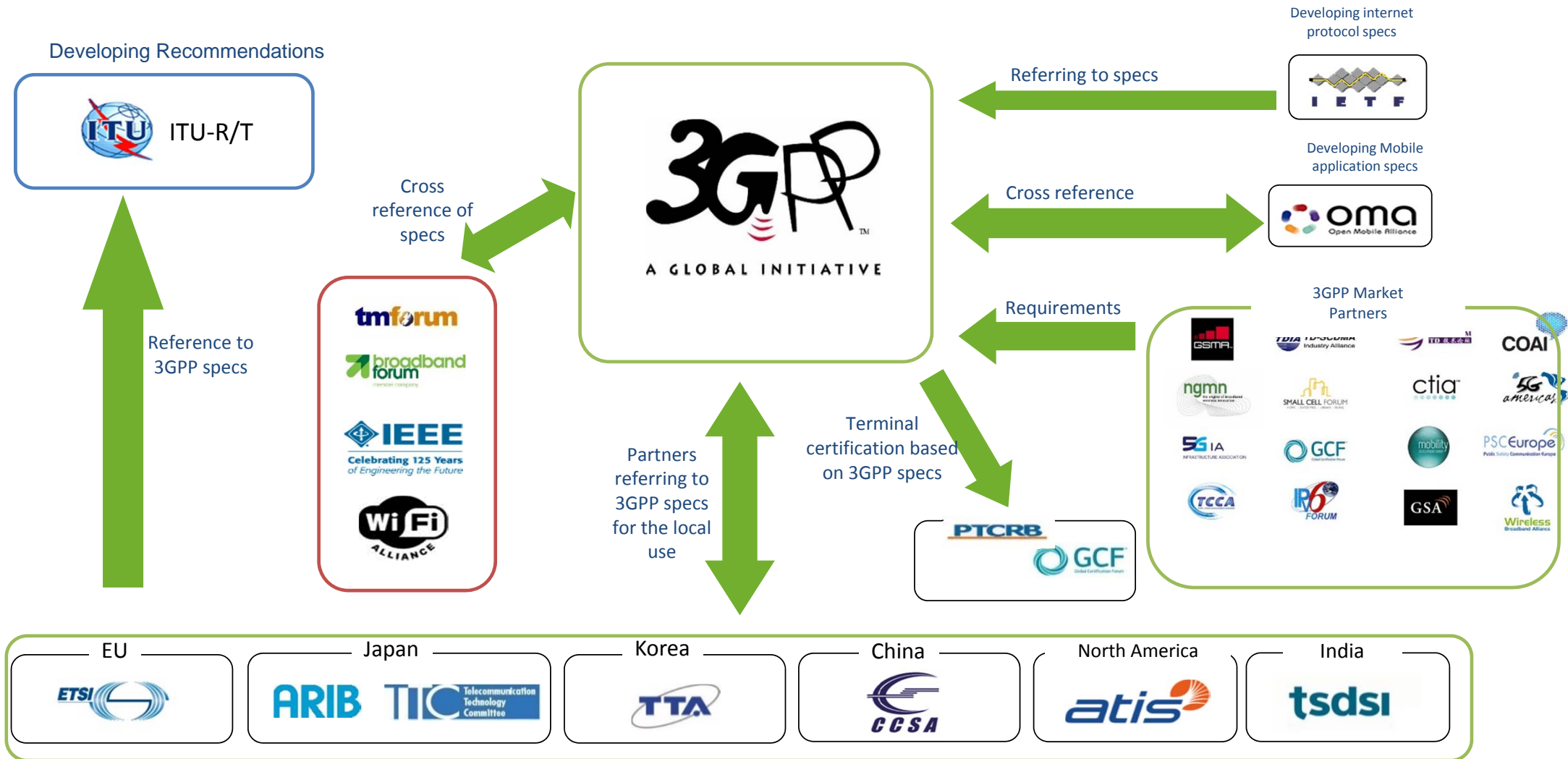
First: Enhanced Mobile Broadband and some Ultra Reliable/Low Latency functionality

Later: Massive Machine Type communications and more comprehensive Ultra Reliable/Low Latency functionality

Where?



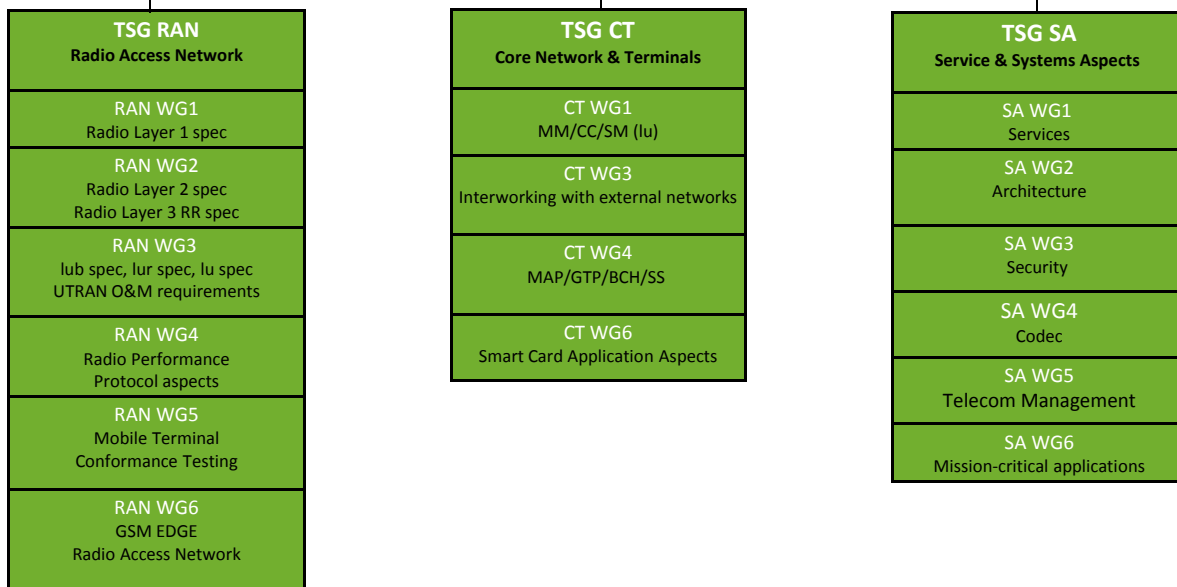
3GPP specifying a complete 5G system



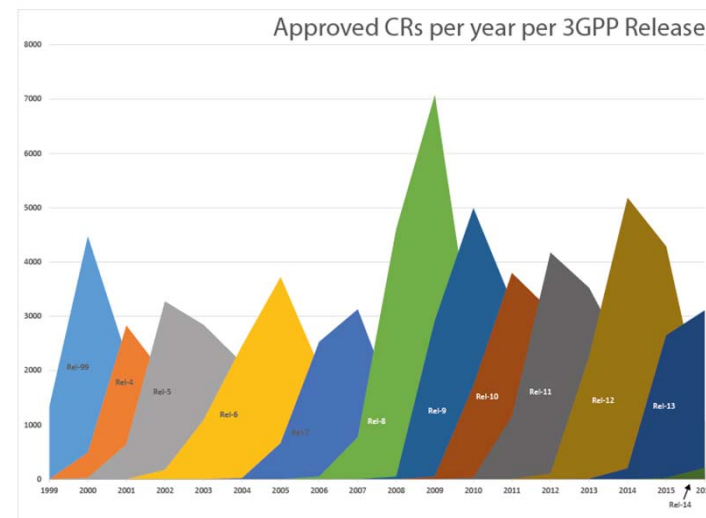
3GPP: Some key facts



Project Co-ordination Group (PCG)



- 50 000 delegate days per year
- 40 000 meeting documents per year
- 10 000 change requests (CRs) per year
- 1 200 specifications per Release
- 530 Companies from 45 Countries
- New Release every ~18 months



ETSI: 5G building blocks



ETSI is preparing significant 5G building blocks:

- Network Functions Virtualization (ISG NFV)
- Open Source MANO (OSG OSM)
- Mobile Edge Computing (ISG MEC)
- Millimetre Wave Transmission (ISG wWT)
- Next Generation Protocols (ISG NGP)
- Mobile/Broadcast Convergence (ISG MBC)

..as well as existing activities, e.g.:

- Use of whitespace spectrum, Spectrum Sharing (licensed and unlicensed) (TC RRS)
- Quantum Safe Cryptology (ISG QSC)
- Energy Efficiency (TC EE)
- Use of Satellites in 5G (TC SES)

...and many more

Key takeaways

There will be many contributors to the 5G standard, it cannot all be done in one place

ETSI is already developing significant building blocks which will form cornerstones of 5G

3GPP is specifying a *complete* 5G system description, using building blocks from other SDOs where appropriate

When?



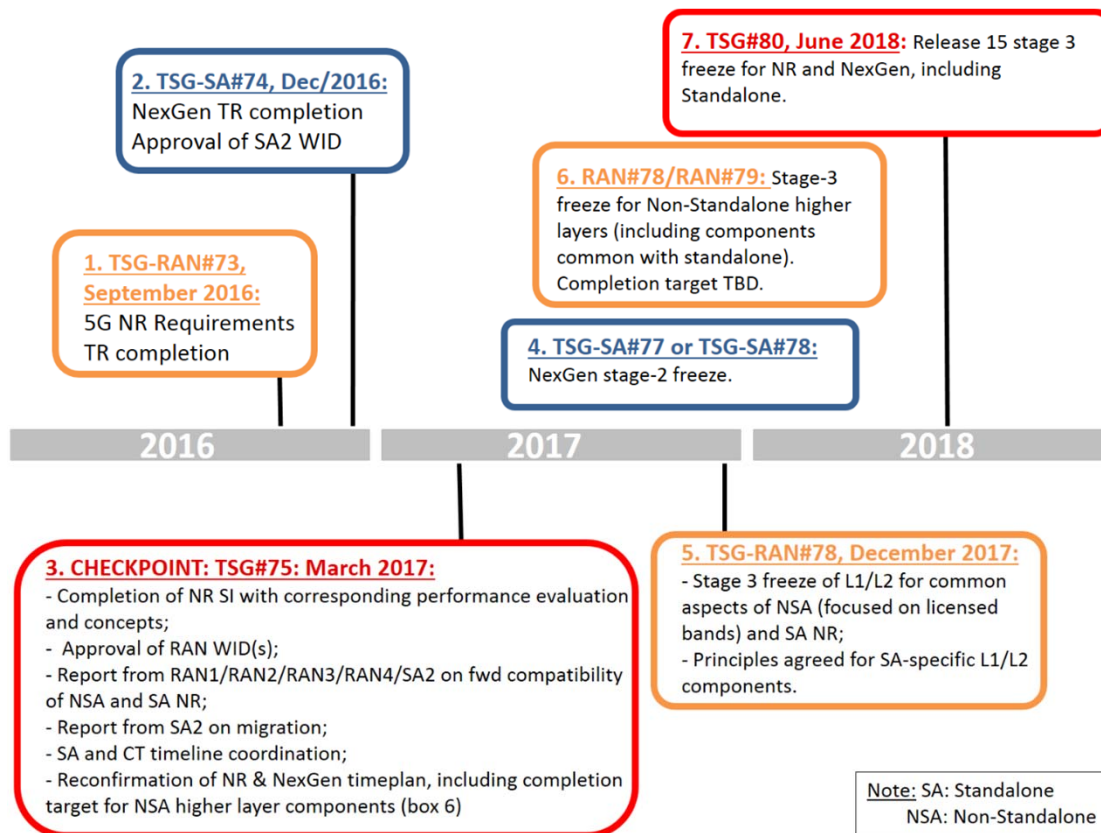
When will 5G be ready?



- 📶 2020 is the headline date for 5G
- 📶 This date has been chosen more for political rather than technical reasons
- 📶 It is also happens to coincide with the Olympic Games in Japan, July 2020
- 📶 However, there is a push to bring the date forward because of:
 - Mobile Operator rush “to be the first”
 - Winter Olympic Games to be held in Korea, February 2018
 - Rugby World Cup to be held in Japan, September 2019
- 📶 5G Open Trial Specification Alliance formed by SK Telecom, KT, NTT DoCoMo and Verizon:
 - To speed up deployment
 - To meet the 2017-2018 early deployment objective



The 5G train has already left the station....



Key takeaways

3GPP will specify:

- A “Phase 1” release of specifications sufficient to enable early 5G launch in 2018 (Release 15)
- A “Phase 2” release of specifications containing a complete 5G system description to enable 5G launch in 2020 (Release 16)

How?



3GPP pre-5G activities



Already in Release 13, features completed that are addressing 5G objectives. More will follow in Release 14 :

- Examples (Radio)

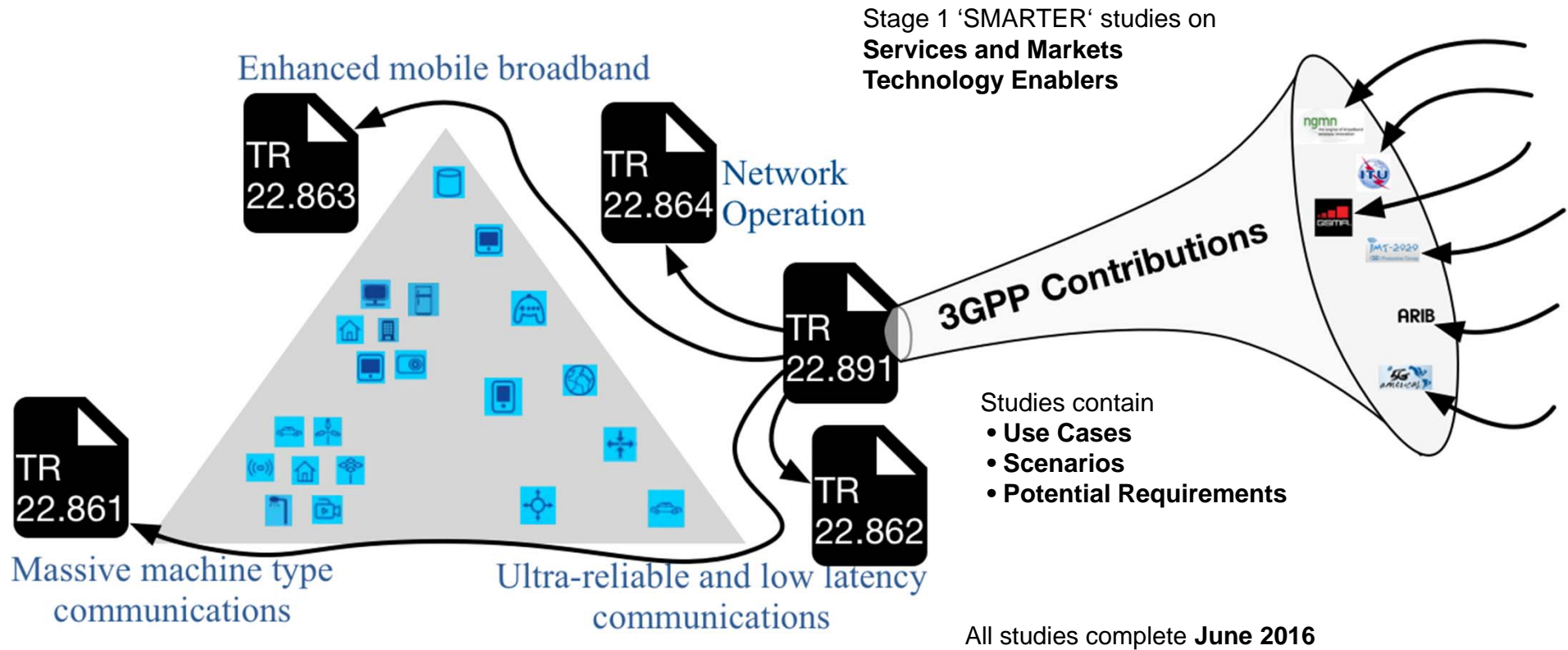
- Proximity Services Enhancement (13, 14)
- Internet of Things RATs (NB-IoT, enhanced LTE, EC-GSM-IoT) (13)
- LTE Carrier Aggregation Enhancement (13, 14)
- Support for V2V services based on LTE sidelink (14)
- Ongoing further enhancement of LTE and eMBMS (13, 14)

- Examples (System)

- Cellular Internet of Things System Enhancements (13)
- Dedicated Core Networks (13), Enhanced Dedicated Core Networks (14)
- User Plane and Control Plane Separation (14)
- Support for Virtual Network Function (Management and Operation) (14)
- Broadband Mission Critical applications – Video and Data (14)



5G requirements capture in 3GPP



Barriers to success

- For 5G to be successful, the telco industry must engage with other industry sectors such as transport, healthcare, mining and exploration, utilities, agriculture, aviation (drones), entertainment, factory automation, etc
- We cannot expect them to come to us, we must be prepared to go to them and to meet them on level terms
- ICT Standards bodies must engage with Standards Bodies from other sectors
- Within each Government, 5G must be coordinated across *all* ministries (e.g., transport, health, industry etc) and not just within a communications or ICT ministry
- Regulation will need to be revisited, especially where they impact on market conditions



Conclusions



- 5G presents a huge opportunity for the digitization of the economy and modernization of all industry sectors
- To achieve the full potential, all actors need to work together towards common objectives
- The 5G timeline is very demanding
- 3GPP has set detailed plans which will enable that timeline to be met
- 3GPP will specify a complete 5G system description, making use of building blocks developed in other SDOs where appropriate



For more Information:



info@3gpp.org



www.3gpp.org