



The Standards People

ETSI and 5G

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For: **ILNAS**

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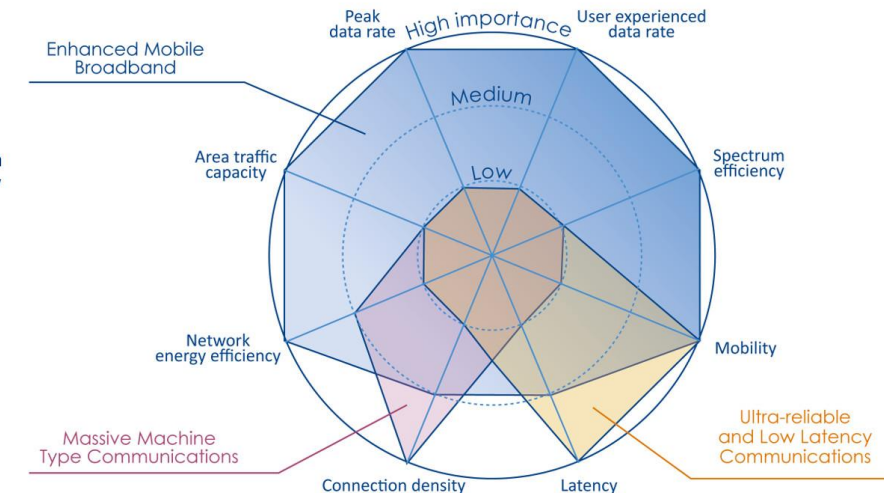
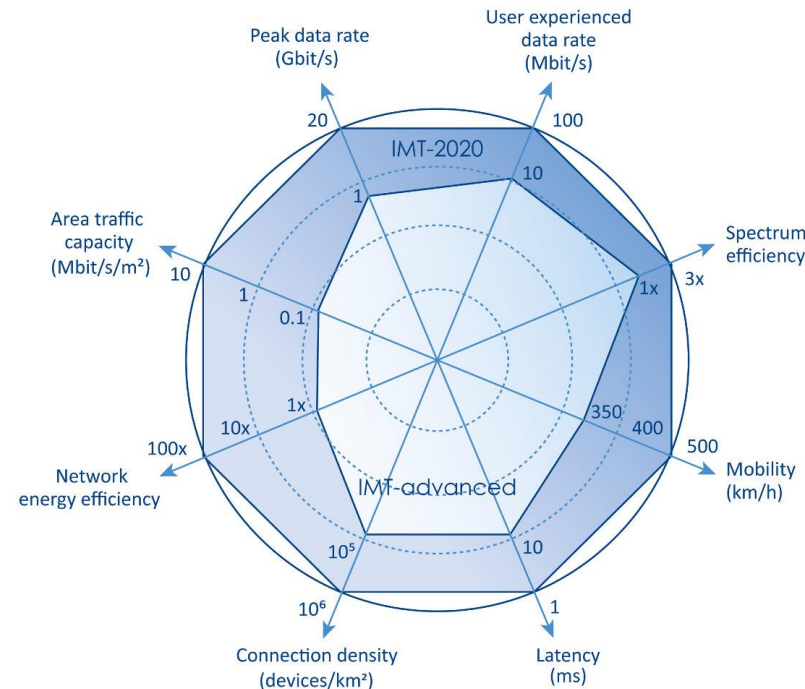
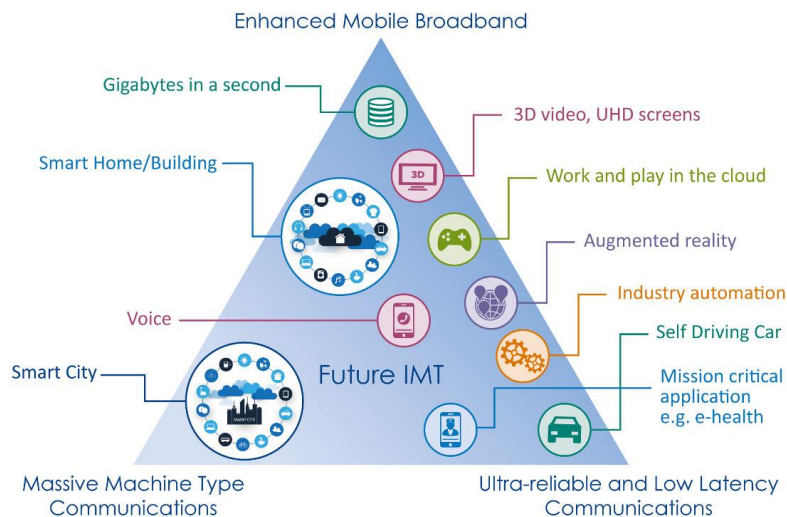


What is 5G?

What is 5G?

The basic performance criteria for 5G systems have been set by the ITU in their IMT-2020 Recommendation. ITU-R M.2083 describes three overall usage scenarios for 5G systems:

- Enhanced Mobile Broadband to deal with hugely increased data volumes, overall data capacity and user density
- Massive Machine-type Communications for the IoT, requiring low power consumption and low data rates for very large numbers of connected devices
- Ultra-reliable and Low Latency Communications to cater for safety-critical and mission critical applications



Why do we need 5G?

Mobile data traffic is rising rapidly, mostly due to video streaming.

With multiple devices, each user has a growing number of connections.

The emergence of the IoT means networks must handle billions more devices.

Network operators are under pressure to reduce operational expenditure, as users don't wish to pay more for increased services.

Operators also need new applications for mobile technology, opening up new revenue streams.

5G aims at total availability. 5G should offer a user experience near that of fixed networks with near total 5G coverage, cater for massive deployment of Internet of Things, while still offering acceptable levels of energy consumption, equipment cost and network deployment and operation cost to ensure the service can be provided economically.

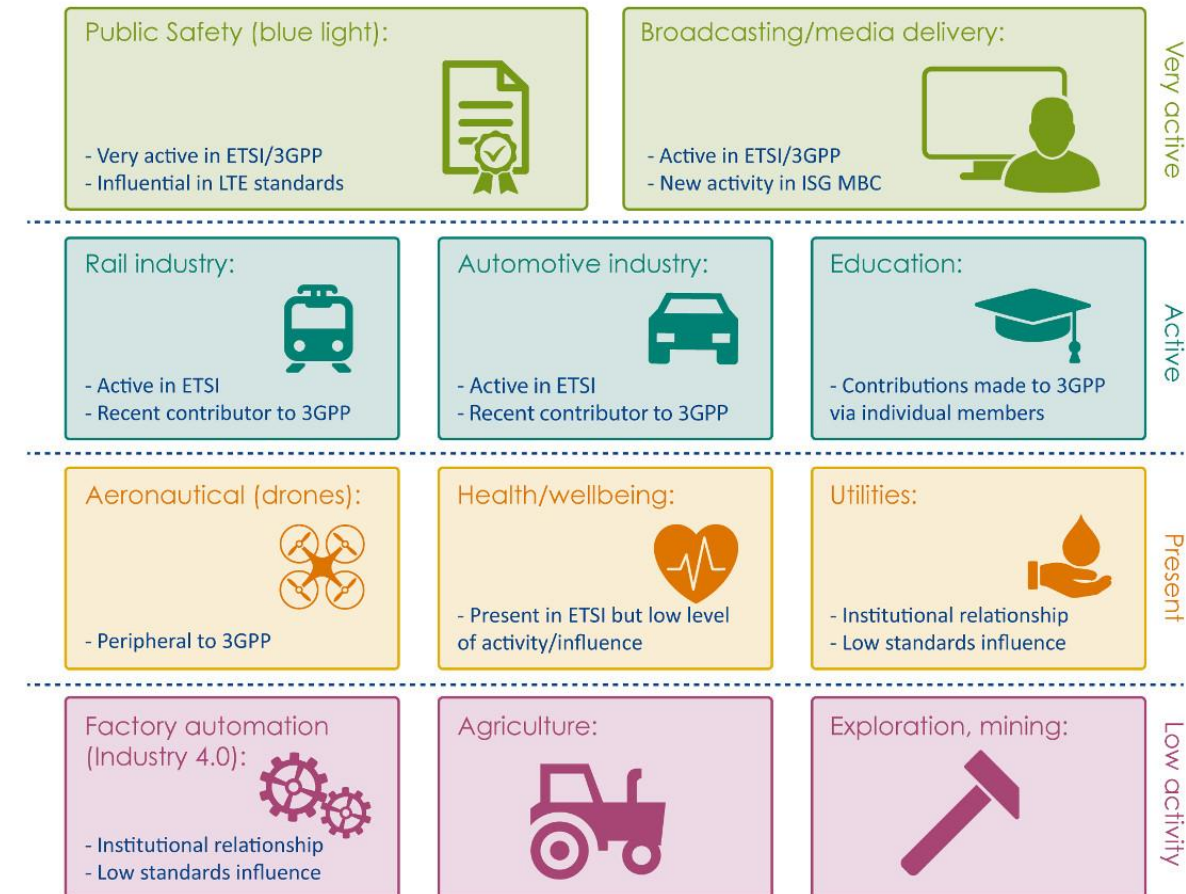


Who is going to use 5G?

The primary beneficiaries of 5G will be consumers, but 5G presents a huge opportunity for the digitization of economies and modernization of all industry sectors.

Several industry sectors are already engaged in the process of building 5G, and are actively shaping the technology to meet their needs through participation in the standardization process.

Other sectors are potentially huge beneficiaries, but have yet to make significant engagement.



ETSI's 5G work

Primary 5G standards: 3GPP



Other ETSI groups contributing:

- ✓ NFV – Network Functions Virtualisation
- ✓ MEC – Multi-access Edge computing
- ✓ mWT – Millimetre Wave Transmission
- ✓ NGP – Next Generation Protocols
- ✓ ZSM – Zero touch network and Service Management

A circular inset showing an aerial view of a city at night, likely Hong Kong, with many skyscrapers and lights. Several buildings have glowing 5G signal icons (three concentric arcs) above them, indicating 5G coverage. The city is situated next to a body of water, and mountains are visible in the background.

Status Report on 3GPP 5G Standards

Introduction

- 3GPP is expanding the LTE platform for new services, while improving its efficiency to meet the mobile broadband demand
- 3GPP 5G is not only a new radio interface, but a full system, integrating LTE and NR access technologies with a 5G Core Network
- Initially some of the 5G use cases will be fulfilled by LTE, but the aim is to eventually fulfil all the requirements with 3GPP 5G
- From Release 15 onwards, the 3GPP specifications are “5G” ready



Content



- About 3GPP
- Release 15 progress on NR
- Release 16 - 5G Phase 2
- 3GPP progress & submission timeline for IMT-2020
- New Use Cases, New Sectors
- System architecture milestones in Rel-15

The 3GPP evolution path



3G / UMTS

- Circuit Switched (CS) & Packet Switched (PS) Domains in parallel

LTE

- All IP
- Mobile Broadband
- Voice over LTE (IMS/VoLTE)

LTE Advanced and LTE Advanced Pro

- Paves the way for 5G
- Cellular Internet of Things
- Mission Critical Push To Talk
- Dedicated Core Networks, Traffic Steering, ...

5G



Whole System Approach

Radio Interfaces

Higher data throughput

Lower latency

More spectrum flexibility

Improved CAPEX and OPEX

The Core network

All-IP network

Support of non-3GPP
accesses

Improved security

Greater device diversity

Services

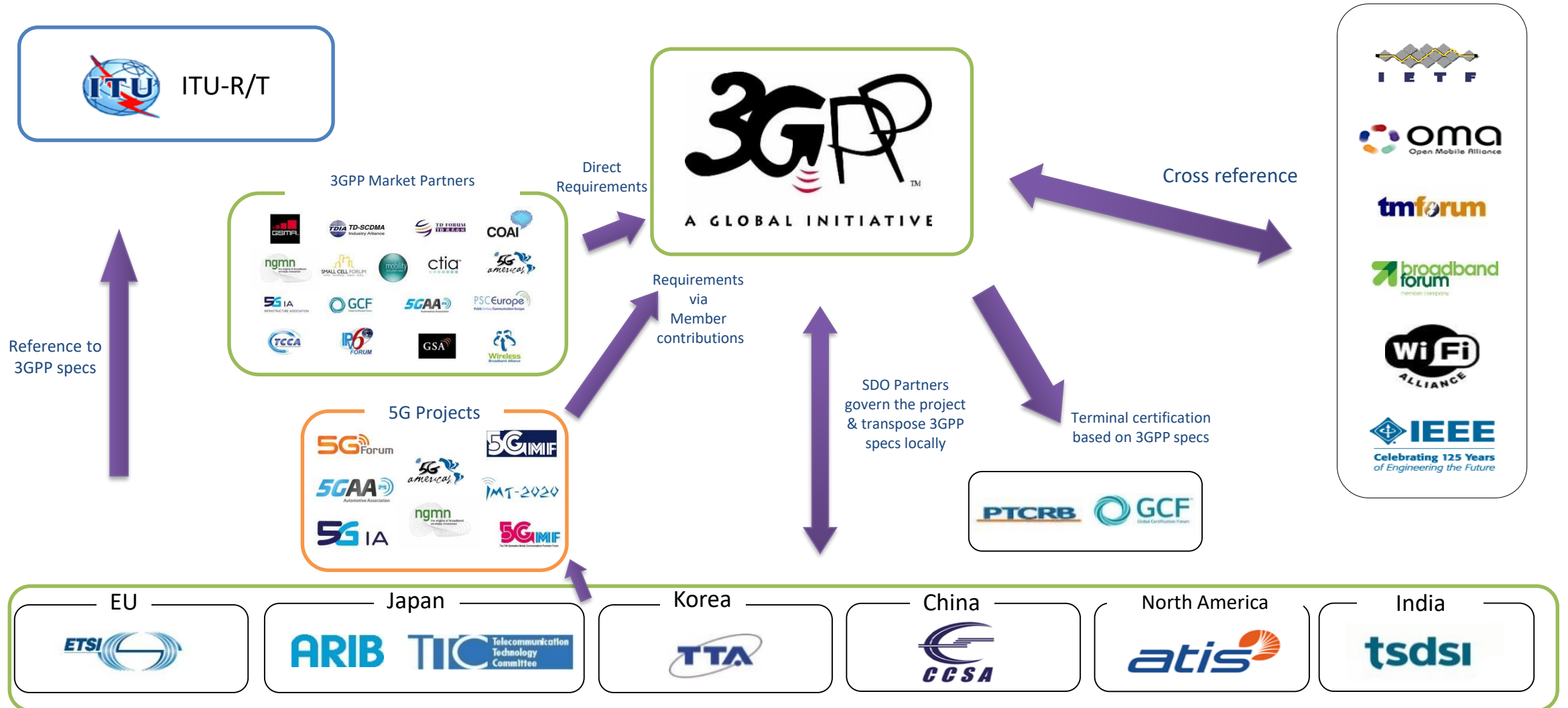
More IMS applications

Greater session continuity

Legacy

Interworking

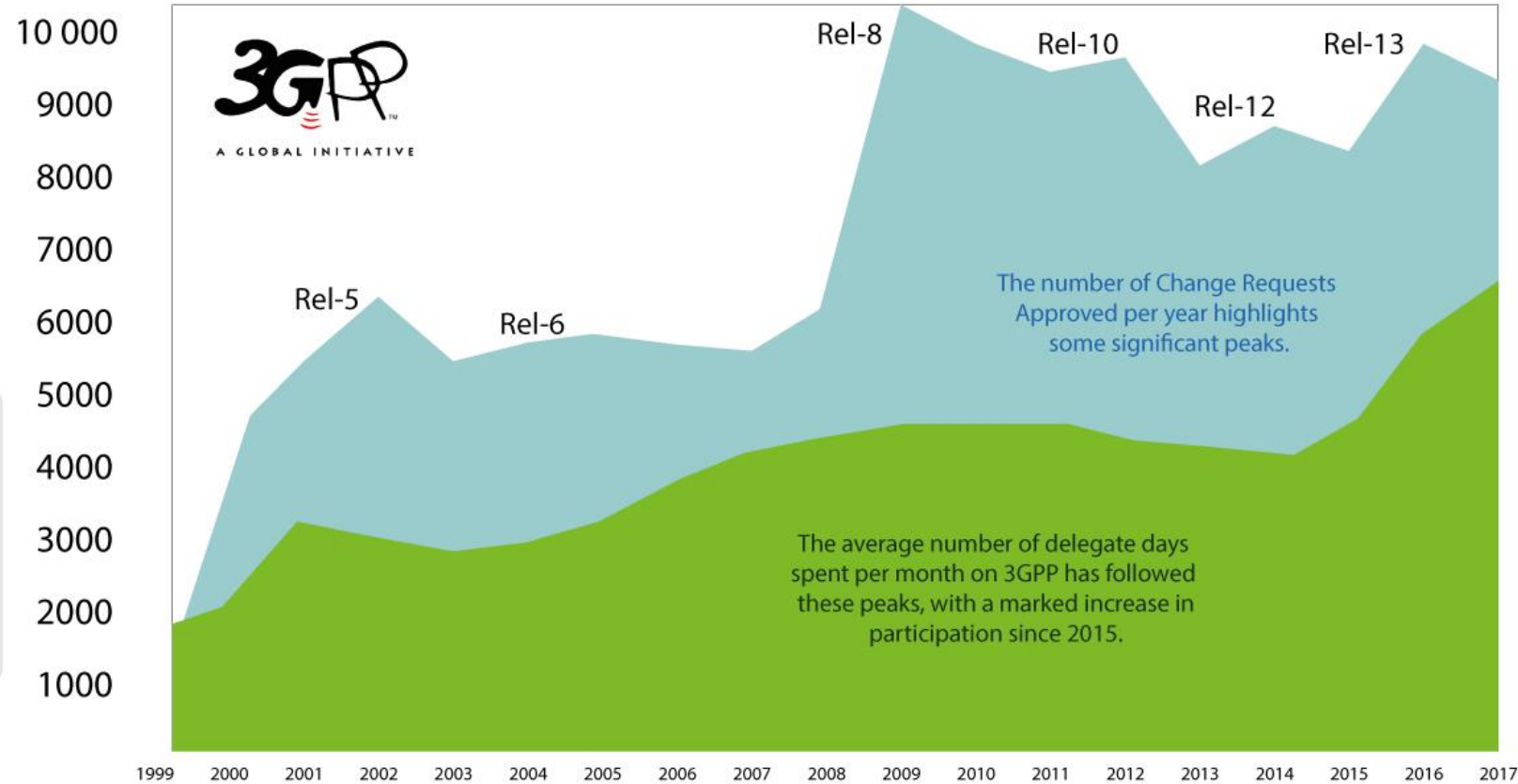
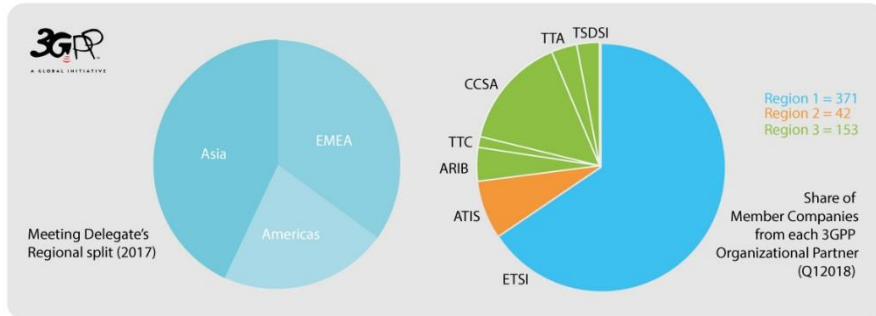
The 3GPP Eco-system



Participation



- ~400 Companies from 39 Countries
- 50.000 delegate days per year
- 40.000 documents per year
- 1.200 specs per Release
- New Release every ~18 months



What is 3GPP NR ?



- Operation from low to very high bands: 0.4 – 100Ghz
 - Including standalone operation in unlicensed bands
- Set of different numerologies for optimal operation in different frequency ranges
- Native forward compatibility mechanisms
- Ultra wide bandwidth
 - Up to 100MHz in <6GHz
 - Up to 400MHz in >6GHz
- New channel coding
 - LDPC for data channel, Polar coding for control channel
- Native support for Ultra Reliable Low Latency
- Flexible and modular RAN architecture: split fronthaul, split C-U plane
- Native end-to-end support for Network Slicing

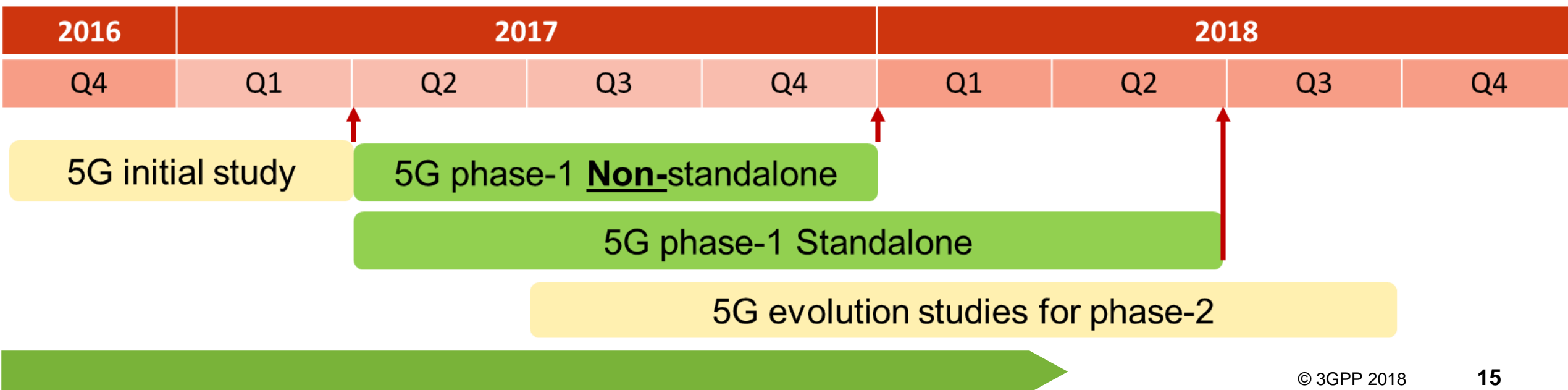
NR timeline (simple view)

Non-standalone 5G

- Uses LTE core and LTE radio anchor with a 5G small cell
- Mobile BroadBand capacity boost

Standalone 5G

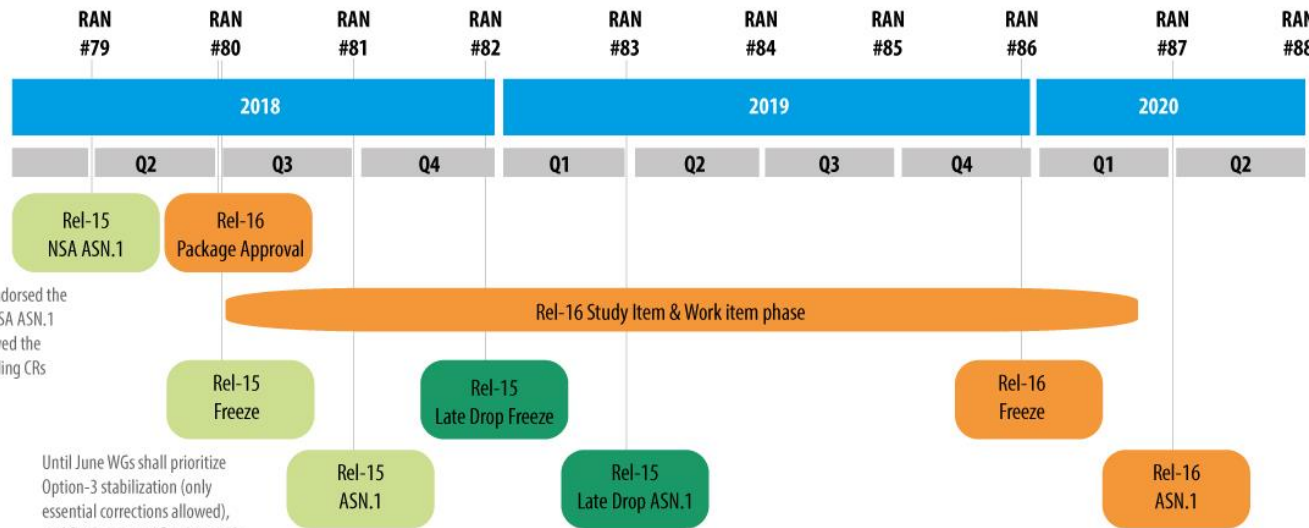
- Uses 5G core and 5G radio anchor
- 5G overlay
- Expansion of the wireless ecosystem



NR Detailed Timeline

- 3GPP RAN plenary has re-enforced the timeline commitment (previous slide)
- Early drop (December 2017): non-stand-alone 5G
- Rel-15 freeze (June 2018); standalone NR with new 5G Core (Option 2)

Release 15 & Release 16 'NR' milestones



RAN#79 endorsed the freeze of NSA ASN.1 and approved the corresponding CRs

Until June WGs shall prioritize Option-3 stabilization (only essential corrections allowed), and Option-2 specification work

Architecture Option 2 & 5 (LTE): ASN.1 Freeze September 2018

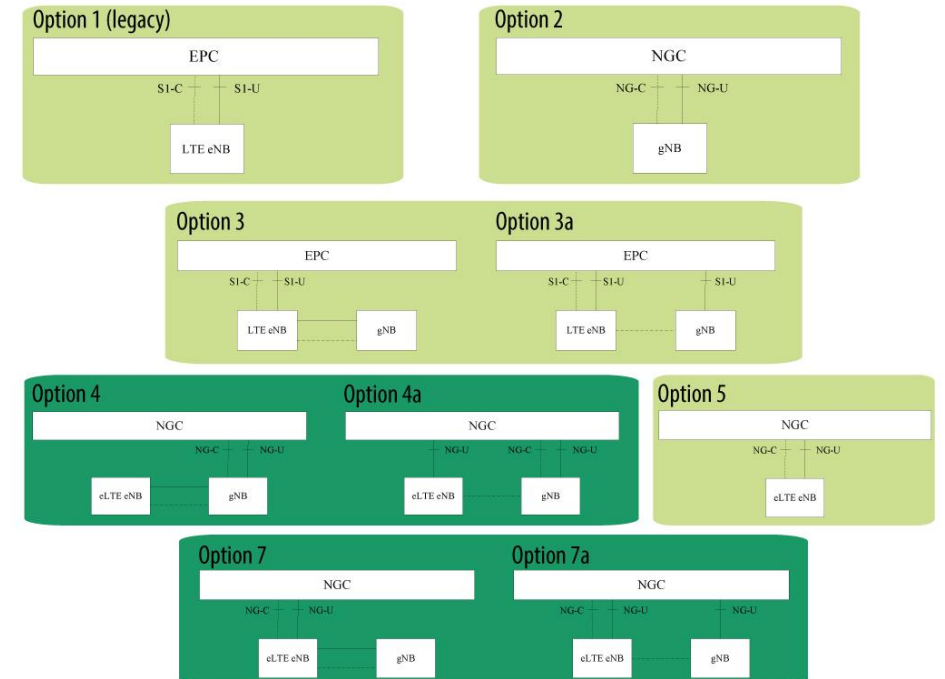
If Option 5 is not completed by September ASN.1 drop, it will be part of the late drop

The late drop is to exclusively contain NR architecture options that were not completed by September ASN.1 drop. Options 4, 7 are part of the late drop

Source: RAN Chairman's Summary from RAN#79, March, 2018

5G Architecture Options being addressed

Based on detail in TS 38.801

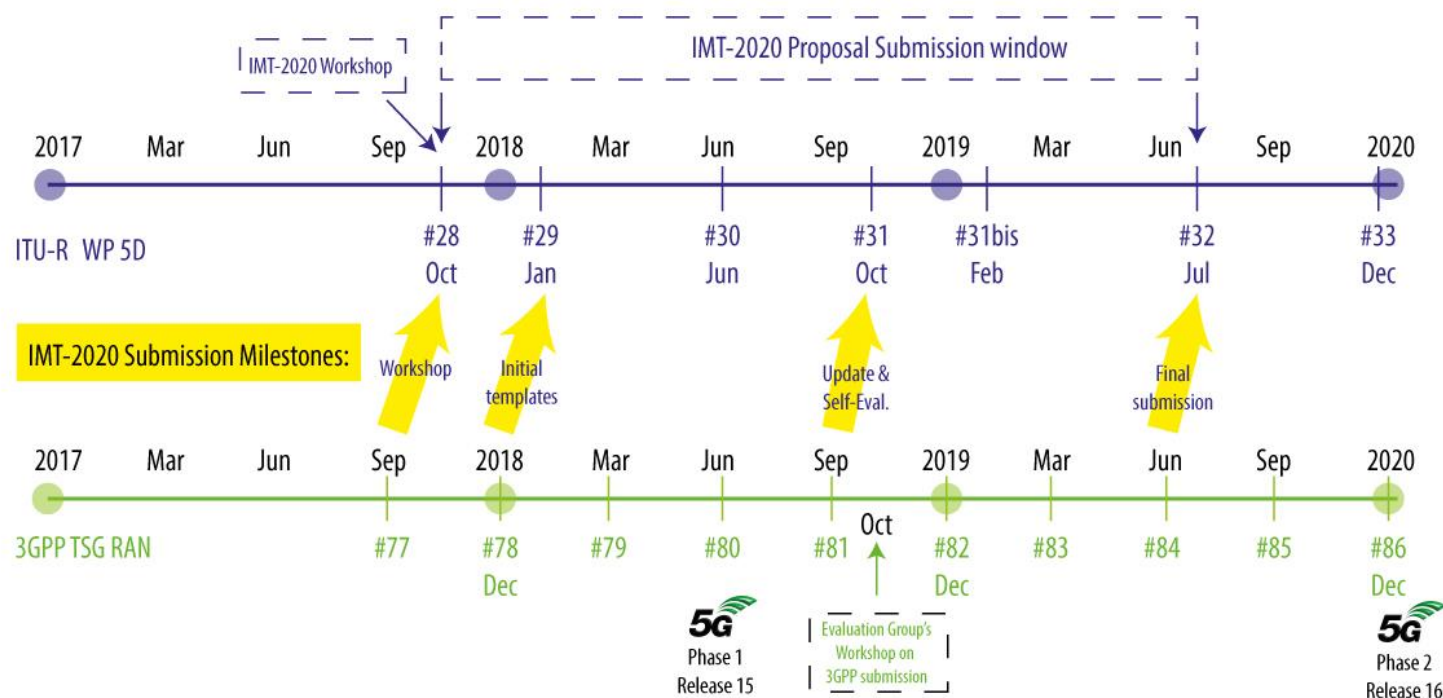


IMT-2020 (radio submission)

- In December 2017, 3GPP RAN and SA agreed on the plan for our candidate technologies for IMT-2020
- To be in place by the World Radiocommunication Conference - 2019
- 3GPP schedule for our IMT-2020 proposal submission is summarised below (Source: SP-171082):

- ✓ There will be three submissions from 3GPP, spanning two Releases;
- ✓ Submissions to be sent only when milestones of high relevance are achieved (See yellow arrows in the diagram):-

- Initial templates - Release 15 December 2017 version
- Update & Self eval. - Release 15 June 2018 version
- Final Submission - Release 16

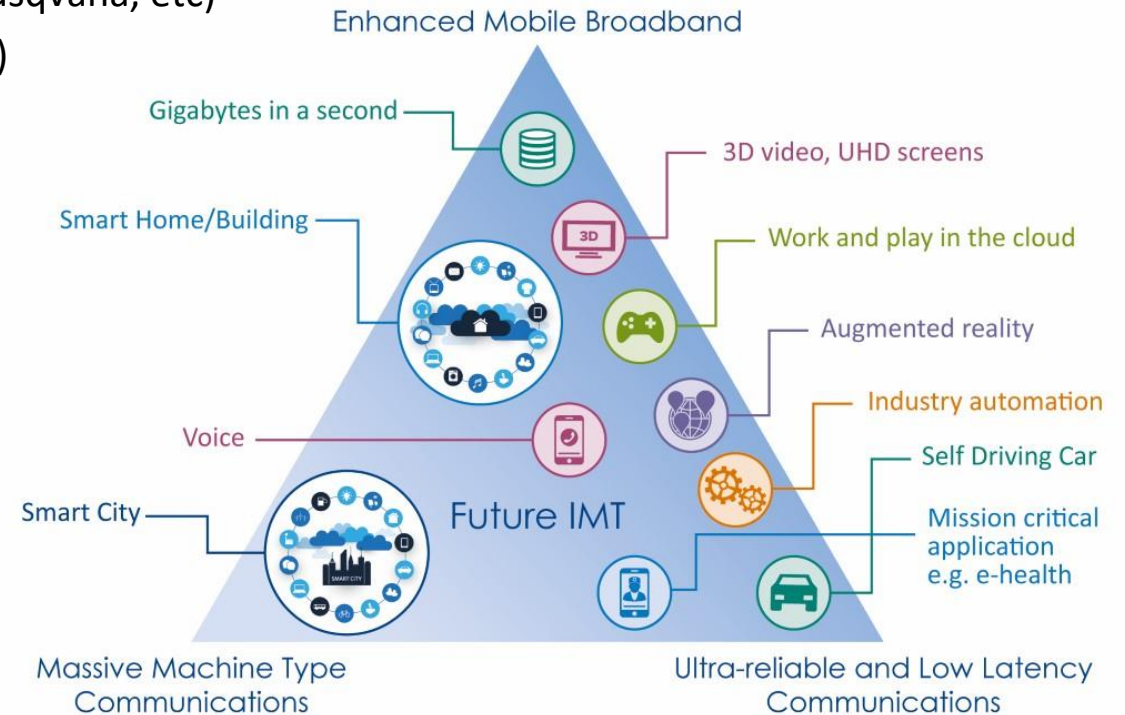


3GPP 5G Approach to meet New Use Cases

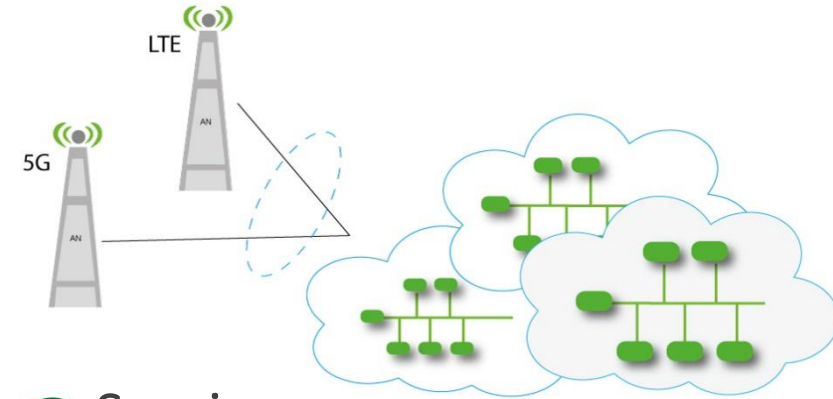
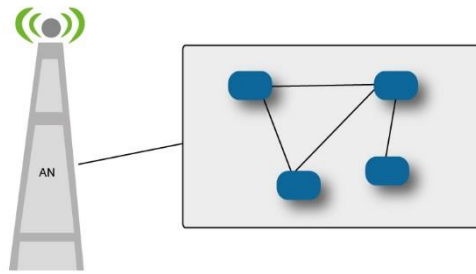


3GPP Members now include these sectors:

- ✓ **Agricultural** machinery manufacturers (e.g., John Deere, Husqvana, etc)
- ✓ **Automotive** manufactures (e.g, Volkswagen, Volvo, Toyota)
- ✓ **Rail** (e.g., International Union of Railways)
- ✓ **Factory Automation** companies (e.g., Siemens)
- ✓ **Energy Sector** (e.g., Legrand)
- ✓ **Environment** (e.g., Veolia)
- ✓ **Broadcasting Community** (e.g., EBU, BBC, TDF)
- ✓ **Satellite Community** (e.g., ESO, Inmarsat)
- ✓ **Aerospace** (e.g., Lockheed Martin, BAE)
- ✓ **Retail Sector** (e.g., Alibaba)
- ✓ **Social Media** (e.g., Facebook)
- ✓ **Advertising** (e.g., Google)



Transformation of the Core Network



- Functional entities
- Single Core
- Dedicated protocols

- Services
- Virtual Core
- Internal Communication: APIs
- Harmonized protocols
- Function/service exposure
- CP / UP Separation

System architecture milestones in Rel-15



Service Based Architecture

- Architecture elements are network functions that offer their services via interfaces of a common framework
- This architecture model is chosen to enable deployments to take advantage of the latest virtualization and software technologies



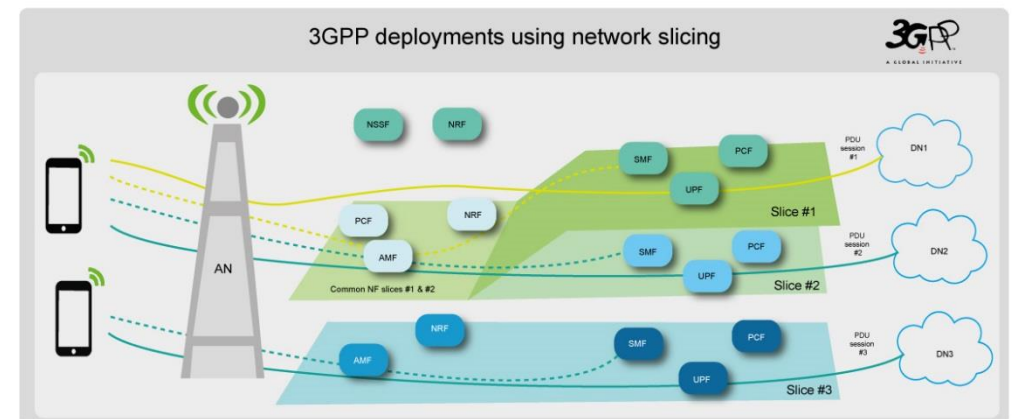
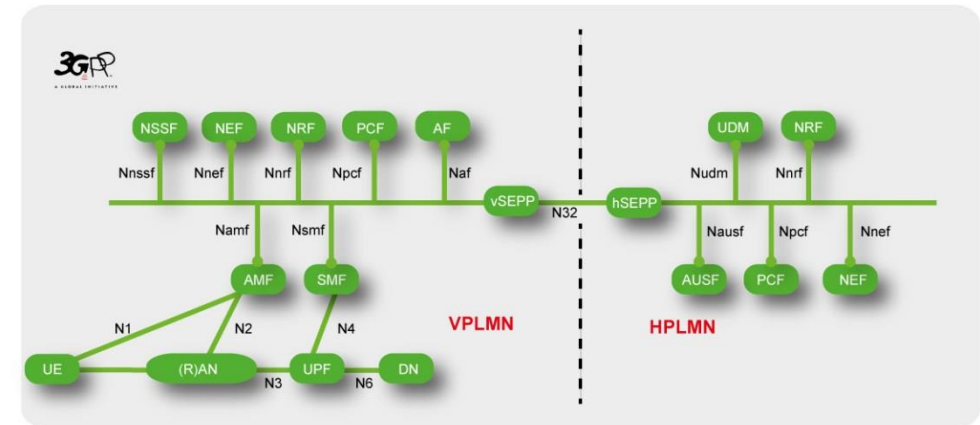
Common Core Network

- 5G Core Network to operate with different Access Networks. In Rel-15 these are 3GPP RAN & 3GPP defined 'trusted' and 'un-trusted' WLAN accesses. Studies on other access systems are on-going



Network Slicing

- Network slicing enables the network operator to deploy multiple, independent PLMNs, each customized by instantiating only the features, capabilities and services required to satisfy the users/UEs needs



[TS 23.501](#) – System Architecture for the 5G System; Stage 2

[TS 23.502](#) – Procedures for the 5G System; Stage 2

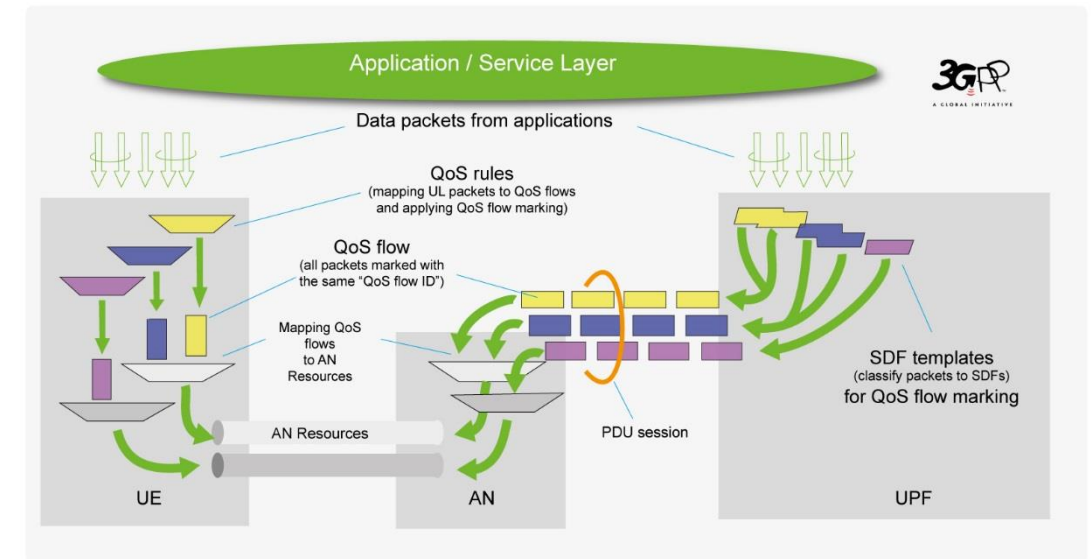
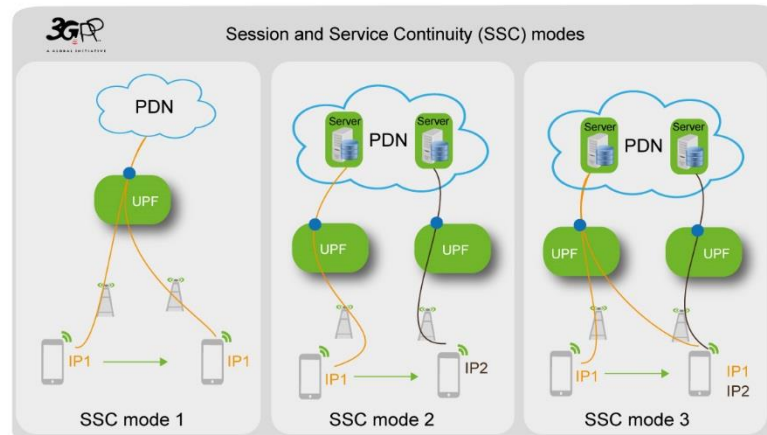
[TS 23.503](#) – Policy and Charging Control Framework for the 5G System; Stage 2

System architecture milestones in Rel-15



Application support

- The new QoS model of the 5G system architecture enables differentiated data services to support diverse application requirements
- Flexible deployment of application functions is supported, via three different Session and Service Continuity (SSC) modes or via the functionality of Uplink Classifiers and Branching Points
- As 5G network deployments are expected to serve huge amounts of mobile data traffic, an efficient user plane path management is essential



[TS 23.501](#) – System Architecture for the 5G System; Stage 2

[TS 23.502](#) – Procedures for the 5G System; Stage 2

[TS 23.503](#) – Policy and Charging Control Framework for the 5G System; Stage 2

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For more Information:



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www.3gpp.org

3GPP Live @3GPPLive · Dec 20
NSA 5G NR specs were approved today at RAN#78. Balazs Bertenyi, RAN Chair called it "an Impressive achievement in a remarkably short time, with credit due particularly to the Working Groups". News article to follow on the 3GPP site and from 3GPP Member announcements.



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Twitter: @3gpplive

Search for WIDs at <http://www.3gpp.org/specifications/work-plan> and http://www.3gpp.org/ftp/Information/WORK_PLAN/ (See excel sheet)



Thank you!

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Director of Innovation

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