3GPP Standardization

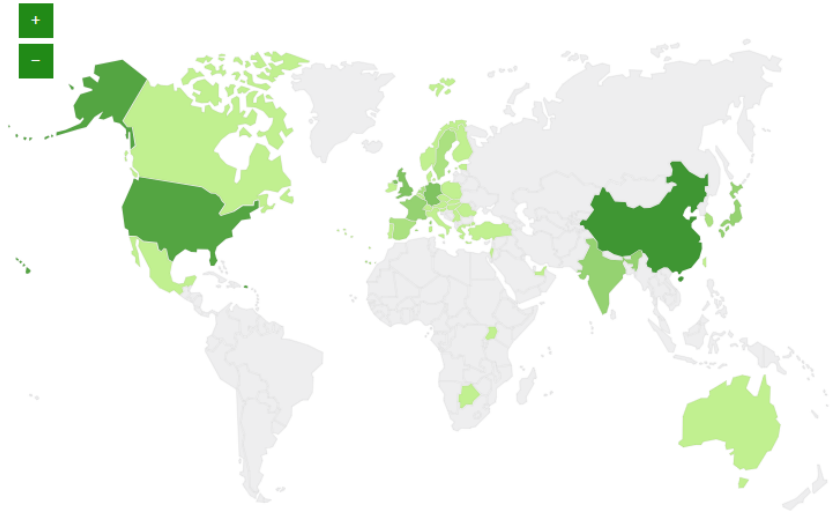**Peter Schmitt**

3GPP TSG CT Chair

3GPP Standardization

- 3GPP standards environment.

- Technical Specification Groups (TSG).

- Three stage approach to Features and Releases.

- Rel-19 timeline & feedback from TSG#105

3GPP Membership

3GPP Global Membership

41
Countries

838
Organizational Partner Members

17447
Number delegates at meetings this year

123
3GPP Meetings per year

4296
3GPP Specifications

< 20 20 40 60 80 100 120 140 > 160

September 2024

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

Companies and Organizations have joined 3GPP as Members via one of these OPs.

ARIB   atis   CCSA

ETSI   tsdsi   TTA   TIC Telecommunication Technology Committee
India's Telecom SDO

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

The role of 3GPP

- **Standardization** of three generations of cellular. Soon to be four!

- Providing the **system description** for mobile telecommunications

- This system description is characterized by a number of **standardized interfaces**.

- Enabling an interoperable, multi-vendor approach to deployment for mass market economies of scale, without stifling innovation

Telco and 'verticals' Use cases

Research & Development

5G Specifications

3GPP standards eco-system

3GPP Organizational Partners (OPs)

800+ 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)

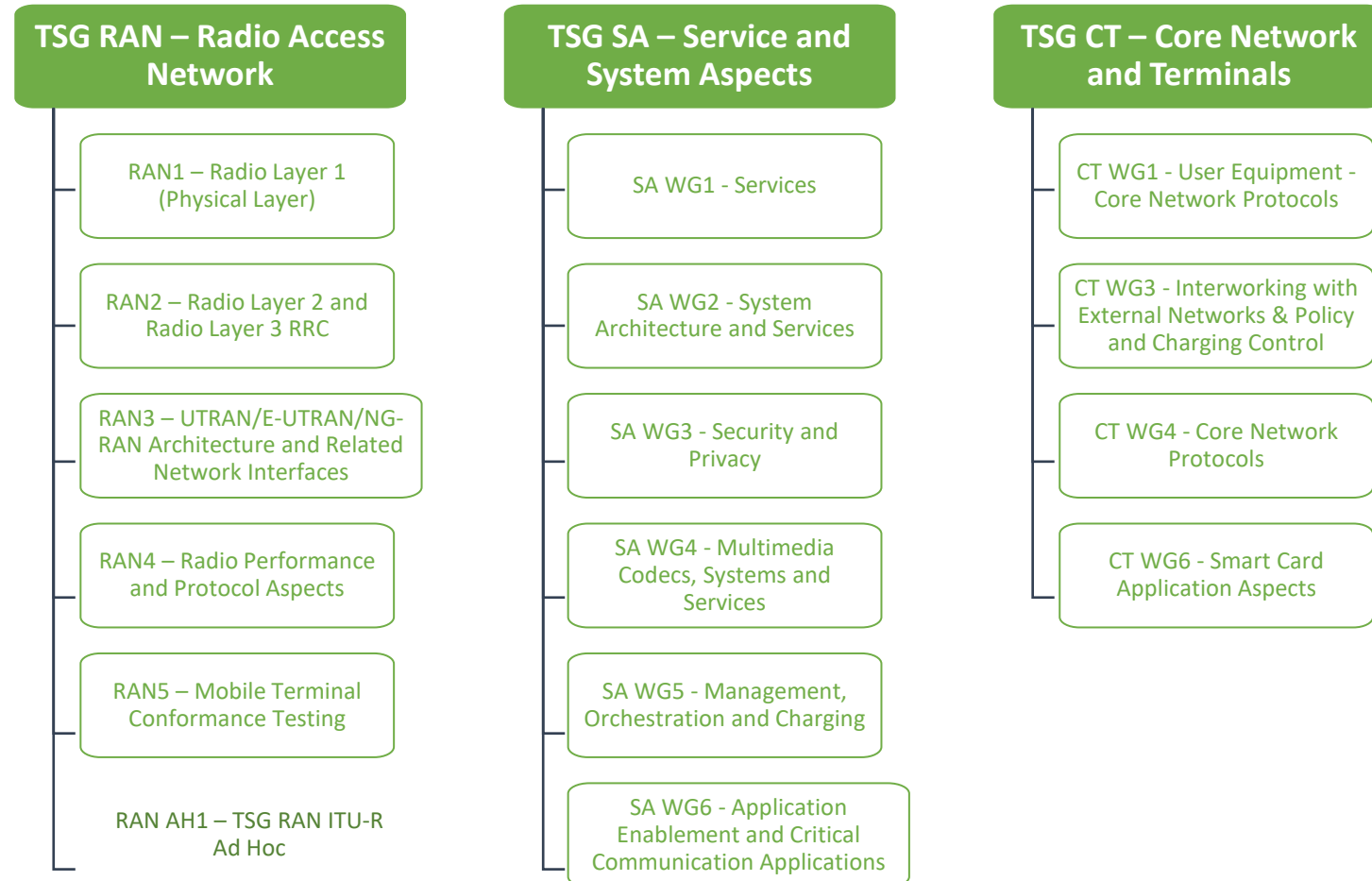## 5G / 6G Projects

Certification Bodies

Liaisons in/out:

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 Telecomunications 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 Mark-up Language (VXML) Forum, Wi-Fi Alliance, Wireless Broadband Alliance (WBA), WLAN Smart Card Consortium, Wireless World Research Forum (WWRF), World Wide Web Consortium (W3C)
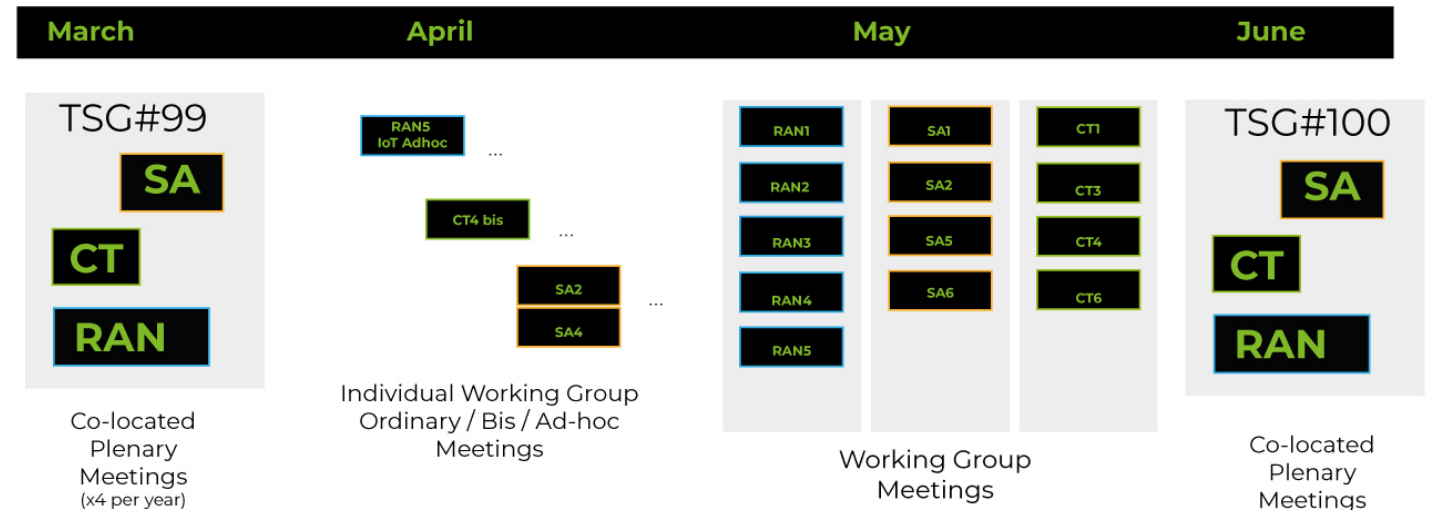
Technical Specification Groups

- TSGs prepare, approve and maintain the 3GPP Technical Specifications and Technical Reports.

- 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

- TSG Chair is responsible for the overall management of the technical work within the TSG and its Working Groups.

- WG Chair is responsible for the overall management of the technical work within the WG and its sub-groups.

- 3GPP Project Coordination Group (PCG) and OP group are management groups (See 'About/PCG' section of the website)

TSG RAN – Radio Access Network

- RAN1 – Radio Layer 1 (Physical Layer)
- RAN2 – Radio Layer 2 and Radio Layer 3 RRC
- RAN3 – UTRAN/E-UTRAN/NG-RAN Architecture and Related Network Interfaces
- RAN4 – Radio Performance and Protocol Aspects
- RAN5 – Mobile Terminal Conformance Testing
- RAN AH1 – TSG RAN ITU-R Ad Hoc

TSG SA – Service and System Aspects

- SA WG1 - Services
- SA WG2 - System Architecture and Services
- SA WG3 - Security and Privacy
- SA WG4 - Multimedia Codecs, Systems and Services
- SA WG5 - Management, Orchestration and Charging
- SA WG6 - Application Enablement and Critical Communication Applications

TSG CT – Core Network and Terminals

- CT WG1 - User Equipment - Core Network Protocols
- CT WG3 - Interworking with External Networks & Policy and Charging Control
- CT WG4 - Core Network Protocols
- CT WG6 - Smart Card Application Aspects

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)

March	April	May	June

TSG#99
SA
CT
RAN

Co-located Plenary Meetings (x4 per year)

RAN5 IoT Adhoc ...
CT4 bis ...
SA2
SA4 ...

Individual Working Group Ordinary / Bis / Ad-hoc Meetings

RAN1 SA1 CT1
RAN2 SA2 CT3
RAN3 SA5 CT4
RAN4 SA6 CT6
RAN5

Working Group Meetings

TSG#100
SA
CT
RAN

Co-located Plenary Meetings

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

Releases, Features & Work Items

- Release-based work

- Multiple releases are maintained in parallel
  - Releases are major packages of Features (There is a new 3GPP Release ~ every 18 – 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

- Work Items are a specification task defined in terms of the following principal parameters:
  - title;
  - intended output (i.e. Technical Specifications or Technical Reports);
  - impact on other Technical Specifications and Technical Reports;
  - technical scope, including the field of application of the intended output;
  - impact on other 3GPP Work Items;
  - the schedule of tasks to be performed;
  - the identities of the supporting Individual Members;
  - the identity of the Work Item Rapporteurs.

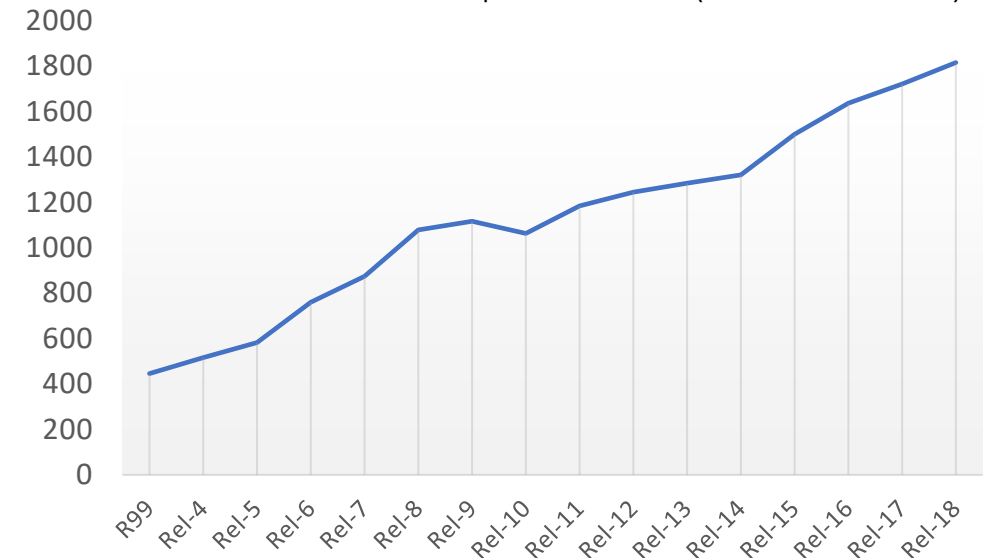- See the 3GPP Work Plan for details of features:
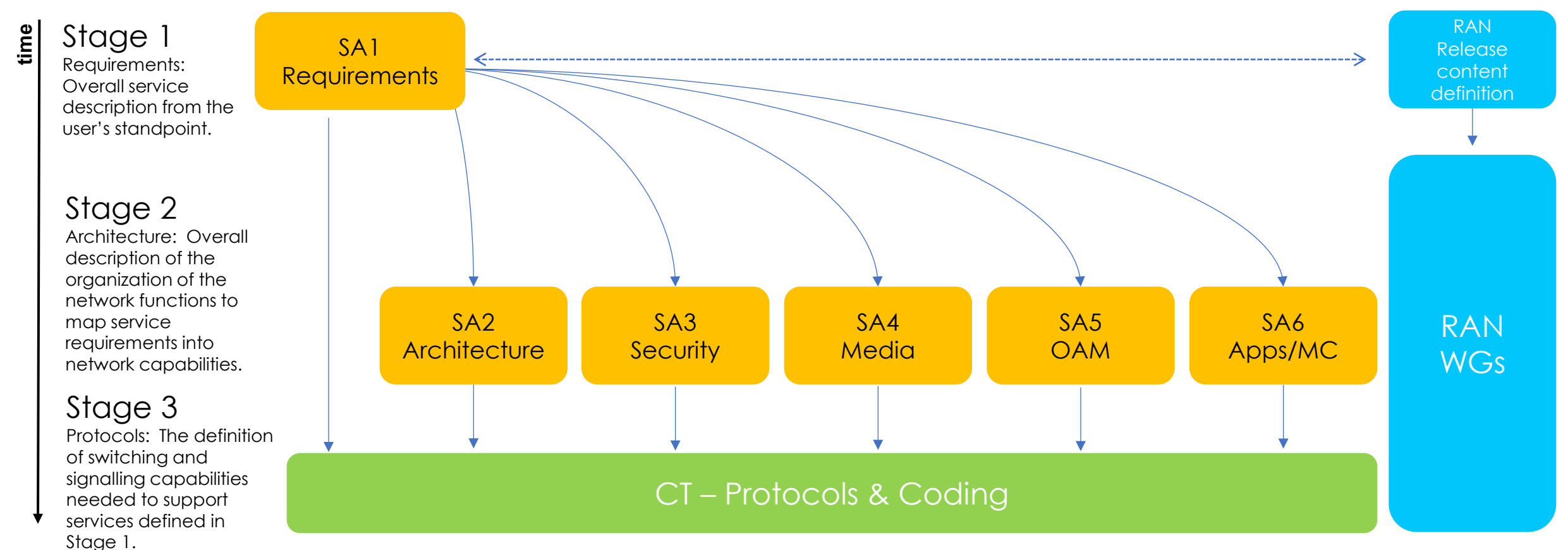 - http://www.3gpp.org/Work-Plan

TAKEAWAY:

We divide the work into Work Items that will bring features into a study (TR) and/or a specification (TS) in a given Release.
A Work Item is built up in multiple Work Item Descriptions.

Number of specifications (frozen Releases)

8

Three stage approach to Features, through Releases

time

Stage 1
Requirements: Overall service description from the user's standpoint.

Stage 2
Architecture: Overall description of the organization of the network functions to map service requirements into network capabilities.

Stage 3
Protocols: The definition of switching and signalling capabilities needed to support services defined in Stage 1.

SA1 Requirements

SA2 Architecture

SA3 Security

SA4 Media

SA5 OAM

SA6 Apps/MC

CT – Protocols & Coding

RAN Release content definition

RAN WGs

Bringing the work into the groups

Use Case diversity
- High or Low data rates
- Higher user mobility
- Improved coverage

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

Pre-Standards R&D
- Test beds
- 3GPP MRP Papers and Vision
- Regional initiatives
- IMT process (ITU)

3GPP Working Groups

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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

5G Releases

- **Release15**: The work on new radio (nr) and the 5G system (5GS) jointly addressed the urgent subset of needs for early commercial deployments.

- **Release16**: 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:** Brought 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.
    - Introduced **5G-Advanced** as a mid-generational marker (covers Rel-18, 19, 20).

- **Release 19:** The current focus of the groups. Due for completion in 2025…improving performance and meeting the needs raised from 5G commercial deployments.

- **Release 20**: Further 5G Advanced content. Stage-3 freeze envisaged Mar. 2027.
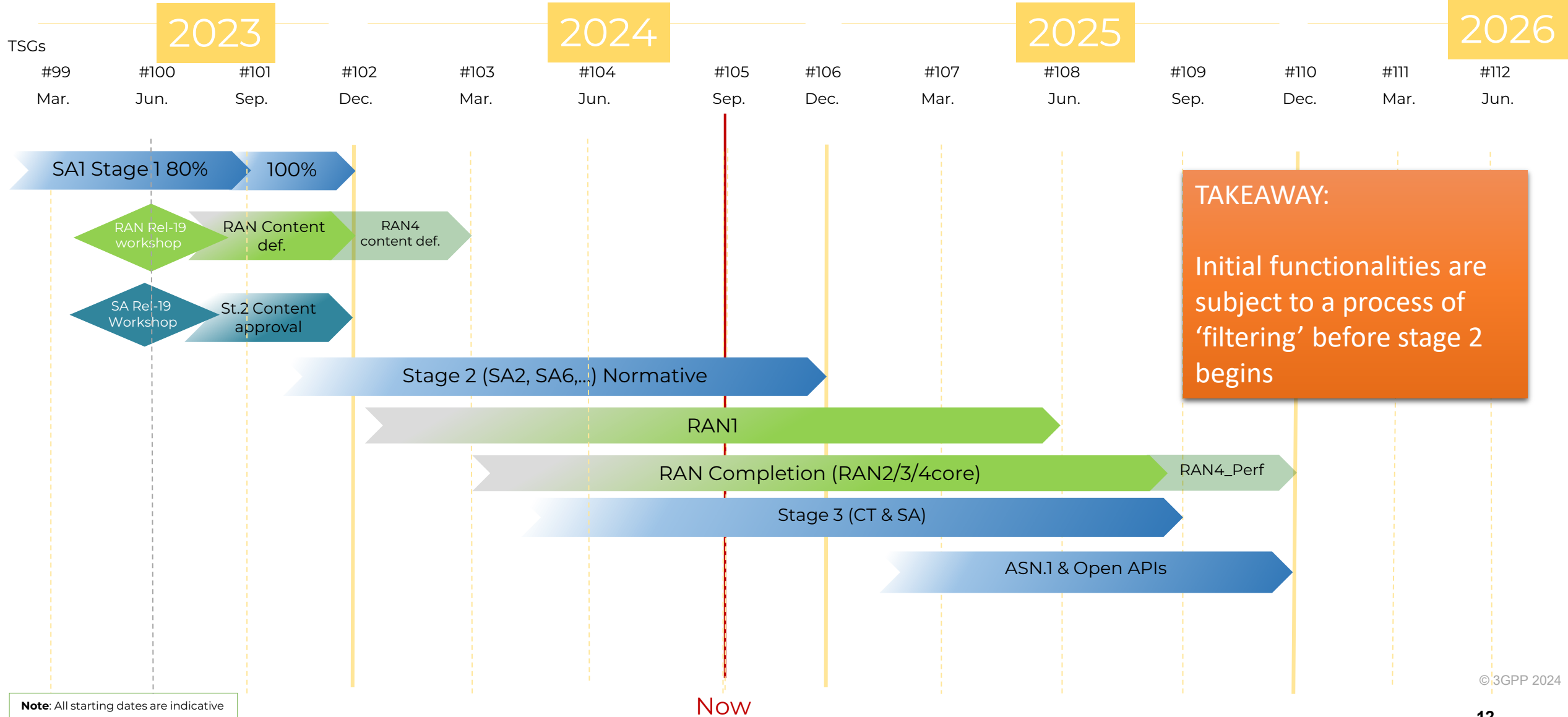
Rel-19 Status

SA1 (Stage 1)

- Studies : 14 studies – stable for long, All studies completed
- Normative : 25 tasks, including "miniWIDs" - All normative work completed

SA2, SA6 (Stage 2)

- SA & RAN Content defined at TSG#101 & 102
- **Studies:** 24 studies (against 23 at previous TSG)
- **Normative**: **62 items** (against 44 at previous TSG)

RAN

- RAN1, 2, 3, 4 content definition completed by TSG#103
- RAN **studies**: 10 studies (against 8 at previous TSG),
- RAN **Core**: 42 items (against 20 at previous TSG)
- RAN **Perf**: 26 items (against 19 at previous TSG)

SA 3/4/5 & CT (mostly Stage 3)

- SA3, SA4, SA5: 51 studies (was 51);
- SA3, SA4, SA5: normative 26 items (was 20);
- CT WG: **4 study** (was 3);
- CT WG: **normative: 62** items (was 27); started in this quarter

Scale:
WG mega-meetings attract 2000 participants.

Plenaries average 600.

TAKEAWAY:

You should commit to ALL three stages of this process

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Rel-19 WI of possible interest to TCCA (1/3)

Rel-19 is the 7th Release introducing MC features, not counting Railway functionalities, which started in 2G

Stage 3 - detailing communication between nodes

- Enhanced Mission Critical Location Management (enhMCLoc)
  - To define protocol aspects of MC (Mission Critical) Location management in alignment with Stage 2 TS 23.280, in particular, instantiating the MC Location Client and MC Location server and their associated interfaces within a dedicated Stage 3 specification.
  - To develop, at protocol level, MC location procedures specified in Stage 2, but currently lacking corresponding Stage 3
    e.g. -procedures that enable an MC user to subscribe/de-subscribe/re-subscribe to, and be promptly notified of, the location of other MC users of interest.
    - procedures for recording and reporting history of defined location events
  - Support of gyroscope/accelerometers

- CT aspects of enhanced application layer support for location services
  - Support of Geofencing
  - Support of history tracing request or playback
  - Support location QoS improvement
  - Support location information exposure
  - Support of location services for multiple User Equipment (USIMs/UEs) sharing the same location

- 5GS enhancement on QoS monitoring enhancement
  - The SMF needs to know whether the NG RAN support QoS monitoring. The QoS monitoring capability configuration and transfer within 5GC need to be supported.

NB:
The content of a Work Item could be subject to added complexity as it goes through the three stages

Rel-19 WI of possible interest to TCCA (2/3)

Stage 3 - detailing communication between nodes

CT aspects of railways specific enhancements to mission critical service

- Enable modifying the criteria for determining the participants during an ongoing ad hoc group emergency alert within single or multiple MC systems
- Enable modification of ad hoc group call criteria by an authorized user involving single or multiple MC systems
- Enable release of an ad hoc group call by an authorized user
- Enable floor revoke by the authorized user
- Update user profile configuration data and service configuration data
- Other minor railways specific enhancements

CT aspects of Vehicle Mounted Relays Phase 2

- For instance the solution whereby the relay node consists of a UE co-located with a full gNB, with the gNB in the relay establishing N2 (Control plane) and N3 (user plane) interface to an AMF (Access and Mobility Function) and UPF (User Plane Function) residing in the 5GC over a PDU (Packet Data Unit) session or PDU sessions. It is called MWAB (Mobile gNB with Wireless Access Backhauling) and consists of a UE component (MWAB-UE) and a gNB component (MWAB-gNB) in stage

MPS for IMS (IP Multimedia Subsystem) Messaging and SMS services

- In addition to Multimedia Priority Service (MPS) for MMTEL (Multi-media Telephony) voice/video calls and MPS for DTS (Data Transport Service), Rel-19 TS 22.153 has been updated to support authorized MPS Service Users with priority for messaging services in periods of network congestion during which normal commercial messaging services are degraded

Rel-19 WI of possible interest to TCCA (3/3)

Stage 3 - detailing communication between nodes

- **CT aspects of Proximity-based Services in 5GS Phase 3**
  - The CT WGs work will be based on to be developed normative work by SA WGs (for 5G ProSe L3 multi-hop UE-to-UE relay and 5G ProSe multi-hop UE-to-Network relays) and potential input received from RAN WGs regarding 5G ProSe layer-2 multi-hop UE-to-Network relays
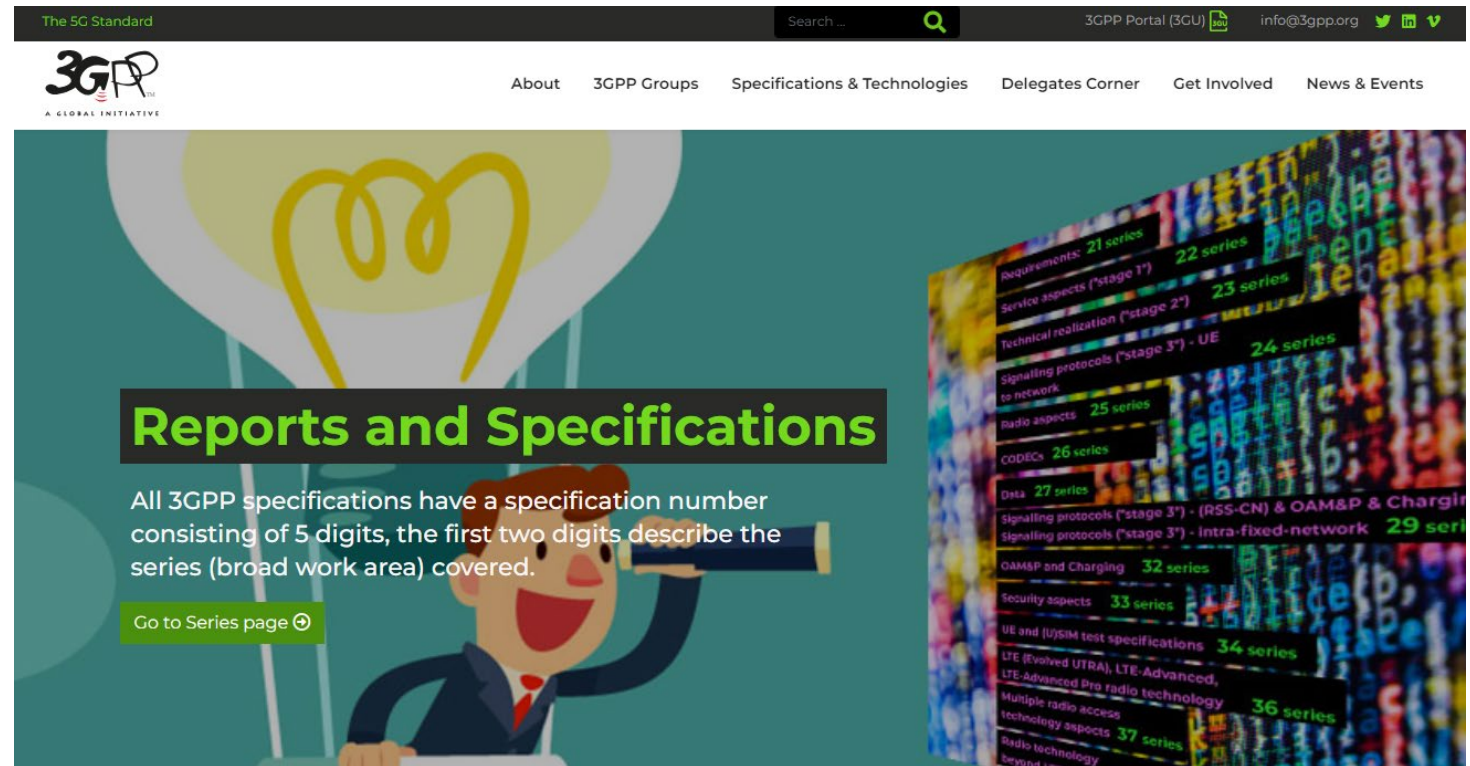
- **CT aspects of application enablement for AIML services**
  - The Rel-19 normative work on application enablement for Artificial Intelligence Machine Learning (AIML) services (AIML_App) is being progressed in SA6 by introducing architecture requirements, functional architecture model, and corresponding solutions that are relevant to the definition of the application layer support for AIML enablement. The conclusions of the study are captured in 3GPP TR 23.700-82. TSG-SA meeting SA#104 approved the "AIML_App" work item as specified in SP-241008 and normative stage 2 work is currently under development.

- **CT aspects of Core Network Enhanced Support for Artificial Intelligence (AI)/Machine Learning (ML)**
  - Core Network Enhanced Support for Artificial Intelligence (AI)/Machine Learning (ML) in order expand the scope of network AI services to leverage AI/ML technologies to enable 5GC and Air interface Intelligence by providing network automation and improving the efficiency of the 5G network architecture see study TR 23.700-84

Concluding Thoughts

⟫ Standardization of interfaces enables an interoperable approach to deployment.

⟫ They are a primary condition for the creation of a multi-vendor environment.

⟫ The 3GPP processes are complex, but you are not alone & in each group there are helping hands.

⟫ Release 19 is ongoing, with stage 2 and stage 3 work underway. Completion in September 2025.

⟫ Work Items reflect the intended functionality. If the work impacts more than one TSG there is a Work Item for each TSG (Stage)

⟫ At the completion of a release (Freeze date) there is a cross-check on whether the features described by the Work Items are consistent, across the Technical Specifications.

⟫ Maintenance is performed for Release 18 and before.

Thank you!

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