

# Introducing 3GPP

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# Content



- What is 3GPP (and what is not)?
- The role of 3GPP
- 3GPP – How the project works
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- Technical Specification Groups
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- 5G Releases
- Rel-18 Priority work
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# What is 3GPP (and what is it not)?



- It is ...
  - A loose association of regional and national Standards Development Organizations (SDOs) from around the globe.
- It is populated by ...
  - Delegates representing member organizations of those SDOs.
  - Delegates of the SDOs themselves.
  - Delegates representing organizations considering becoming members

# What is 3GPP (and what is it not)?



## It is **not** ...

- A government agency
- A regulatory body
- An arm of the ITU or the United Nations
- An arm of the EU or of CEPT
- A certification body
- A frequency-allocation body
- A legally constituted entity

# The role of 3GPP



- Part of the invention, proof of concept, **standardization**, trials, commercialization ...cycle
- Specifications and Studies providing a complete **system description** for mobile telecommunications
- The system description is characterized by a number of **standardized interfaces**. It is **not** a description of a standardized **deployment**
- This standardization effort enables an interoperable, multi-vendor approach to deployment and generates mass market economies of scale, without stifling innovation



# 3GPP – How the project Works



## 3GPP works based on

- Participation in face-to-face meetings
- Pro-activity & Contributions – you need written proposals to get attention
- Consensus – nobody says “no” in order to progress

## Work organization

- Study Items, Work Items
- Releases with fixed time-lines, which are partially overlapping
- [Work Plan](#) (good overview)

## 3 stages, often overlapping

- Stage 1: Requirements
- Stage 2: Architecture
- Stage 3: Protocols

## Companies not individuals participate

- From all over the world
- All major telecommunication companies – operators, vendors, service providers
- Ministries, Regulators and government agencies actively engaged
- More and more vertical industry representatives bring their work directly to 3GPP

## Amazing Track Record

- 3GPP started 1998, since then all major standards projects were deployed
- Seamless migration from “old” to “new” mobile generations

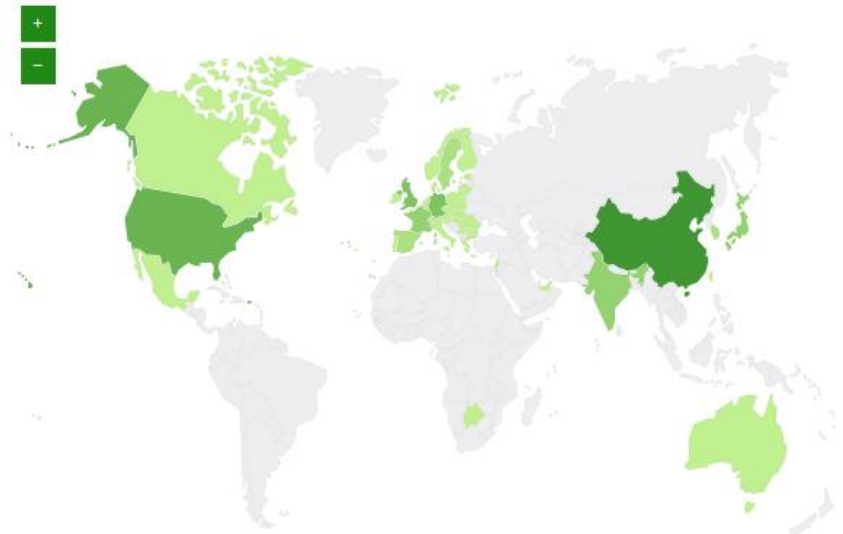
## A new Release every 15 to 24 months

- Allows for reasonably fast standardization & deployment of new technologies
- Strong commitment to time-lines guarantees reliable planning

# 3GPP Membership



## 3GPP Global Membership



< 20 20 40 60 80 100 120 140 > 160

42

Countries

838

Organizational Partner Members

14086

Number delegates at meetings this year

120

3GPP Meetings per year

4137

3GPP Specifications

ARIB

atis

CCSA

ETSI

tsdsi  
India's Telecom SDO

TTA

TTC  
Telecommunication  
Technology  
Committee

The 3GPP Organizational Partners – from Asia, Europe and North America – determine the general policy and strategy of 3GPP.

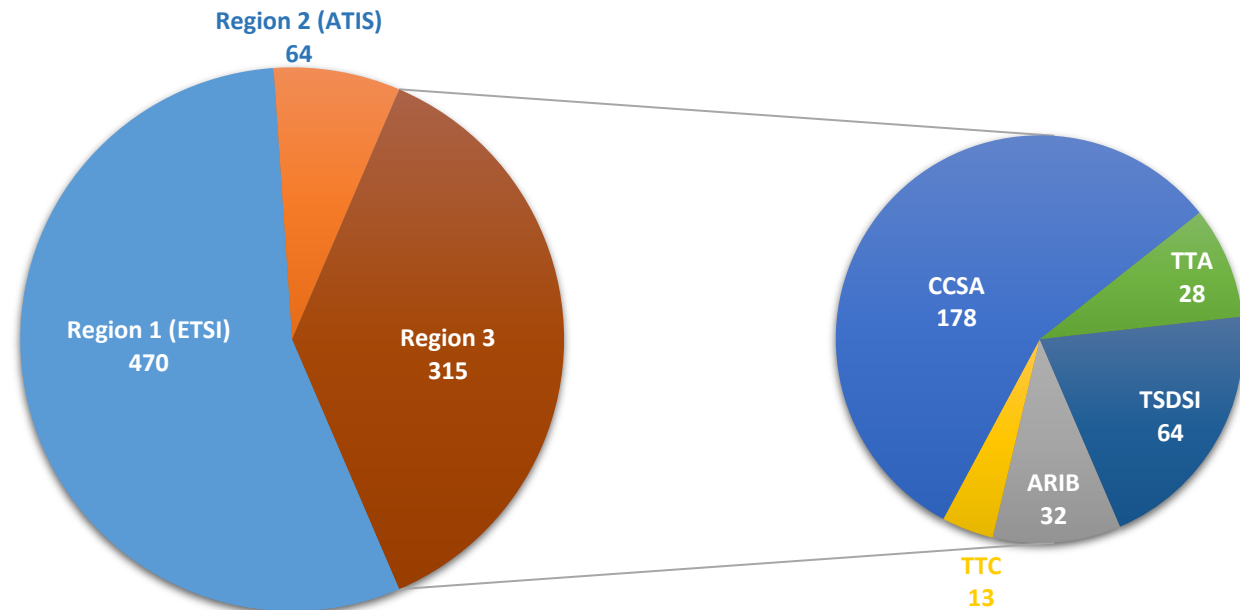
838 organizations have joined 3GPP via one of these seven OPs.

<https://www.3gpp.org/about-us/partners>

# 3GPP Membership



	TSG#101	TSG#100
ETSI	470	458
ATIS	64	63
ARIB	32	32
TTC	13	12
CCSA	178	173
TTA	28	28
TSDSI	64	55
<b>Total</b>	<b>849</b>	<b>821</b>



- Europe
- North America
- Asia

Total membership = 849 (821)

Guests = 34 (30)

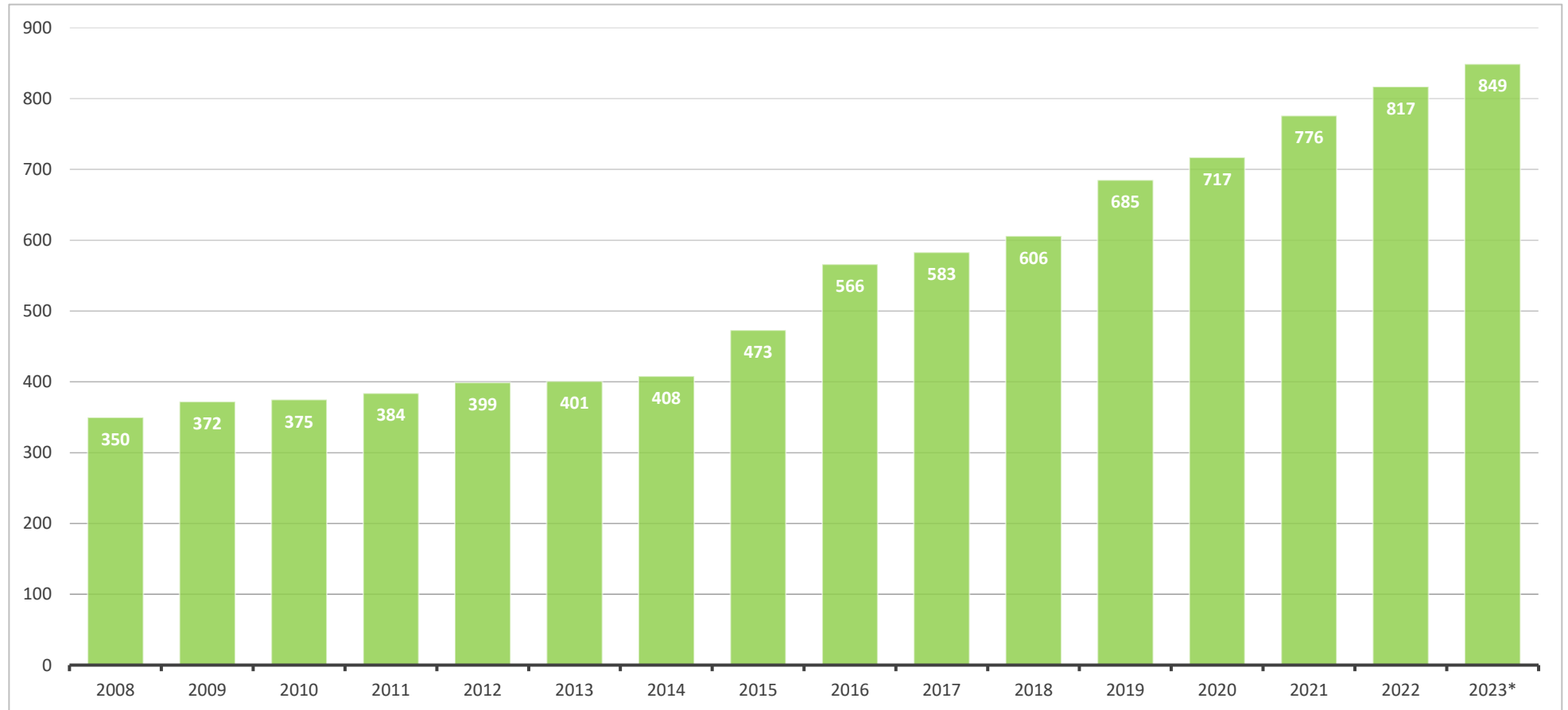
Data of 08/09/2023



# 3GPP Membership



Number of Individual Members in 3GPP is more than 800



# 3GPP standards eco-system



## 3GPP Organizational Partners (OPs)

838 companies



- The 3GPP **Organizational Partners (OP)** - 7 Standards Organizations - from China, Europe, India, Japan, Korea and the United States.
- Participation in 3GPP by companies and organizations becoming Members of one of these 7 OPs.
- Inputs on market requirements may come in to the Project via 3GPP **Market Representation Partners (MRP)**.
- There is a lot of additional **external liaison** activity...SDOs, Industry bodies, projects...

## 3GPP Market Representation Partners (MRPs)



## Next Generation Projects

### 5G Projects



...

### Certification Bodies



## Official Liaisons on specification work:

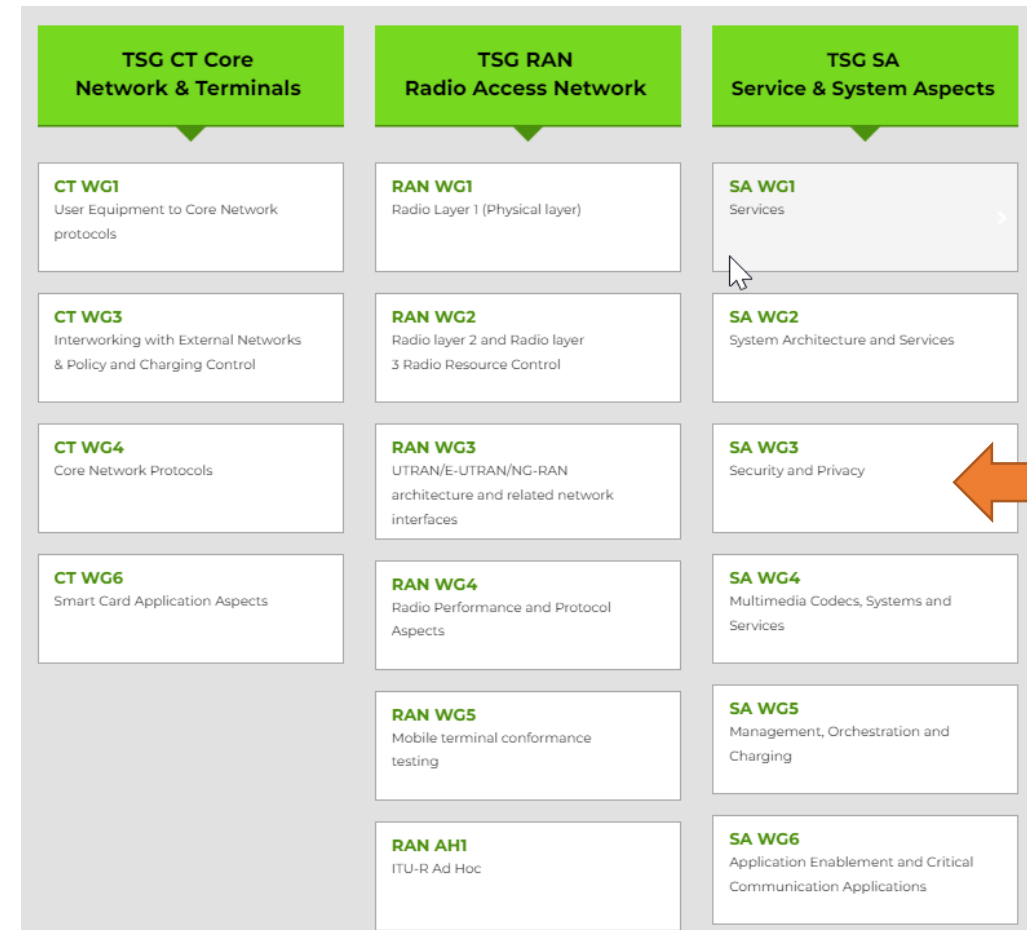
450 MHz Alliance, AISG, Bluetooth, Broadband Forum (BBF), CableLabs, International Special Committee on Radio Interference (CISPR), CTIA, Digital Video Broadcasting (DVB) Project, Ecma, International, Expert Group for Emergency Access (EGEA), Eurescom, COST 273, European Radiocommunications Committee (ERC), Fixed Mobile Convergence Alliance (FMCA), GCF, Global TD-LTE Initiative (GTD), GPS Industry Council, GSM Association, HomeRF Forum, IDB Forum, IEEE, Internet Engineering Task Force (IETF), IrDA, International Multimedia Telecommunications Consortium (IMTC), Internet Streaming Media Alliance, ISO-ITU expert group, ISO MPEG / JPEG, ITU-T SG2, JAIN tm (Javatm APIs for Integrated Networks), The Java Community Process (JCP), Liberty Alliance Project, Metro Ethernet Forum (MEF), NENA, NGMN (Next Generation Mobile Networks), oneM2M, OMA (Open Mobile Alliance), Open Networking Foundation (ONF), Open IPTV Forum, Object Management Group (OMG), PCS Type Certification Review Board (PTCRB), Portable Computer and Communications Association (PCCA), Presence and Availability Management (PAM) Forum, RSA Laboratories, SDR Forum, Sun Micro Systems Inc., Steerco, SyncML Initiative, Trusted Computing Group (TCG), TeleManagement Forum (TMF), TCCA, TIA /TR45, TIA/TR47, ITU, TV-anytime Forum, Voice eXtensible Markup Language (VXML) Forum, Wi-Fi Alliance, Wireless Broadband Alliance (WBA), WLAN Smart Card Consortium, Wireless World Research Forum (WWRF), World Wide Web Consortium (W3C)

(Source: extract from <https://www.3gpp.org/about-3gpp/15-bodies-with-which-3gpp-has>)

# Technical Specification Groups



- The TSGs prepare, approve and maintain the 3GPP Technical Specifications and Technical Reports.
- They are responsible for the detailed time frame and management of the work's progress;
  - Management of work items;
  - Technical Co-ordination;
  - Proposal and approval of work items within the agreed scope and terms of reference of the TSG
- The TSG Chair is responsible for the overall management of the technical work within the TSG and its Working Groups.
- The WG Chair is responsible for the overall management of the technical work within the WG and its sub-groups.



# Bringing the work in to the groups



## Use Case diversity

- High or Low data rates
- Higher user mobility
- Improved coverage

## Overall System Goals

- Enable new business
- Greater efficiency
- More flexibility – not one-size-fits-all



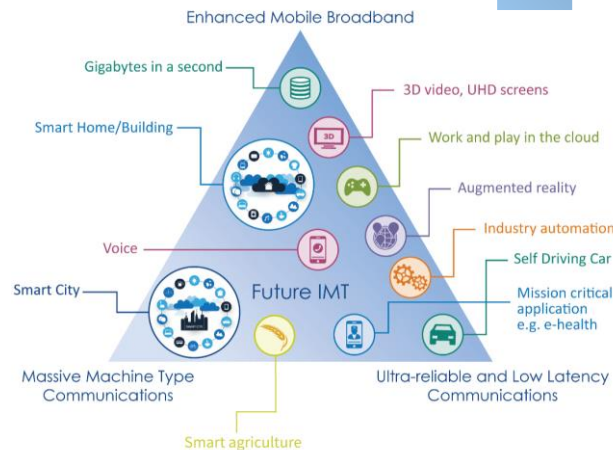
## 3GPP Working Groups

TSG CT Core Network & Terminals	TSG RAN Radio Access Network	TSG SA Service & System Aspects
<b>CT WG1</b> User Equipment to Core Network protocols	<b>RAN WG1</b> Radio Layer 1 (Physical layer)	<b>SA WG1</b> Services
<b>CT WG3</b> Interworking with External Networks & Policy and Charging Control	<b>RAN WG2</b> Radio layer 2 and Radio layer 3 Radio Resource Control	<b>SA WG2</b> System Architecture and Services
<b>CT WG4</b> Core Network Protocols	<b>RAN WG3</b> UTRAN/E-UTRAN/NG-RAN architecture and related network interfaces	<b>SA WG3</b> Security and Privacy
<b>CT WG6</b> Smart Card Application Aspects	<b>RAN WG4</b> Radio Performance and Protocol Aspects	<b>SA WG4</b> Multimedia Codecs, Systems and Services
	<b>RAN WG5</b> Mobile terminal conformance testing	<b>SA WG5</b> Management, Orchestration and Charging
	<b>RAN AH1</b> ITU-R Ad Hoc	<b>SA WG6</b> Application Enablement and Critical Communication Applications

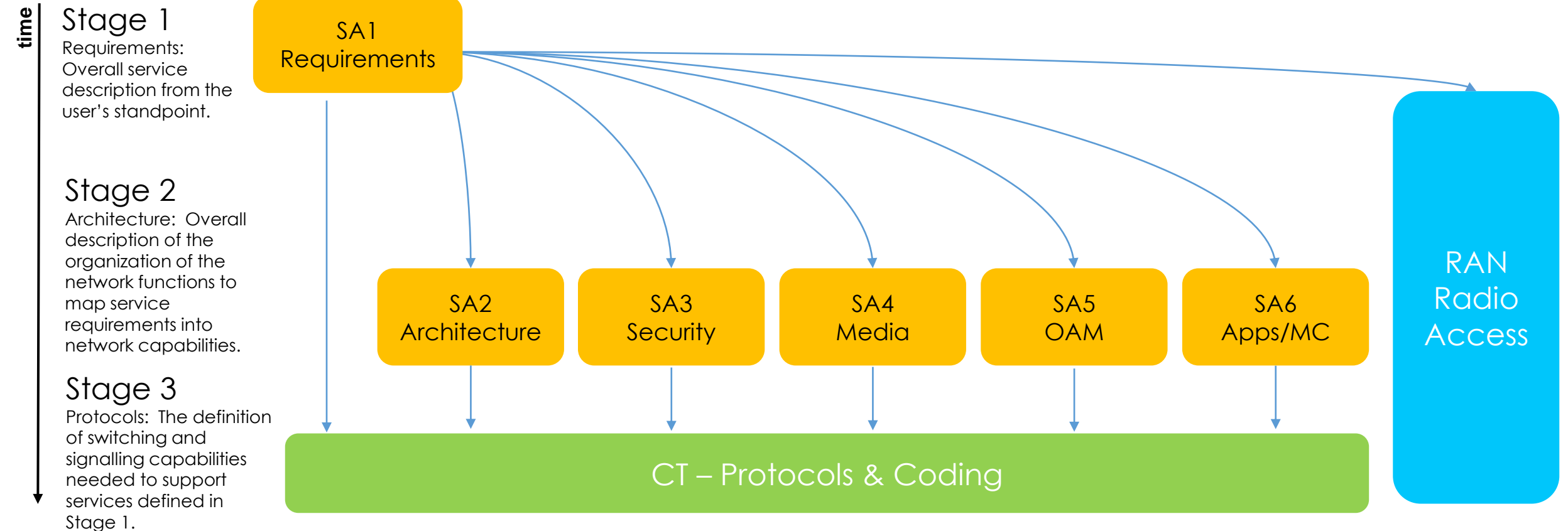


## 3GPP Specifications and Reports:

Requirements	21 series
Service aspects ("stage 1")	22 series
Technical realization ("stage 2")	23 series
Signalling protocols ("stage 3") - user equipment to network	24 series
Radio aspects	25 series
CODECs	26 series
Data	27 series
Signalling protocols ("stage 3") -(RSS-CN) and OAM&P and Charging (overflow from 32.- range)	28 series
Signalling protocols ("stage 3") - intra-fixed-network	29 series
Programme management	30 series
Subscriber Identity Module (SIM / USIM), IC Cards. Test specs.	31 series
OAM&P and Charging	32 series
Security aspects	33 series
UE and (U)SIM test specifications	34 series
Security algorithms	35 series
LTE (Evolved UTRA), LTE-Advanced, LTE-Advanced Pro radio technology	36 series
Multiple radio access technology aspects	37 series
Radio technology beyond LTE	38 series



# Three stage approach to Features, through Releases

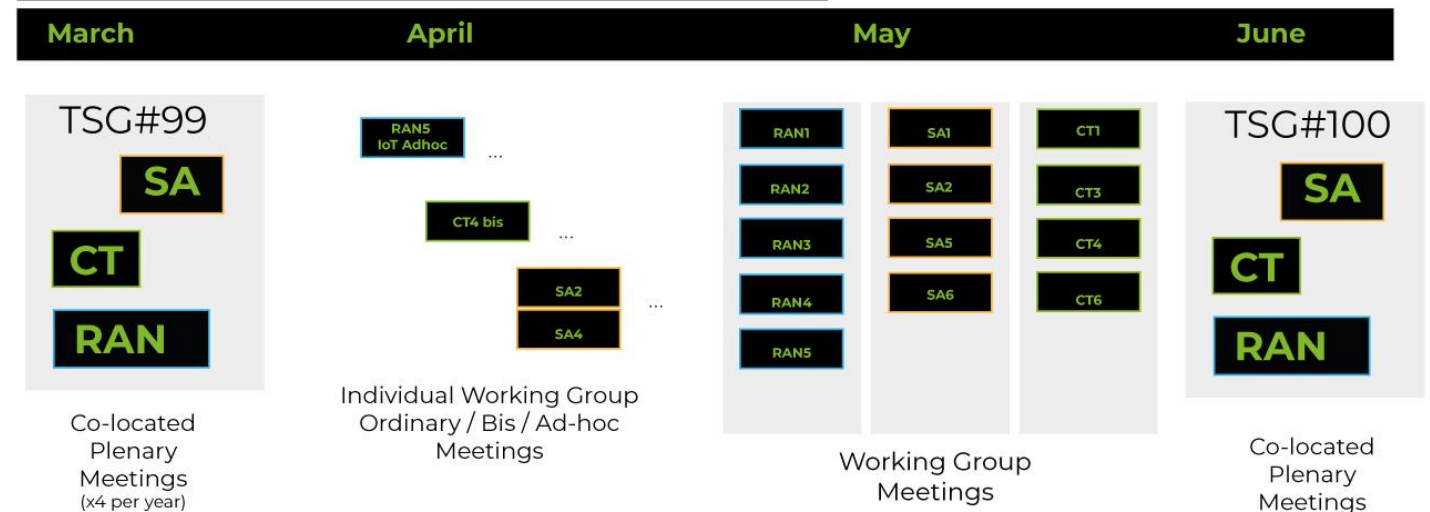


# Work Schedule driven by technical meetings



- New work is initiated by member companies as Work Items, via Tdocs at meetings
- Work Items are prioritised and allocated time for discussion during meetings
- 3GPP member companies may contribute to any work item, on equal terms
- 3GPP seeks **consensus** on all technical matters (but has mechanisms if consensus cannot be reached)
- The Release deadline is respected. Unfinished work is deferred to a later release

## 3GPP Meeting Cycle (Q2 example)



These examples are to demonstrate the principle and are not based on actual meeting dates.

# 3GPP productivity



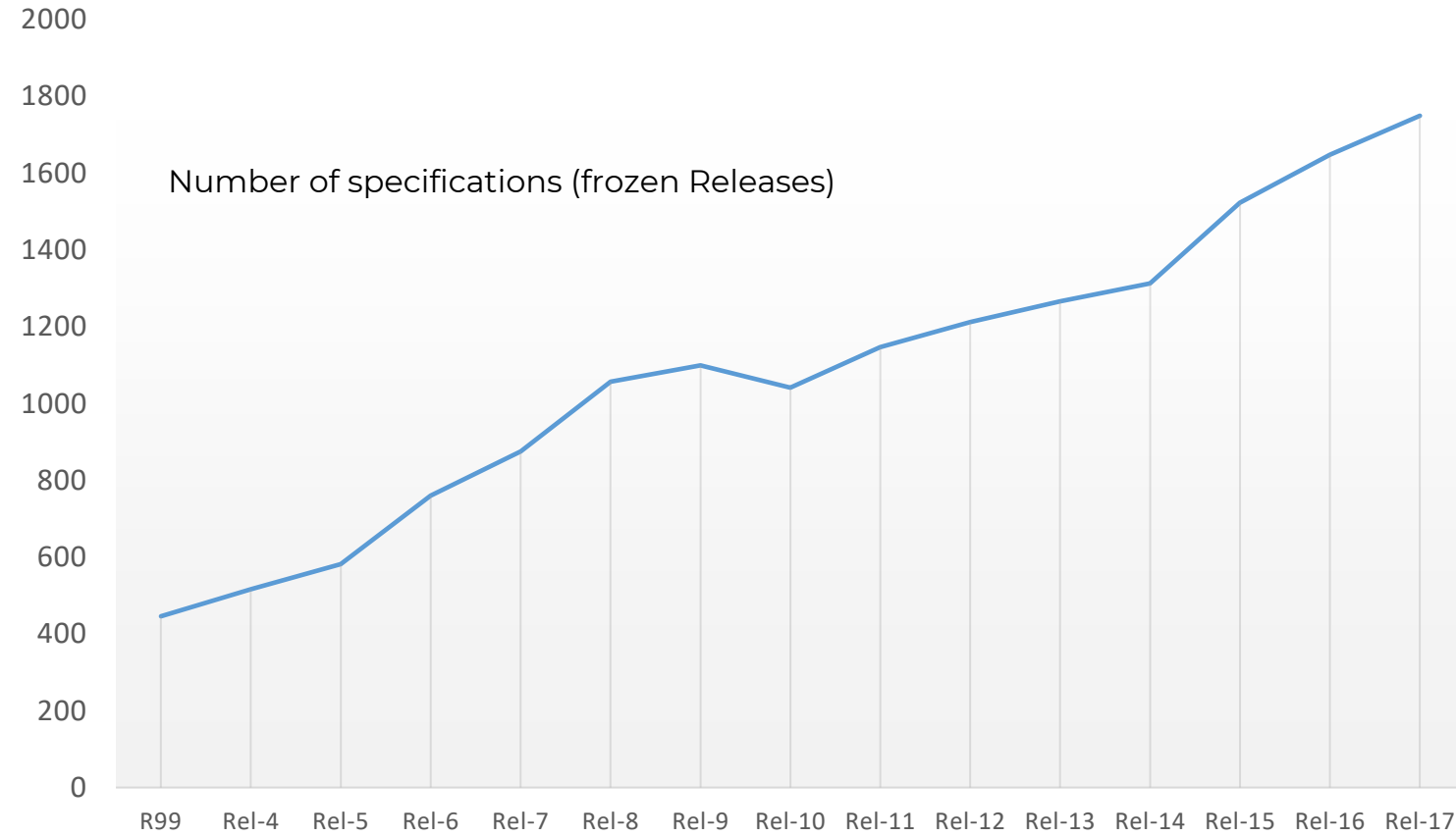
## Release-based work

- Releases are major packages of Features (There is a new 3GPP Release ~ every 15 – 24 months)
- A strong commitment to time-lines guarantees reliable planning and time-to-market
- The Work plan is built-up of Work Items that deliver the Features
- Work Items:
  - 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 are maintained in parallel

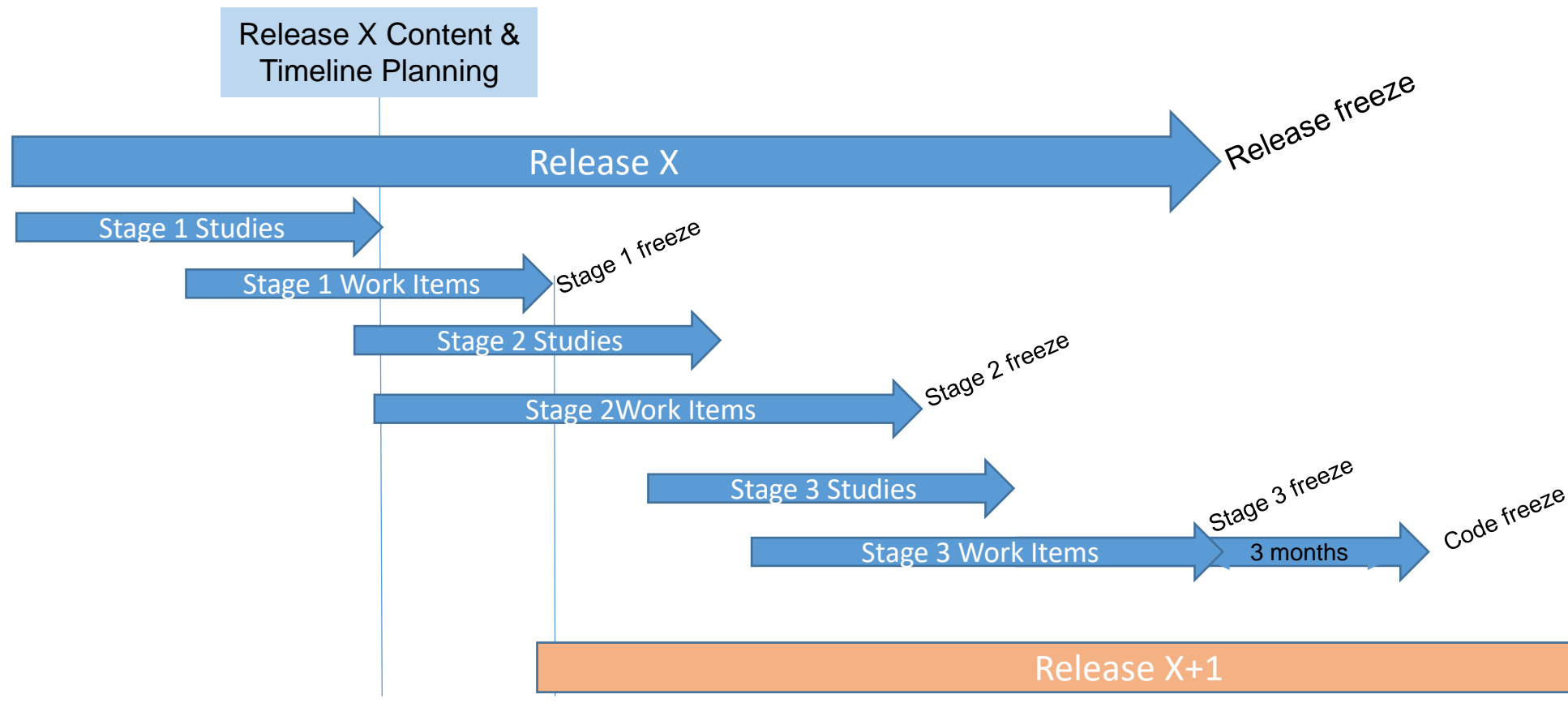
## See the 3GPP Work Plan for details of features:

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



December 2022

# Releases (simplified)

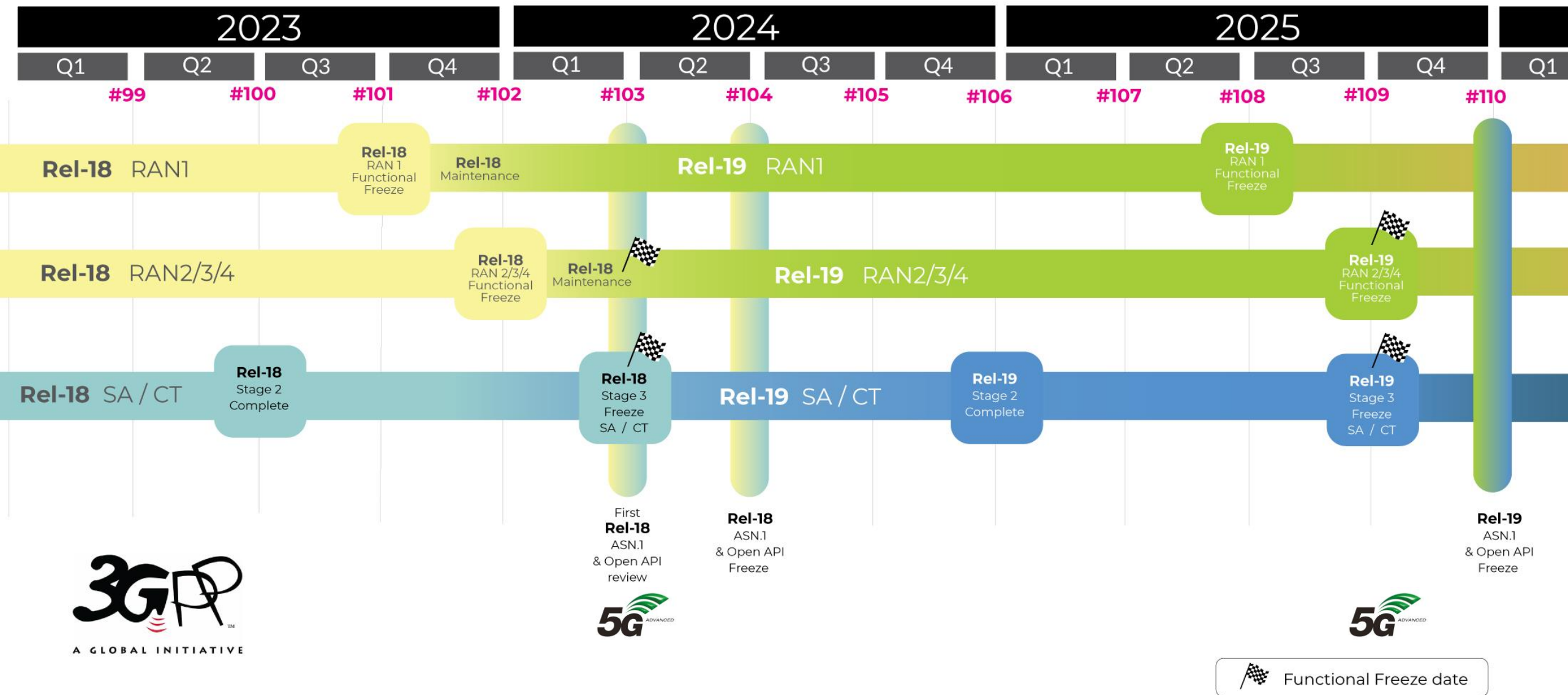





# 5G Releases

- 📶 **Release 15:** The work on new radio (nr) and the 5G system (5GS) jointly addressed the urgent subset of needs for early commercial deployments.
- 📶 **Release 16:** Met all identified 5G use cases, to allow a full 3GPP IMT-2020 submission to ITU-R.
- 📶 **Release 17:** Enhances the earlier 5G work, meeting more 'vertical' industry needs, specifying NR operation in unlicensed bands, NR MIMO, V2-everything.
- 📶 **Release 18:** The current focus of the groups, scheduled for completion during 2024. Rel-18 will see a balanced evolution in terms of:
  - Mobile broadband evolution versus further vertical domain expansion;
  - Immediate versus longer-term market needs;
  - Device evolution versus network evolution.
  - **5G-Advanced** is a mid-generational marker (covers Rel-18, 19, 20)
- 📶 **Release 19:** From 2024
- 📶 6G mobile systems come later. 6G time-to-market expected to be 2030.





 Functional Freeze date

Graphic adapted from original data in [SP-230738](#) Work Plan report to TSG SA#100

# Release 18



## Release 18:

Poster size version of this graphic is available at

<https://www.3gpp.org/release18>

### TSG SA priorities



#### SA2 led - System Architecture and Services

- XR (Extended Reality) & media services
- Edge Computing Phase 2
- System Support for AI/ML-based Services
- Enablers for Network Automation for 5G Phase 3
- Enh. support of Non-Public Networks Phase 2
- Network Slicing Phase 3
- 5GC LoCatIon Services Phase 3
- 5G multicast-broadcast services Phase 2
- Satellite access Phase 2
- 5G System with Satellite Backhaul
- 5G Timing Resiliency and TSC & URLLC enh.
- Evolution of IMS multimedia telephony service
- Personal IoT Networks
- Vehicle Mounted Relays

#### SA3 led - Security and Privacy

- Privacy of identifiers over radio access
- SECAM and SCAS for 3GPP virtualized network products and Management Function (MnF)
- Mission critical security enhancements Phase 3
- Security and privacy aspects of RAN & SA features

#### SA4 led - Multimedia Codecs, Systems and Services

##### Systems & Media Architecture:

- 5G Media, Service Enablers
- SpII-Rendering
- 5G XR Experiences Architecture

##### Media:

- Video codec for 5G
- Media Capabilities for Augmented Reality Glasses
- AI / ML Study

##### Real-Time Communications:

- XR conversational services
- WebRTC-based services and collaboration models

##### Immersive Voice & Audio:

- EVS Codec Extension for Immersive Voice and Audio Services (IVAS\_Codec)
- Terminal Audio quality performance and Test methods for Immersive Audio Services (ATIAS)

##### Streaming & Broadcast services:

- SGMS Enh. (Network slicing, Low latency, Background traffic, SGMS Uplink)
- Further MBS Enh. (Free to air, Hybrid unicast/broadcast)

\*These are preliminary lists (As at SA#94-e)

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- Access Traffic Steering, Switching & Splitting support in the 5G system architecture Phase 3
- Proximity-based Services in 5GS Phase 2
- UPF enh. for Exposure & SBA
- Ranging based services & sidelink positioning
- Generic group management, exposure & communication enh.
- 5G UE Policy Phase 2
- UAS, UAV & UAM Phase 2
- 5G AM Policy Phase 2
- RedCap Phase 2
- Support for 5WWC Phase 2
- System Enabler for Service Function Chaining
- Extensions to TSC framework to support DetNet
- Seamless UE context recovery
- MPS when access to EPC/5GC is WLAN

#### SA5 led - Management, Orchestration and Charging

##### Operations, Administration, Maintenance and Provisioning (OAM&P):

- Intelligence and Automation: Self-Configuration of RAN NEs, Enh. autonomous network levels, Evaluation of autonomous network levels, Enh. intent driven management services for mobile networks, AI/ML management, Enh. of the management aspects related to NWDAF

- Management Architecture and Mechanisms: Network slicing provisioning rules, Enh. service based management architecture

- Support of New Services: Enh. Energy Efficiency for 5G Phase 2, New aspects of Energy Efficiency for 5G networks Phase 2, Enh. management of Non-Public Networks, Network and Service Operations for Energy Utilities, Key Quality Indicators (KQIs) for 5G service experience, Deterministic Communication Service Assurance

##### Charging:

- Charging Aspects for Enh. Support of Non-Public Networks

#### SA6 led - Application Enablement & Critical Communication Applications

##### Critical Communications:

- MCX Enhancements - MC over 5GS (5MBS, ProSe) Adhoc group comm., MCPIT Enh.
- Railways - Gateway UE, Interworking

##### Service Frameworks:

- Edge App Architecture Enh., SEAL Enh., Subscriber-Aware API (CAPIF Enh.)
- Fused location, Application Data Analytics, App Layer NW Slicing

##### Enablers for Vertical Applications:

- Enhancements to V2X, UAS application-enablement
- Future Factories, Personal IoT networks, Capability exposure for IoT platforms

See the 3GPP Work Plan for full details, as Release 18 develops: [www.3gpp.org/specifications/work-plan](http://www.3gpp.org/specifications/work-plan)

### TSG RAN priorities



#### RAN1 led - Radio Layer 1 (Physical layer)

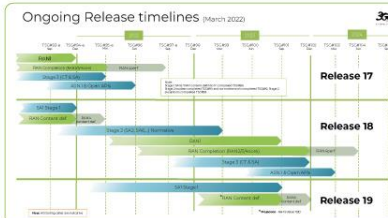
- MIMO Evolution for Downlink and Uplink
- Study on Artificial Intelligence (AI)/Machine Learning (ML) for NR Air Interface
- Study on Evolution of NR Duplex Operation
- NR sidelink evolution
- Study on expanded and Improved NR positioning
- Study on further NR RedCap UE complexity/cost reduction
- Study on network energy savings
- Further NR coverage enhancements
- Study on NR Network-Controlled Repeaters
- Enh. of NR Dynamic spectrum sharing (DSS)
- Study on low-power Wake-up Signal and Receiver for NR
- Multi-carrier enhancements for NR

#### RAN2 led - Radio layer 2 & layer 3 Radio Resource Control

- NR Mobility Enh.
- Study on XR Enh. for NR
- NR sidelink relay enh.
- NR NTN (Non-Terrestrial Networks) enh.
- IoT NTN enh.
- NR Support for UAV
- Dual Tx/Rx MUXIM
- In-Device Co-existence (IDC) enh. for NR and MR-DC
- Mobile Terminated-Small Data Transmission (MT-SDT) for NR
- Enh. of NR Multicast and Broadcast Services

#### RAN3 led - UTRAN/E-UTRAN/NG-RAN architecture & related network interfaces

- Mobile IAB
- Artificial Intelligence (AI)/Machine Learning (ML) for NG-RAN
- Further enh. of data collection for SON (Self-Organising Networks)/MDT (Minimization of Drive Tests) in NR and EN-DC
- Enh. on NR QoE management and optimizations for diverse services
- Study on enh. for resiliency of gNB-CU



### Release 18

#### RAN4 led - Radio Performance and Protocol Aspects\*

- Further RF requirements enh. for NR frequency range 1 (FR1)
- NR RF requirements enh. for frequency range 2 (FR2), Phase 3
- Req. for NR frequency range 2 (FR2) multi-Rx chain DL reception
- RRM enh. for NR and MR-DC
- Enh. on NR and MR-DC Measurement Gaps and Measurements without Gaps
- NR demodulation performance evolution
- Study on simplification of band combination specification
- Study on enh. for 700/800/900MHz band combinations
- NR BS RF requirement evolution
- Study on NR frequency range 2 (FR2) Over-the-Air (OTA) testing enh.
- Support of intra-band non-collocated EN-DC/NR-CA deployment
- Enh. NR support for high speed train scenario in frequency range 2 (FR2)
- BS/UE EMC enh.
- Air-to-ground network for NR
- NR support for dedicated spectrum less than 5MHz for FR1

\*There are other approved items related to Rel-17 continuation; more spectrum-related items are expected to be approved later.

### TSG CT priorities



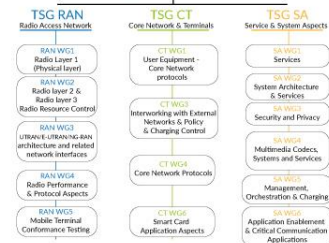
#### Rel-18 Workplan for TSG CT

CT will work on stage 3 completion and ASN.1 code and OpenAPI freeze of Rel-17 until June 2022 (TSG#96).





Work Item discussion on Rel-18 stage 2 / stage 3 (under CT) from June 2022.

CT waits for a stable output of the stage 2 work in SA and RAN before initiating the work on Rel-18 (expected TSG#99 March 2023). Completion of stage 3 is targeted for TSG#103 March 2024.

#### 3GPP Project Co-ordination Group (PCG)





- 
 3GPP is industry driven - Standardization of interfaces enables an interoperable, multi-vendor approach to deployment.
- 
 The 3GPP processes are necessarily complex, but we will adapt to bring new sectors in to the work.
- 
 Release 19 content and priorities discussion ongoing. **NOW is the time to influence this work.**
- 
 Release 18 and **Release 19 will have an important role in helping to lay early foundations for future work on 6G technologies.**

Meeting	Start	End	City
3GPP CT1#143	21-Aug-23	25-Aug-23	Goteborg
3GPP CT3#129	21-Aug-23	25-Aug-23	Goteborg
3GPP CT4#117	21-Aug-23	25-Aug-23	Goteborg
3GPP CT6#116	22-Aug-23	25-Aug-23	Goteborg
3GPP SA1#103	21-Aug-23	25-Aug-23	Goteborg
3GPP SA2#158	21-Aug-23	25-Aug-23	Goteborg
3GPP SA3#112	14-Aug-23	18-Aug-23	Goteborg
3GPP SA4#125	21-Aug-23	25-Aug-23	Goteborg
3GPP SA5#150	21-Aug-23	25-Aug-23	Goteborg
3GPP SA6#56	21-Aug-23	25-Aug-23	Goteborg
3GPP RAN1#114	21-Aug-23	25-Aug-23	Toulouse
3GPP RAN2#123	21-Aug-23	25-Aug-23	Toulouse
3GPP RAN3#121	21-Aug-23	25-Aug-23	Toulouse
3GPP RAN4#108	21-Aug-23	25-Aug-23	Toulouse
3GPP RAN5#100	21-Aug-23	25-Aug-23	Toulouse
3GPP CT#101	11-Sep-23	12-Sep-23	Bangalore
3GPP RAN#101	11-Sep-23	15-Sep-23	Bangalore
3GPP SA#101	11-Sep-23	15-Sep-23	Bangalore
3GPP CT#102	11-Dec-23	12-Dec-23	Edinburgh
3GPP RAN#102	11-Dec-23	15-Dec-23	Edinburgh
3GPP SA#102	11-Dec-23	15-Dec-23	Edinburgh



# For more info on 3GPP...



- All documents available online; [www.3gpp.org](http://www.3gpp.org)
- Attend special newcomers sessions at F2F Plenary meetings
- Subscribe to our regular newsletter 'Highlights'
- Keep in touch;
  - Info, membership, marcom, liaisons;

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



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