

# 3GPP Standards Overview

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# Content



- 5G Research & Policy Initiatives – Europe & India
- The eco-system for mobile standards
- The role of 3GPP
- The impact of 5G
- Current priorities in radio, systems and core network groups
- Future Outlook and Conclusions

# 5G Research & Policy initiatives

## Europe

- In 2013, EC established Public Private Partnership on 5G (5GPPP) to accelerate R&D in 5G technology.
  - funded by Horizon 2020 and is being organized in 3 phases:
    - Phase 1: The future 5G network architecture (2015-2017): 19 research projects
    - Phase 2: Move towards demonstration and experiments with the involvement of the vertical industries (2017-2019): 21 projects,
    - Phase 3: End to end 5G platforms, connected and automated mobility, trials across vertical industries and long term 5G evolution: 15 new projects
- EC launched 5G Action Plan for Europe in 2016 to start launching 5G services by end of 2020 in all EU member states,
  - In 2018, EC launched European 5G observatory to monitor the progress of the 5G Action Plan and to focus on 5G developments in Europe.

## India

- Government has set up a High Level Forum (HLF) to articulate the Vision for 5G in India.
  - ✓ HLF has published a report "Making India 5G Ready"
- Building an End-to-End 5G Test Bed: three-year program began in March 2018 to advance R&D in 5G
  - This program has been awarded to IIT Madras, IIT Hyderabad, IIT Delhi, IIT Kanpur, CEWIT, SAMEER and IISc Bangalore.
- Telecom Regulatory (TRAI) released White Paper on 'Enabling 5G in India'
  - highlights the specifications of the 5G technology, architecture of 5G network, spectrum requirements for 5G networks, the regulatory issues & challenges and areas that will require investment for 5G deployment.
- National Digital Communication Policy-2018 (NDCP-2018):
  - Emphasizes on Hi-speed internet, IoT/M2M by rollout of 5G technologies

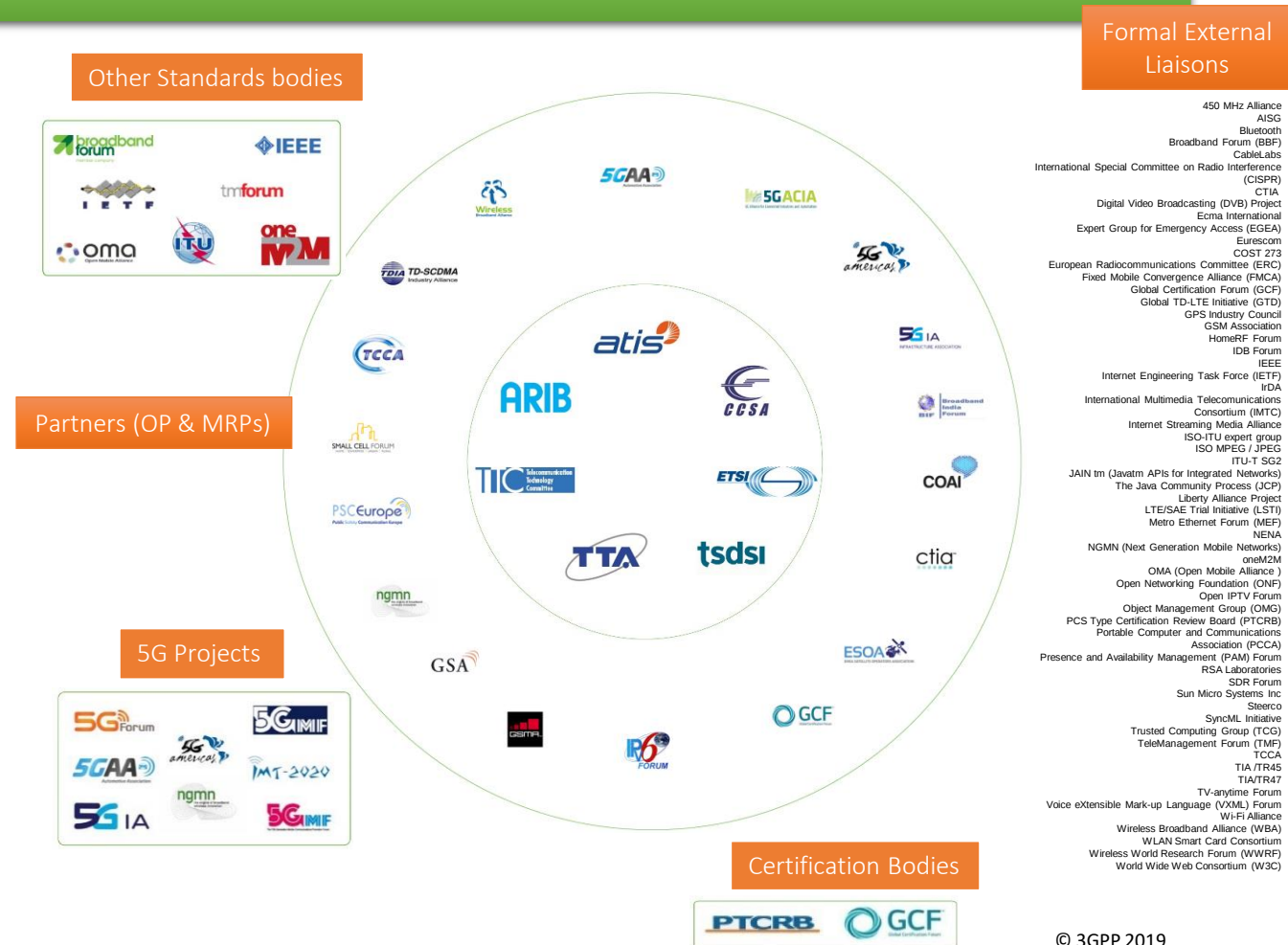
# 3GPP standards eco-system



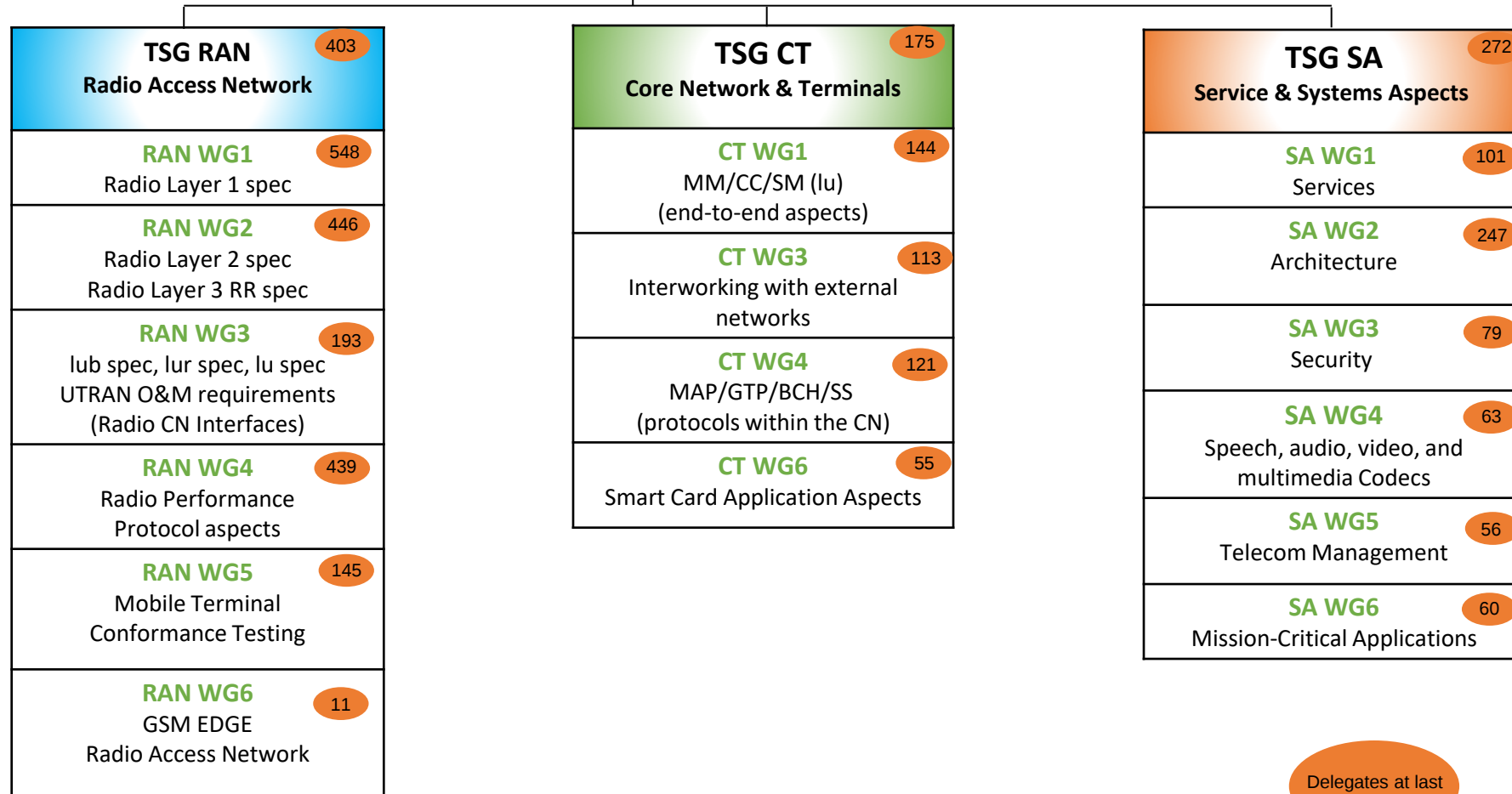
Participation in 3GPP is made possible by companies and organizations becoming members of one of the 3GPP **Organizational Partners**, the seven Standards Developing Organizations (SDOs) - from China, Europe, India, Japan, Korea and the United States.

Specific inputs, in the form of market requirements may also come in to the Project via any of the 18 **Market Representation Partners** in 3GPP. These organizations have all signed up to the 3GPP Project scope and objectives.

There is also a lot of external cooperation with other standards bodies and a broad variety of other groups, by way of formal Liaisons.



Project Coordination Group (PCG)



Delegates at last meeting



3GPP  
A GLOBAL INITIATIVE

[illegible]

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# 3GPP Work Plan



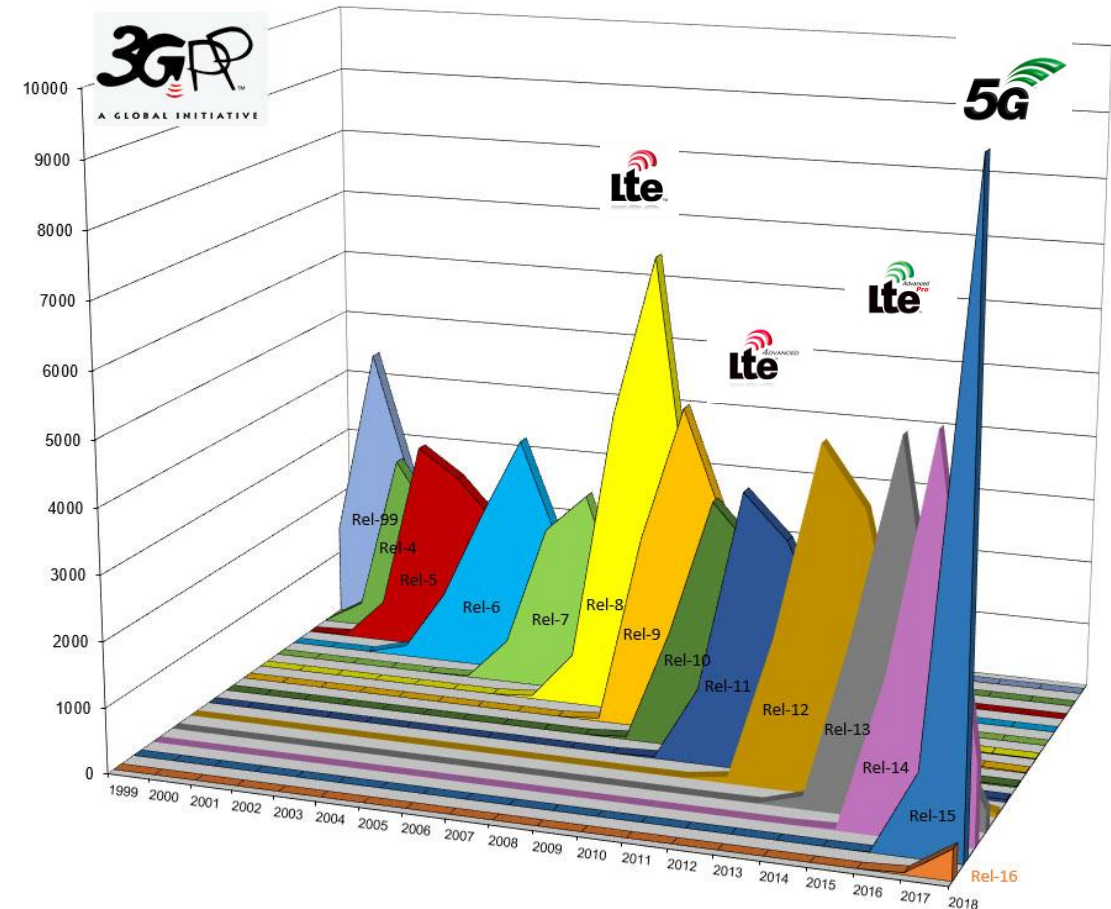
## Release-based work

- Releases are major packages of Features
- Work plan built using Work Items that deliver the Features
- Work Item Description exists for each of these
  - WI may cover more than one specification
  - WI may cover more than one TSG or WG
  - WI Description document exists for each WI

## Multiple releases maintained in parallel

## 3GPP WorkPlan:

- <http://www.3gpp.org/Work-Plan>



# Multiple breakthrough technologies

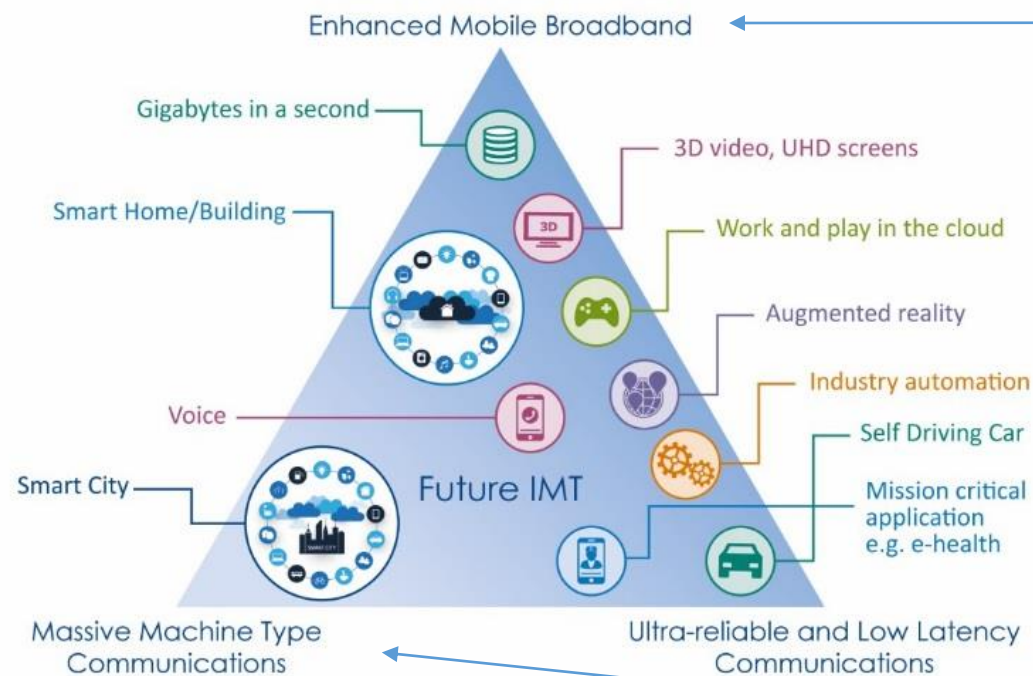


Perfect storm of :

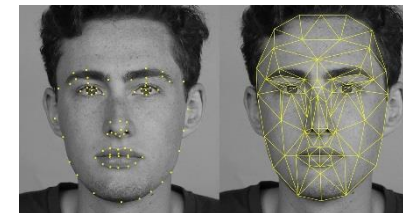
- Low latency radio with fully flexible network
- Artificial Intelligence and Automation
- Device revolution for AR/VR
- Vertical industries going cellular



# The IMT vision



Initial driver for early adopters of 3GPP 5G



Future capabilities will tip the balance of network load towards IoT

# Work on 5G NR

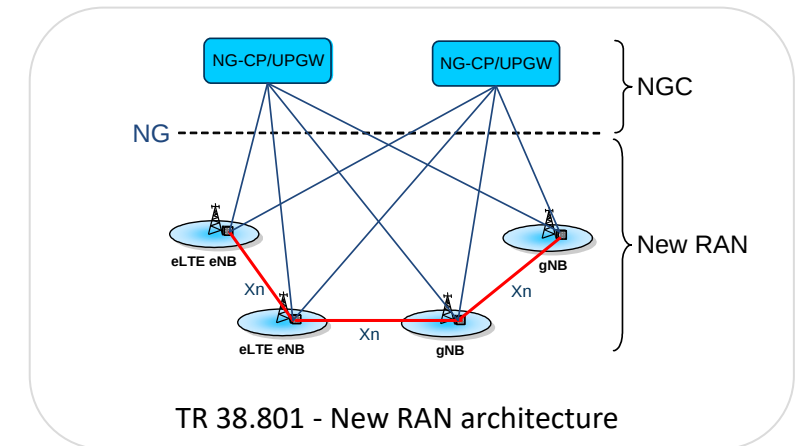


-  Operation from low to very high bands: 0.4 – 100GHz
  - Including standalone operation in unlicensed bands
-  Ultra wide bandwidth
  - Up to 100MHz in <6GHz
  - Up to 400MHz in >6GHz
-  Set of different numerologies for optimal operation in different frequency ranges

3GPP will standardize  
the Radio Access  
Architecture and Interfaces  
for a New Radio  
Technology for 5G.

# 5G NR

- Native forward compatibility mechanisms
- New channel coding
  - LDPC for data channel, Polar coding for control channel
- Native support for Low Latency and Ultra Reliability
- Flexible and modular RAN architecture: split fronthaul, split control- and user-plane
- Native end-to-end support for Network Slicing



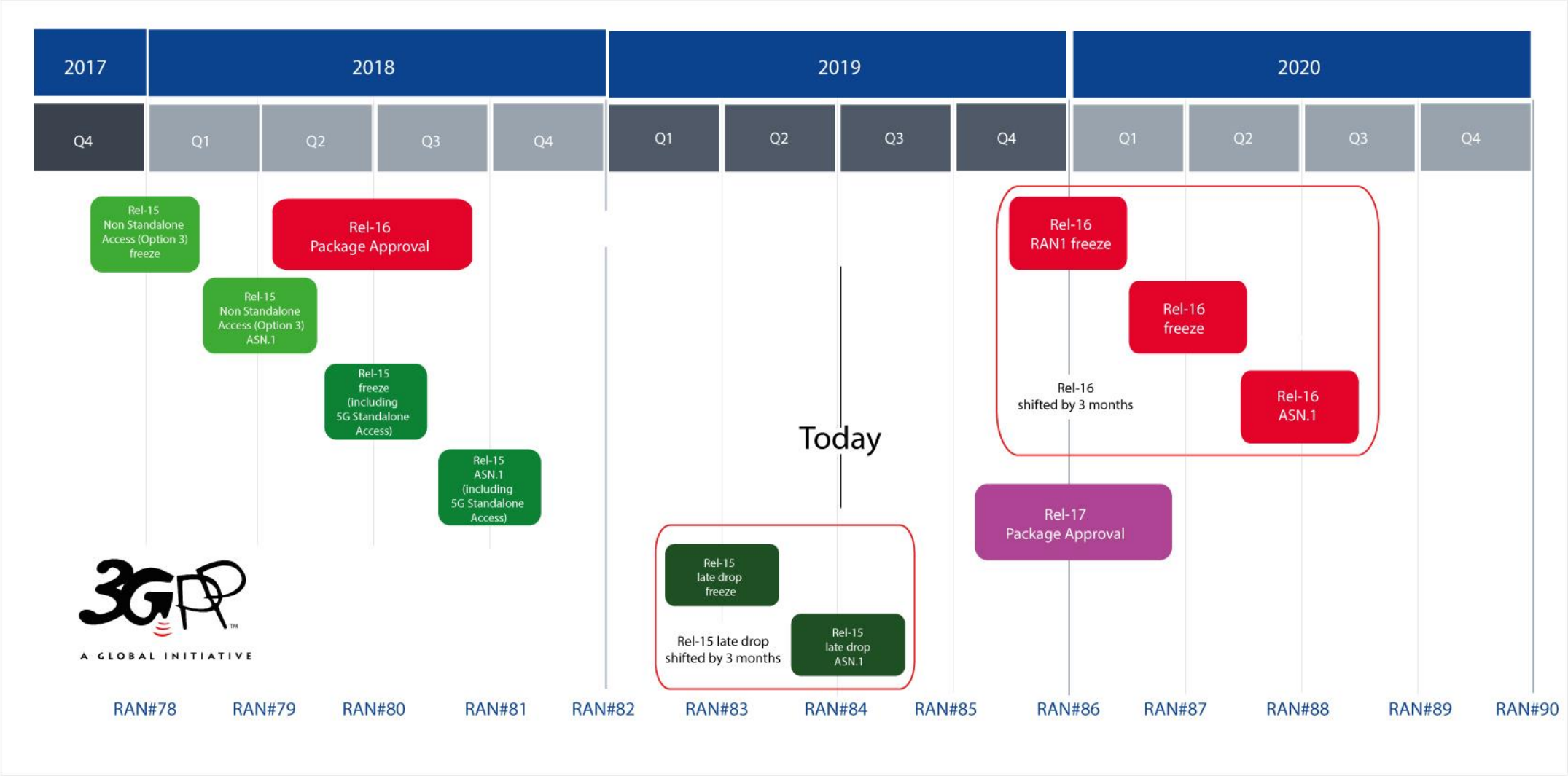
# Where are we now on 5G?



- 3GPP continues to expand the LTE platform to improve its efficiency to meet the mobile broadband demand
- 3GPP is on schedule with the standardization of 5G, addressing the expanded connectivity needs of the future
- Phases for the normative 5G work
  - Phase 1 (Rel-15): Addresses the more urgent subset for commercial deployments
  - Phase 2 (Rel-16): Completes the IMT 2020 submission, addresses all identified use cases & requirements

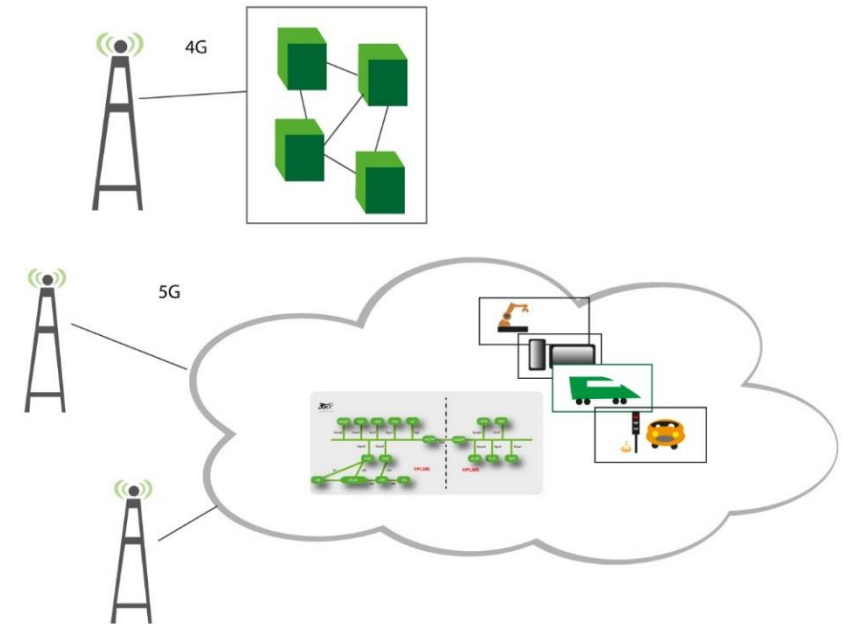


# Adjusted schedule for 2nd wave of 5G specifications (As at TSG RAN#82):



# Network Transformation

- One Network fits all ➔ Open & Flexible Enabler
- Telecom Operators ➔ Multiple Stakeholders
- Phones ➔ Things
- Procedures ➔ Services
- Static Topology ➔ On-demand Resources
- Dedicated Hardware ➔ Orchestrated Resources
  - Network Function ➔ Virtualization
  - Single Network ➔ Slice



# Future outlook



## 5G Vertical support

- Vehicle Communication, Mission Critical Communications, Industrial IoT, Audio Visual Production...



## Enhancements for the system coming:

- 5G LAN, High Precision Positioning, Cellular IoT for 5G, URLLC capabilities, Fixed and Satellite as 3GPP accesses, ONAP interworking, QoS Monitoring, Network Automation, protocol and core network improvements...



## 5G will span several releases, look out for the Rel-17 work plan soon



### Release 17

Functional Freeze: June 2021\*

#### ● TSG SA content & prioritization discussion at SA#85 (September 2019):

- 5G System Enhancement for Advanced Interactive Services
- Cellular IoT enhancement for the 5G System
- System enhancement for Proximity based Services in 5GS
- Enhancement of support for 5G LAN-type service
- Integration of Satellite in 5G Systems
- Architectural enhancements for 5G multicast-broadcast services
- Support for 5G Wireless Wireline Convergence
- Application Awareness Interworking between LTE and NR
- Extended Access Traffic Steering, Switch and Splitting support in the 5G architecture
- Enhanced IMS to 5GC Integration
- Enhancement to the 5GC LoCation Services Phase 2
- Enablers for Network Automation for 5G Phase 2
- Enhancement of support for Edge Computing in 5GC
- Enhanced support of Non-Public Networks
- Enhancement of Network Slicing Phase 2
- Enhancement of 5G UE Policy
- Architecture enhancements for 3GPP support of advanced V2X services - Phase 2
- Supporting Flexible Local Area Data Network
- Supporting Unmanned Aerial Systems Connectivity, Identification, and Tracking
- Enhanced support of Industrial IoT - TSC/URLLC enhancements
- Multimedia Priority Service (MPS) Phase 2
- Support for Multi-USIM Devices
- System architecture for next generation real time communication services
- Service-based support for SMS in 5GC
- Smarter User Plane
- UPF enhancement for control and SBA
- Usage of User Identifiers in the 5G System
- Enhancements for cyber-physical control applications in vertical domains
- Support for Minimization of service Interruption
- Complete Gap Analysis for Railways Mobile Communication System

#### ● TSG RAN Work Areas under discussion

For final decision on the Rel-17 content at RAN#86 (December 2019):

- NR Light
- Small data transfer optimization
- Sidelink enhancements
- NR above 52.6 GHz (incl 60GHz unlicensed)
- Multi SIM operation
- NR multicast broadcast
- Coverage enhancements
- NB-IoT and eMTC enhancements
- Industrial IoT & URLLC enhancements
- MIMO enhancements
- NR for Non Terrestrial Networks
- Integrated Access and Backhaul enhancements
- Generic enhancements to NR-U
- Power saving enhancements
- RAN data collection enhancements
- Positioning enhancements

Projected \*

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# Conclusions



- 3GPP is an industry driven standardization activity with truly global reach
- Standardization of interfaces enables an interoperable, multi-vendor approach to deployment and generates mass market economies of scale
- NR remains high focus for RAN groups
- IMT-2020 '5G' process progressing – 3GPP leading the way
- Release 16 focus continues to expand towards new use cases and new sectors
- The 3GPP processes are necessarily complex, but we need to adapt to bring new sectors in to the work
- 5G will be a multi-Release technology (beyond Release 16), Rel-17 in the planning stage

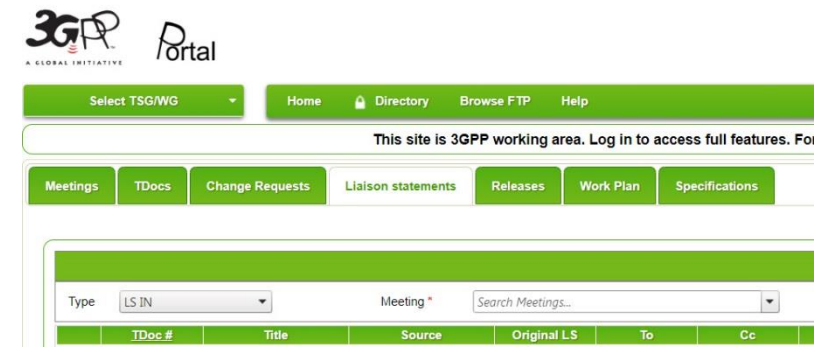
# For more Information



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[www.3gpp.org](http://www.3gpp.org)



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