



# 3GPP SA5-SNS ORIGAMI Joint Workshop

5<sup>th</sup> of December 2024, 13:00-14:30 UTC

# Agenda



## **Objectives: Presentation for information of Origami innovation topics related to network and service management, focus on SA5 closely related aspects**

- (5 min) Introduction to the meeting
- (20 min) Rel-19 SA5 working progress and Rel-20 3GPP SA5 Work Planning [by 3GPP SA5 chair]
- (20 min) Enhancement of Service Based Management Architecture: an enhancement of service based management architecture for network management based on GSBA (Global Service Based Architecture) Origami proposal.
- (20 min) Management Exposure: Management Exposure that enables vertical tenants or other MNOs to interact with the mobile network according to their needs and maintain streamlined global operations.
- (20 min) Management of network intelligence: Managing Network Intelligence (NI) instances and computing resources with a simple interface that can be operated at fast timescales, while hiding the complexity of the underlying hardware.
- (5 min) Q&A



# 3GPP SA5 Rel-19 working progress and Rel-20 3GPP SA5 work planning

Zou Lan, 3GPP SA5 Chair, HUAWEI

# Content



- 3GPP SA5 introduction
- Release 19 working progress
- Release 20 work planning

# 3GPP SA5 Introduction



## Introducing 3GPP

- The 3rd Generation Partnership Project (3GPP) unites seven telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TSDSI, TTA, TTC), known as “Organizational Partners” providing their members with a stable environment to produce the Reports and Specifications that define 3GPP technologies.
- 3GPP specifications cover cellular telecommunications technologies, including radio access, core network and service capabilities, which provide a complete system description for mobile telecommunications. The 3GPP specifications also provide hooks for non-radio access to the core network, and for interworking with non-3GPP networks.

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

## Introducing 3GPP SA5

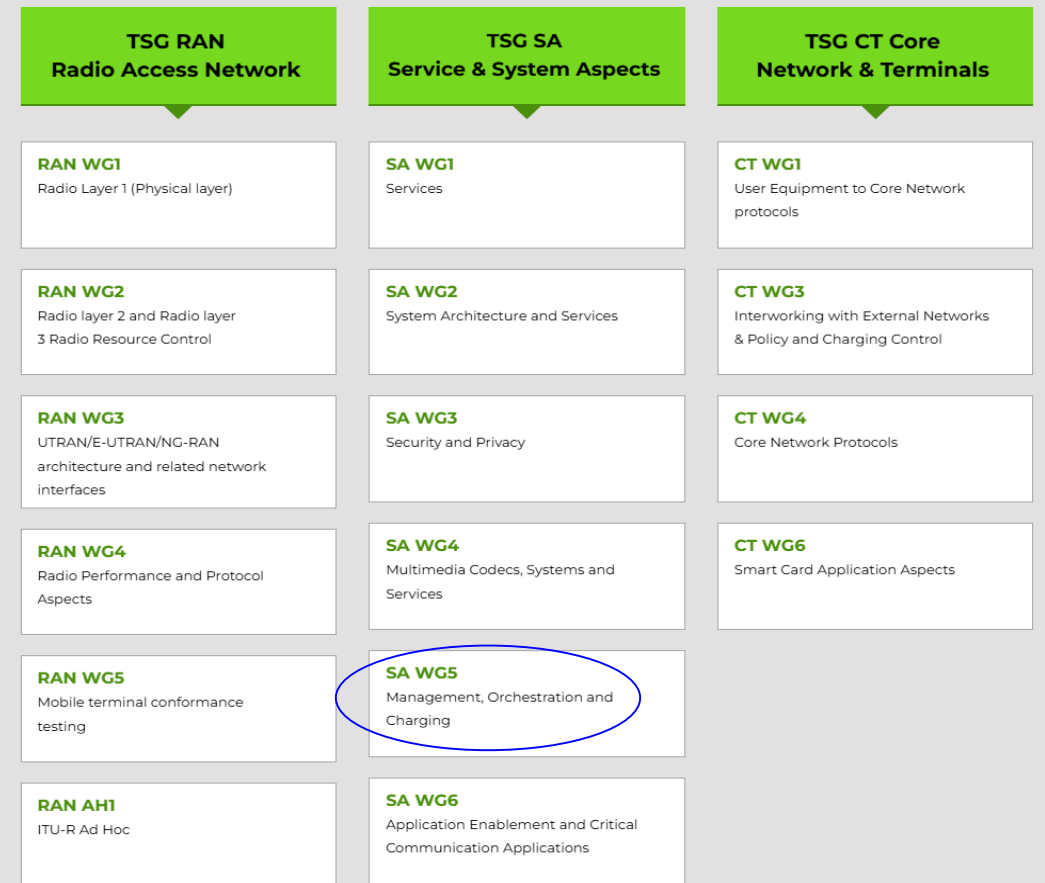
TSG SA WG5 is currently responsible for:

- Management and Orchestration which covers aspects such as operation, assurance, fulfillment and automation, including management interaction with entities external to the network operator (e.g. service providers and verticals).
- Charging which covers aspects such as Quota Management and Charging Data Records (CDRs) generation, related to end-user and service-provider.

<https://www.3gpp.org/3gpp-groups/service-system-aspects-sa/sa-wg5>

## Technical Specification Groups (TSGs)

The Working Groups, within the TSGs, meet regularly and come together for their quarterly TSG Plenary meeting, where their work is presented for information, discussion and approval.



# 3GPP Working Methodology



## 3GPP Working methodology

### 4.1 Overview

Where appropriate, the three-stage methodology defined in ITU-T Recommendation I.130 should be employed:

Stage 1 is an overall service description from the user's standpoint.

Stage 2 is an overall description of the organization of the network functions to map service requirements into network capabilities.

Stage 3 is the definition of switching and signalling capabilities needed to support services defined in stage 1.

In addition, it is often appropriate to perform a feasibility study prior to formal specification work. This is sometimes referred to as "stage 0".

Furthermore, it will often be appropriate to follow stage 3 with the production of test specifications – a stage 4.

[https://www.3gpp.org/ftp/Specs/archive/21\\_series/21.900/21900-i20.zip](https://www.3gpp.org/ftp/Specs/archive/21_series/21.900/21900-i20.zip)

3GPP SA5 follows 3GPP working procedures and cover related work in multiple stages.



SA5 stage 0 - Management features studies  
(technical reports)



SA5 stage 1 - Management requirements  
(technical specifications)






SA5 stage 2 - Management stage 2  
protocol agnostic  
(technical specifications)



SA5 stage 3 - Management stage 3  
Protocol specific  
(technical specifications and source code in 3GPP forge)

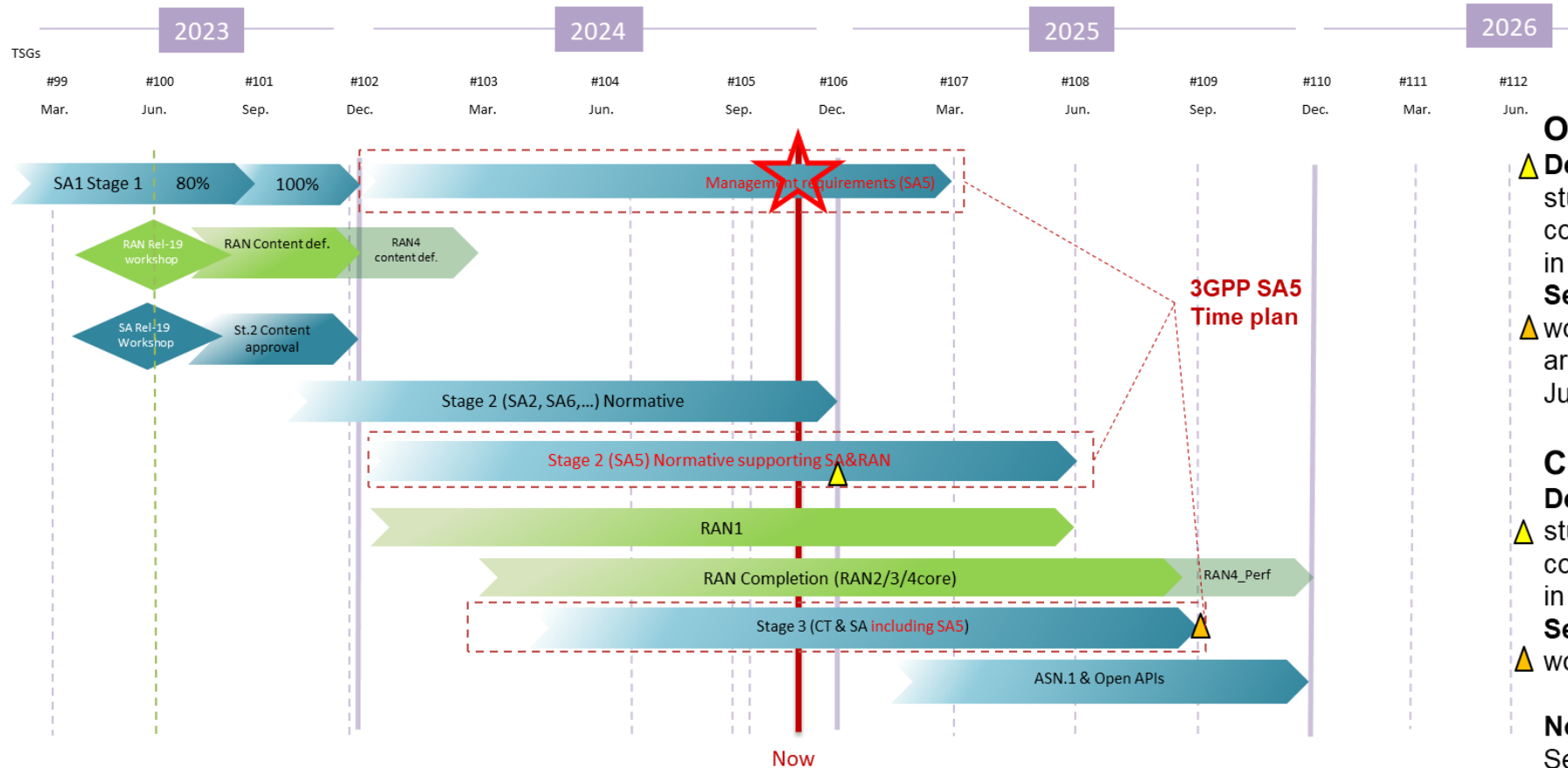
# Content



-  3GPP SA5 introduction
-  Release 19 working progress
-  Release 20 work planning

# SA5 Rel-19 Time Plan

## Release 19 timeline



### OAM:

- ▲ **Dec 2024:** finalize Rel-19 studies which plan to have corresponding normative work in Rel-19.
- ▲ **Sep 2025:** finalize all Rel-19 work items, majority work items are preferable to be finalized in Jun 2025.

### CH:

- ▲ **Dec 2024:** finalize Rel-19 studies which plan to have corresponding normative work in Rel-19.
- ▲ **Sep 2025:** finalize all Rel-19 work items

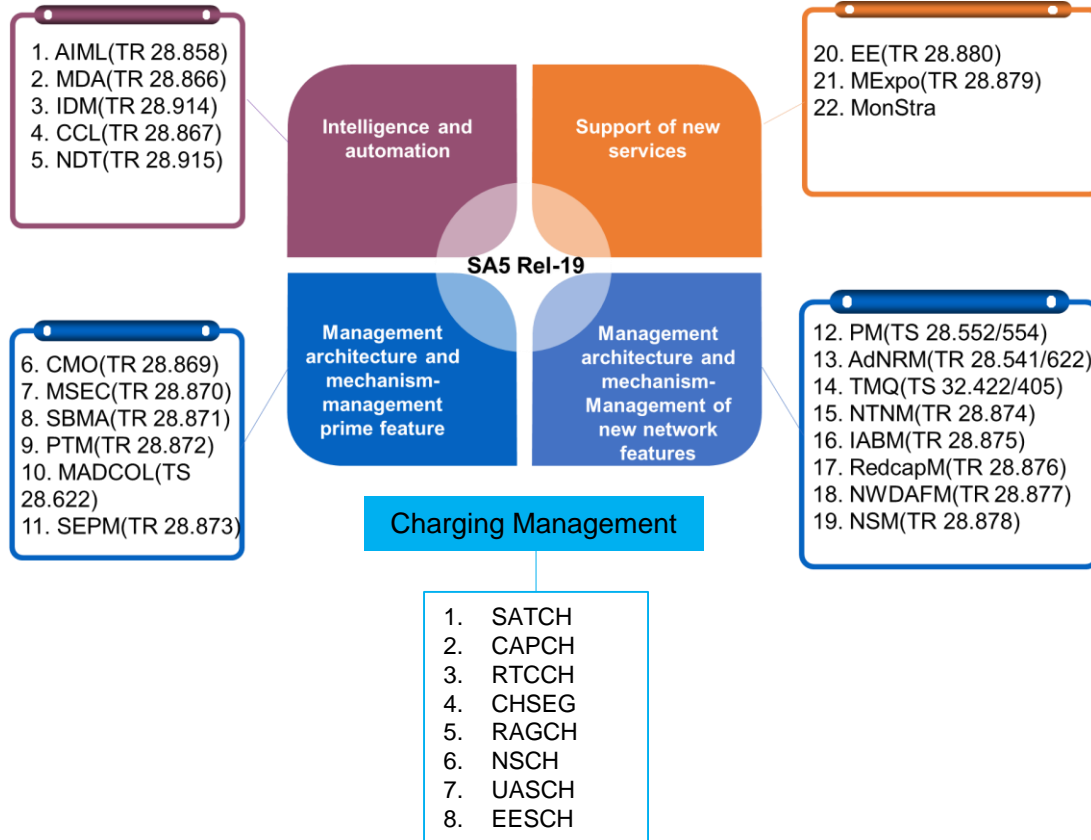
**Note:** Studies can continue until Sep.2025 if no corresponding normative work is planned for Rel-19.



# Summary of Rel-19 topics



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Overview of SA5 Rel-19 topics

The following topics may be potentially related to **ORIGAMI**.

**Service based management architecture (SBMA):** focuses on elaboration on usage guidance of model driven service, and also target to provide collection of the management capabilities and advertise management capability mechanisms.

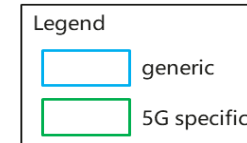
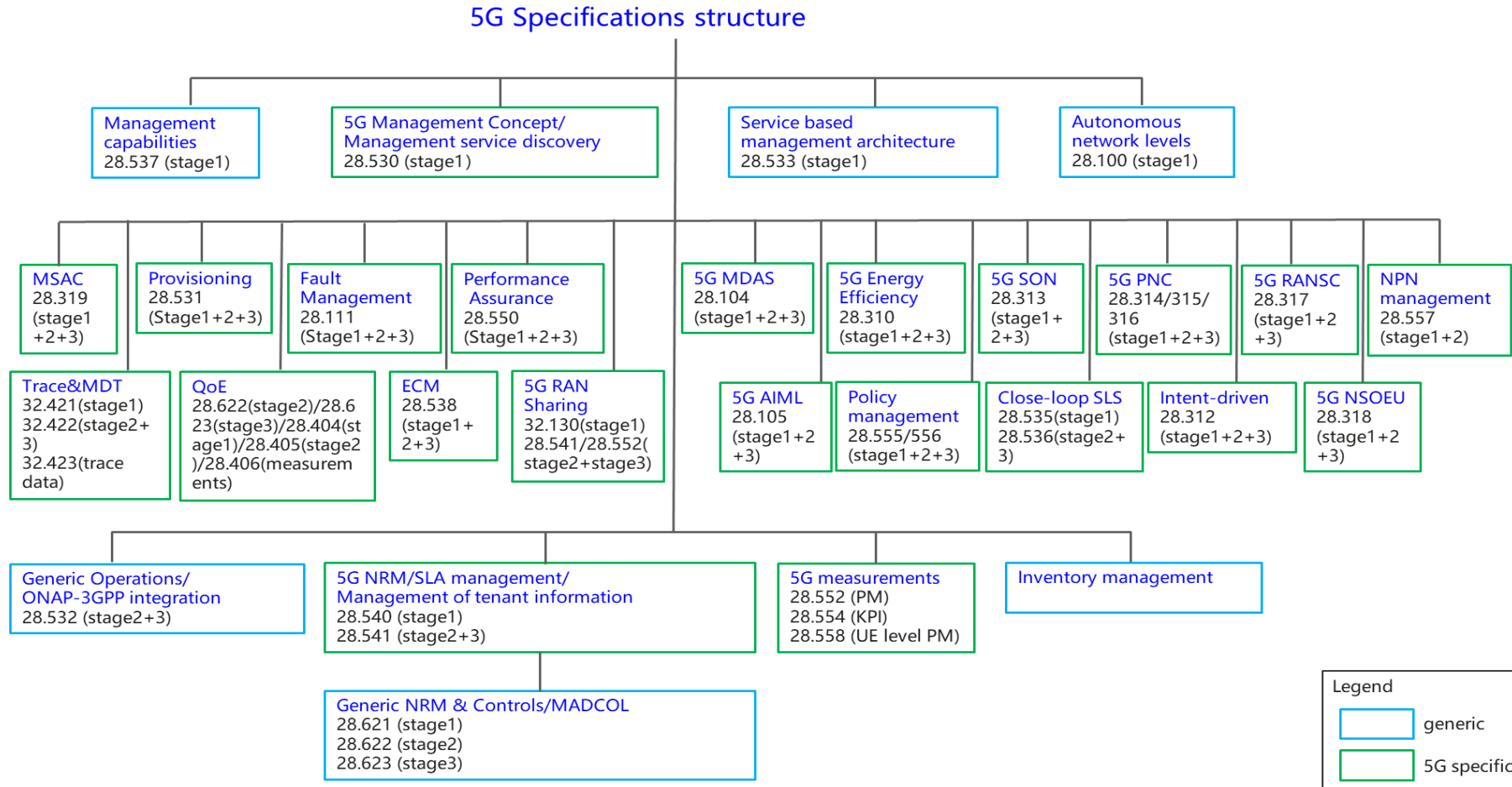
## Intelligence and automation

- **AI/ML management (AIML)** studies the mechanisms of how to enable and facilitate the efficient deployment, operation of the relevant AI/ML features located in 5GC, RAN or management functions. It is targeted to provide manageable capability to perceive how AIML model works with lifecycle management, giving the operator the confidence of taking advantage of AIML technology under their own supervision.
- **Management data analytics (MDA)** investigates the potential management analytics solutions for Energy efficiency analytics, End-to-End performance analytics including Edge computing domain, Data correlation analytics, ATSSS performance analytics, UE throughput analytics, Fault management related analytics and alarm prediction, Software Upgrade Validation.
- **Intent driven management (IDM)** Enhanced management functionalities like Intent negotiation mechanisms, network intent to support new business opportunities, adopting natural language to express intent will be discussed. With the new enhancement features, operators could interact with the intent handler more efficiently and extend the intent capability to support new services.
- **Closed control loop (CCL)** investigates the dynamic closed control loop creation for communication service assurance, Conflict Detection and Resolution across multiple CCLs. The CCL could be disintegrated into multiple parts each coming from different vendors.
- **Network Digital Twin (NDT)** NDT helps operators to efficiently verify changes in network operation's potential impact on the real network before it takes effect. Network digital twin could construct a full view of network topology and traffic, which can help the operator with efficient end-to-end or single-domain fault localization, traffic path optimization, prediction and avoidance of signaling storms.

## Support of new services

- **Management capability exposure (MExpo)** focuses on defining a generic approach for discovery and exposure of SA5 management service capabilities to external consumers including verticals. The study will also investigate exposing network slice capability in network sharing scenarios for communicating with external consumers.
- **Energy efficiency management (EE)** new or enhanced Energy Consumption (EC) and Energy Efficiency (EE) KPIs and measurements while considering various granularities, and also provide the estimation of Carbon emissions efficiency and information on renewable energy consumption to operators. This study also addresses how to measure or estimate the energy consumption of containerized network functions.

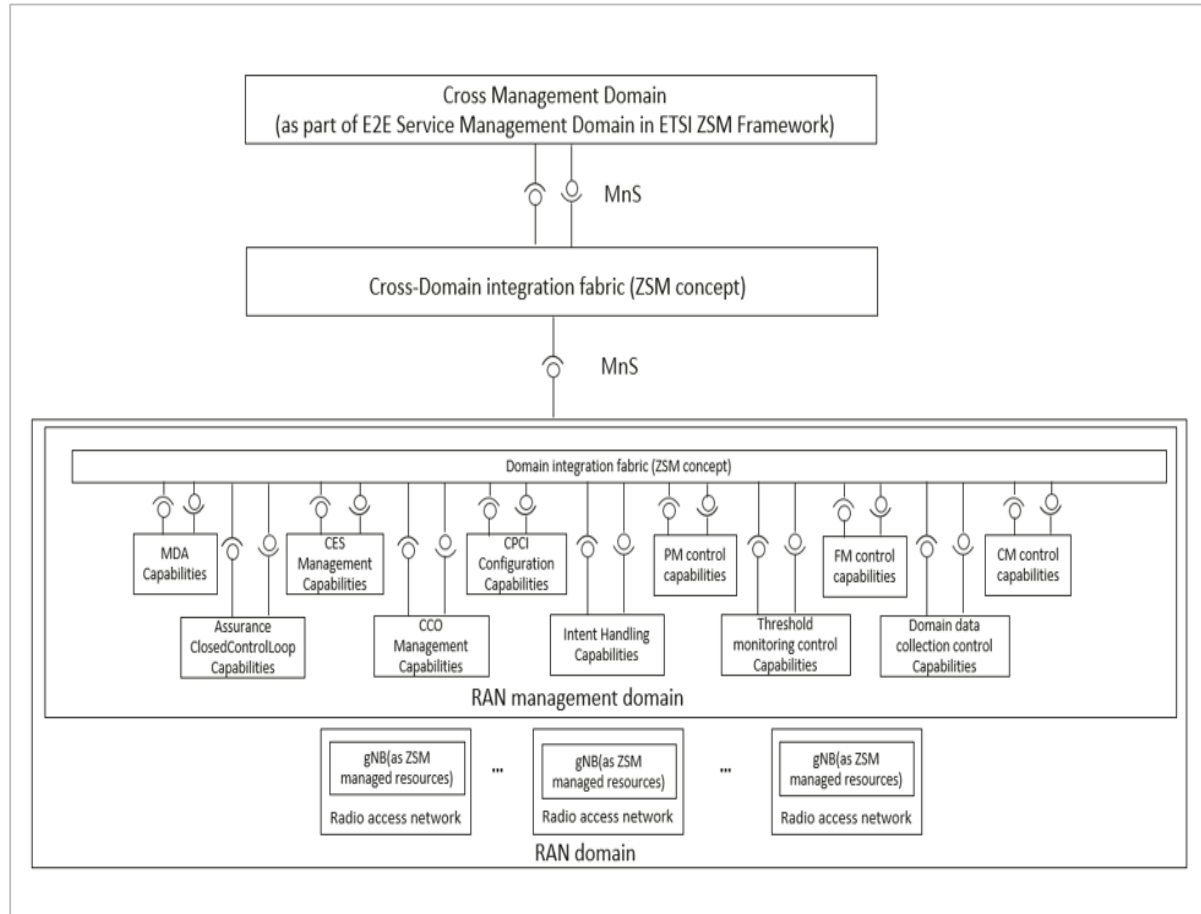
# Overview of 5G management specifications



# Rel-19 Service Based Management Architecture (SBMA) study



## An example of deployment scenario for RAN management functions

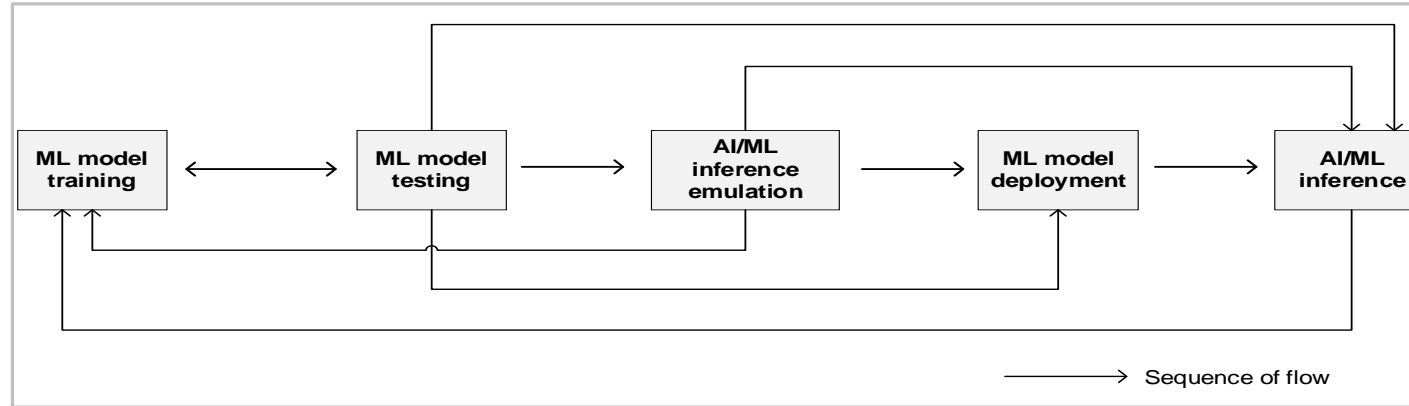


## Rel-19 eSBMA topics

- ✓ NRM investigation
- ✓ Connection between 3GPP TS 28.537 and 3GPP TS 28.622 for generic control NRM capabilities
- ✓ Discovery of management capabilities of MnS supported by a MnS Producer
- ✓ <<Support IOCs>> instances in SBMA
- ✓ Discovery of management capabilities of MnS instances based on area of interest
- ✓ PM investigation
- ✓ Common Notification Header
- ✓ Schema retrieval enhancements
- ✓ Schema reference enhancements
- ✓ List and handle Alarming-Conditions
- ✓ Overview of management capabilities and corresponding Solution Sets
- ✓ MnS Version Number Handling
- ✓ Reliable notification transfer
- ✓ Usage of MnS Registry NRM fragment for MnS Registry and Discovery for different deployment scenarios
- ✓ Decouple the management and resource models

# Rel-19 AIML Management (AIML) Study

## ML model lifecycle



## New Capabilities

Following AIML management capabilities have been investigated in TR 28.858 and recommended for Rel-19 normative work:

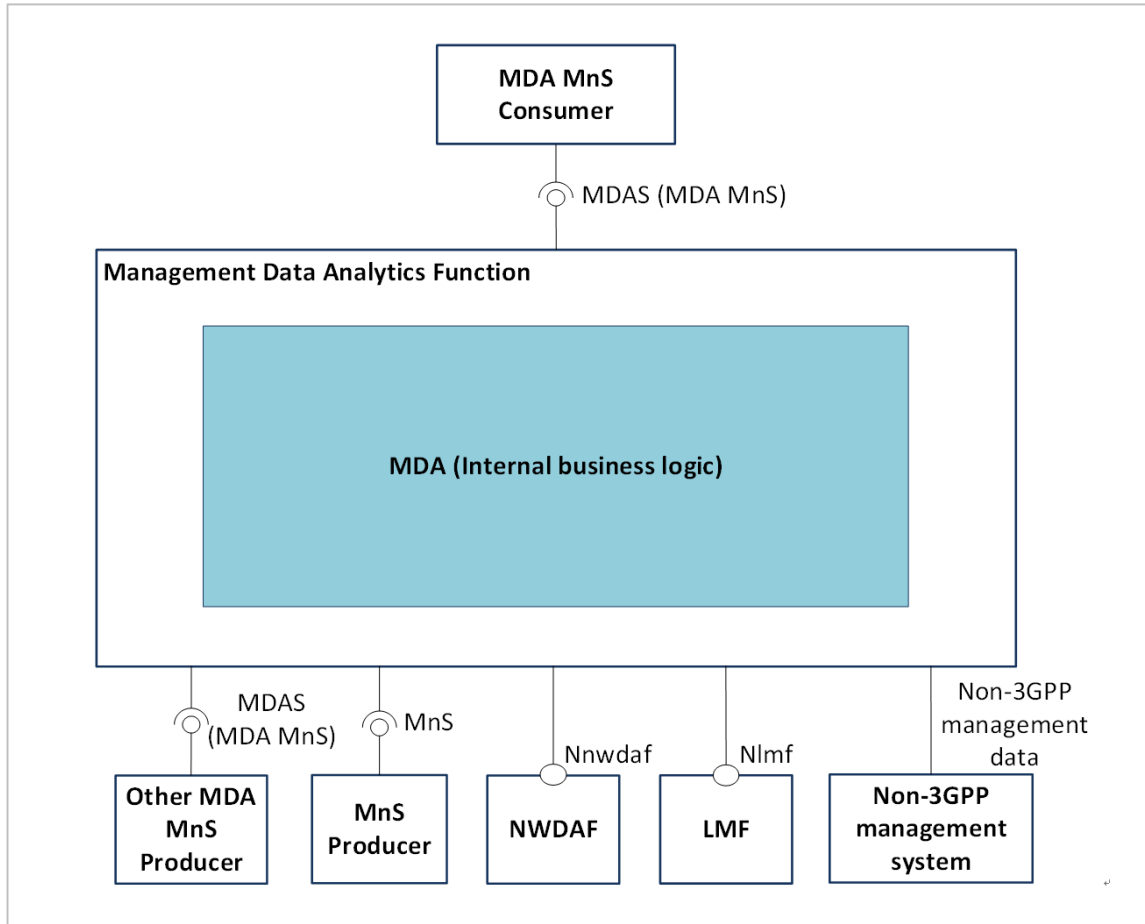
- ✓ Management capabilities for **ML model training**, including ML-Knowledge-based Transfer Learning, ML pre-training and fine-tuning, Management of Reinforcement Learning, Sustainable AI/ML for ML training, Management of Federated Learning, ML explainability, etc.
- ✓ Management capabilities for **AI/ML inference emulation**, including ML inference emulation, ML inference emulation environment selection.
- ✓ Management capabilities for **ML model deployment**, including Enhancements to ML model loading, ML model transfer/delivery.
- ✓ Management capabilities for **AI/ML inference**, including Coordination between the ML capabilities, ML remedial action management, etc.

## New Scenarios

- ✓ NG-RAN AIML-based **Coverage and Capacity Optimization, and NG-RAN AIML-based Network Slicing** defined by RAN3
- ✓ **Model delivery/transfer** as defined by RAN1/2
- ✓ **ML model training and AI/ML inference functions for 5GC** as defined by SA2
- ✓ MDA (**Management Data Analytics**) as defined by SA5

# Rel-19 Management data analytics (MDA) Study

## MDA functional overview and service framework



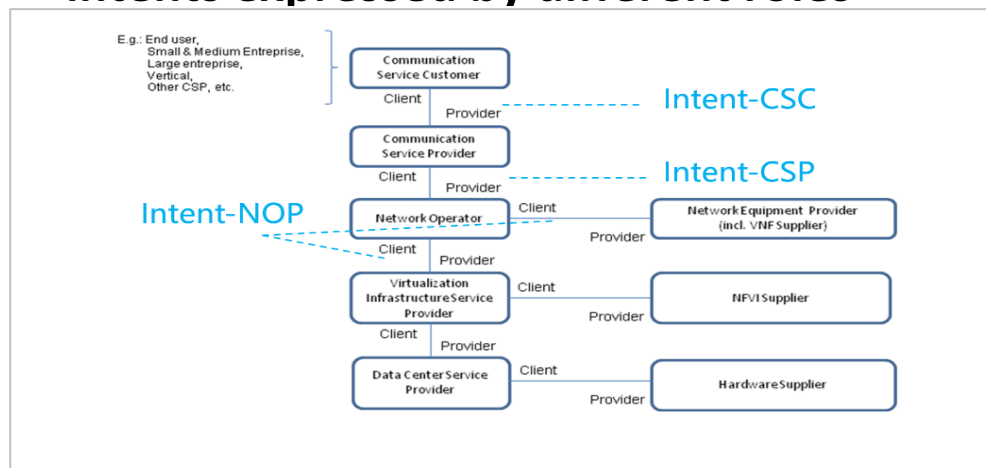
## New Capabilities

Following management data analysis management capabilities have been investigated in TR 28.858 and recommended for Rel-19 normative work:

- ✓ Energy efficiency analytics
- ✓ End-to-end performance analytics including edge computing domain
- ✓ Data correlation analytics
- ✓ ATSSS performance analytics
- ✓ UE throughput analytics
- ✓ Fault management related analytics
- ✓ Software upgrade validation
- ✓ Control plane congestion analytics

# Rel-19 Intent-driven Management (IDM) Study

## High-level model of different kind of intents expressed by different roles



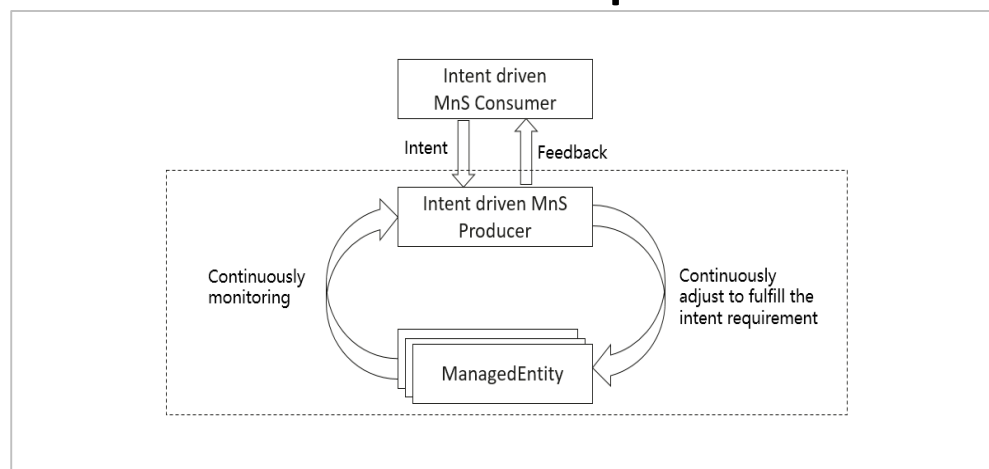
## New Capabilities

- ✓ Intent **negotiation** functionalities
- ✓ Implicit **intent report** subscription with customized requirements.
- ✓ Intent handling **state management**.
- ✓ Intent handling capability enhancement.
- ✓ Intent degradation based on expectation preference.

## New Scenarios

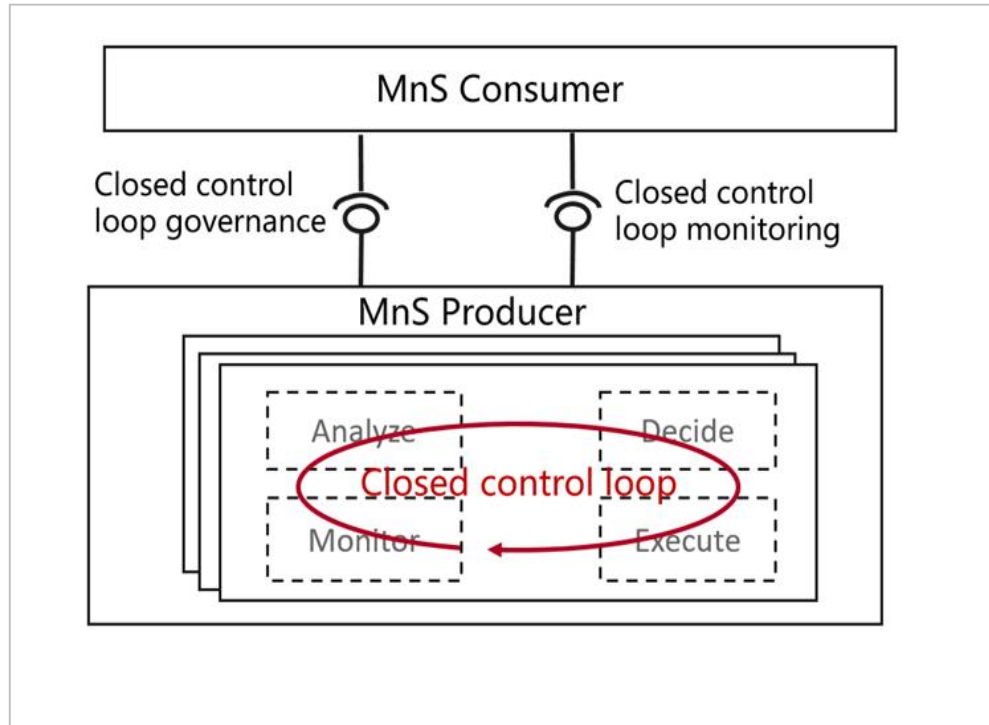
- ✓ Enhance the RadioServiceExpectation to support the scenario of delivering a radio service in a scheduled time scenario.
- ✓ Enhance the RadioNetworkExpectation to support following scenarios: RAN energy saving scenario, Radio network traffic assurance for scheduled events scenario, Radio network support for UAV pre-flight preparation and Radio Network support MOCN undifferentiated radio service.
- ✓ Introduce communication service expectation for communication service delivering and assurance.
- ✓ Introduce intent expectation for network maintenance.

## Intent driven closed-loop



# Rel-19 Closed Control Loop (CCL) Study

## 📶 Closed control loop governance and monitoring

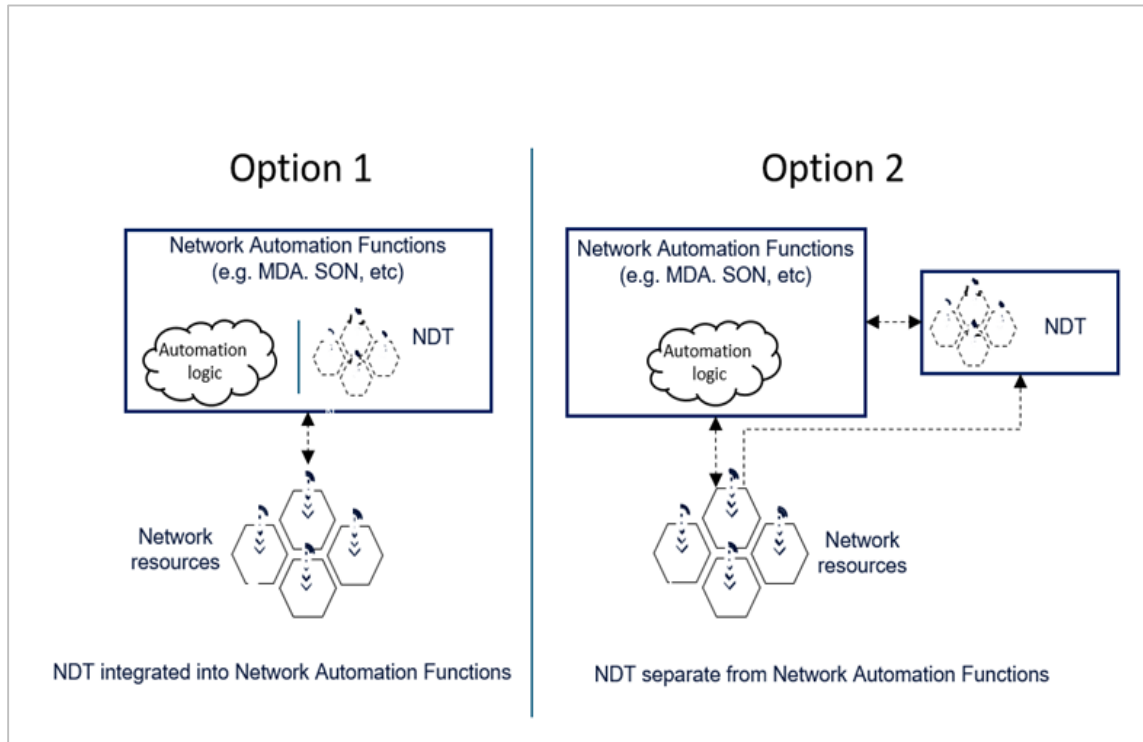


## 📶 Following CCL Use cases investigated in TR 28.867

- ✓ Use case 1: Dynamic CCL Creation
- ✓ Use case 2: Triggered CCL
- ✓ Use case 3: CCL creation based on Historical CCL data
- ✓ Use case 4: closed control loop for problem recovery
- ✓ Use case 5: CCL for fault management
- ✓ Use case 6: CCL conflicts management
- ✓ Use case 7: CCL scope management
- ✓ Use case 8: CCL-impact assessment and resolution
- ✓ Use case 9: Consumers feedback on CCL actions
- ✓ Use case 10: CCL decision escalation
- ✓ Use case 11: Performance Evaluation of a Closed Control Loop
- ✓ Use case 12: Coordinating CCLs with other management functions

# Rel-19 Network Digital Twin (NDT) Study

## Relations between digital twins and network automation functions



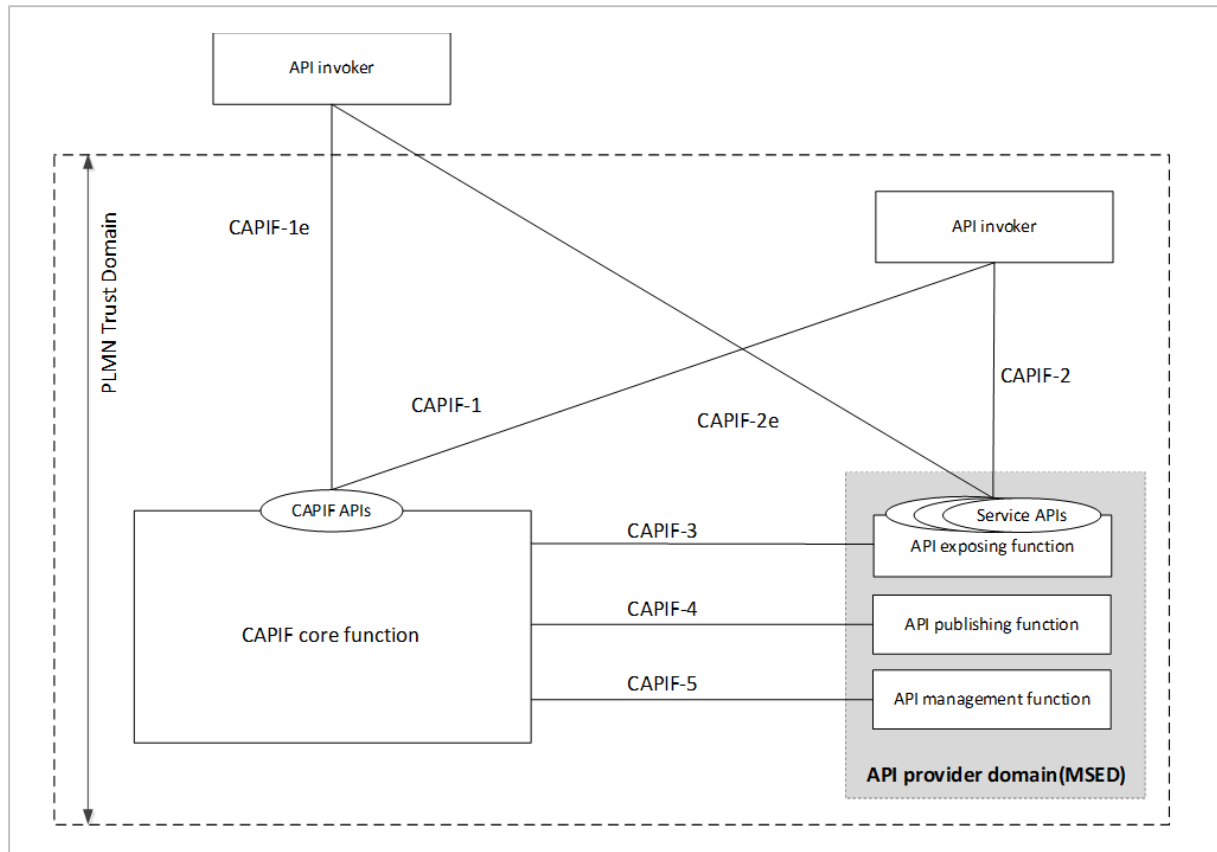
## NDT Scenarios

- ✓ NDT support for network automation including signalling storm analysis, emergency preparedness, network failure and risk prediction and network issue inducement.
- ✓ NDT support for verification including RAN energy saving policy verification, configuration verification.
- ✓ NDT support for generation including generating data for ML model training and measuring customer satisfaction with the network services
- ✓ Advanced NDT capabilities including nested NDTs.



# Rel-19 Management Service Exposure (MExpo) Study

## MSED providing the API provider domain functions as defined by the CAPIF framework



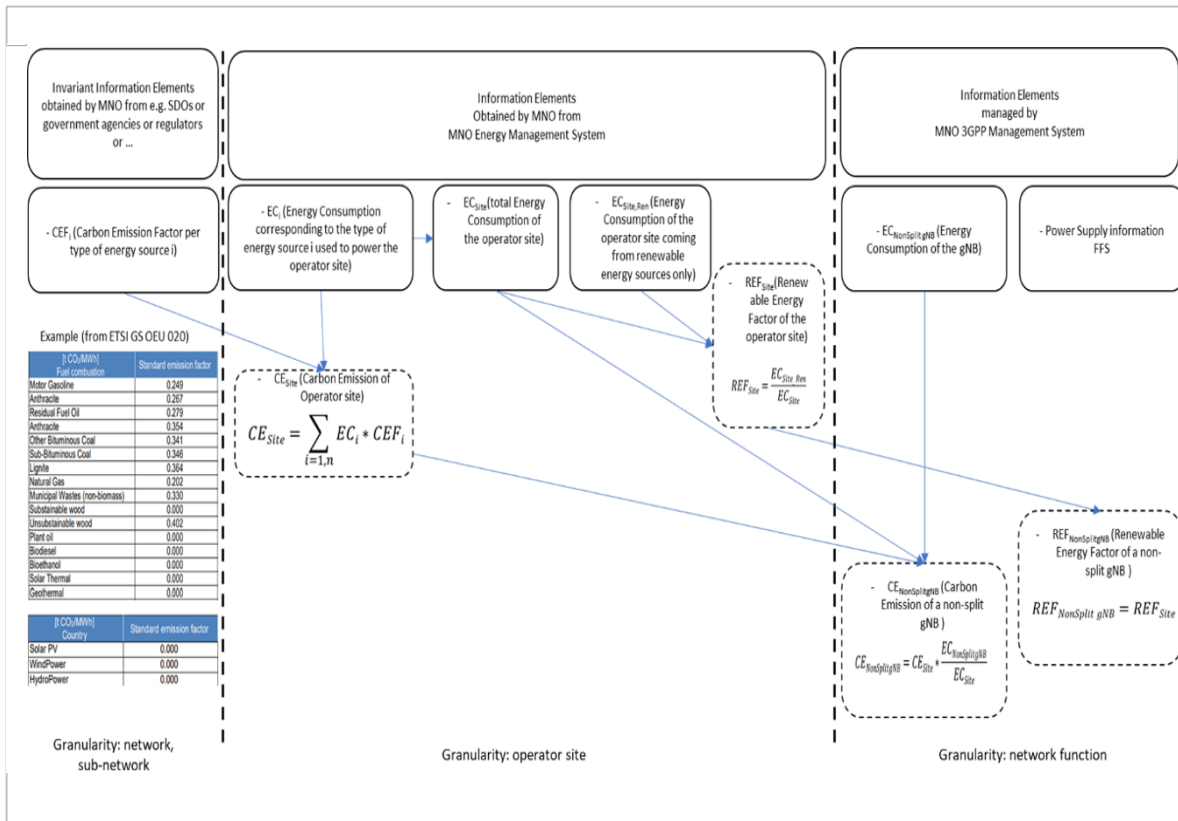
## New Scenarios

The following use cases of exposure of management services to external consumers have been investigated in TR 28.879

- ✓ Use case #1: MnS producer registration into CAPIF
- ✓ Use case #2: Publishing of management services to the CCF
- ✓ Use case #3: Configuring discovery information of an external MnS consumer
- ✓ Use case #4: Authorization of the external MnS consumer to access the management service API
- ✓ Use case #5: Logging the management service API invocations to the CCF

# Rel-19 Energy Efficiency (EE) Study

## Types of energy related information



## New Scenarios

The following use cases of energy efficiency and energy saving aspects of 5G networks and services have been investigated in TR 28.880:

- ✓ Use case #1: Estimation of containerized VNF/VNFC energy consumption
- ✓ Use case #2: Alternative option to obtain energy consumption of VNF/VNFC
- ✓ Use case #3: Enabling renewable energy consumption and carbon emission information reporting
- ✓ Use case #4: Exposure of carbon and renewable energy related information
- ✓ Use case #5: Estimating averaged gNB energy consumption per UE
- ✓ Use case #6: Multi-dimensional network energy efficiency metrics
- ✓ Use case #7: Renewable energy based LBO
- ✓ Use case #8: Energy saving by converting QoS of a service
- ✓ Use case #9: Renewable energy enabling 5GC NF re-selection
- ✓ Use case #10: Deployment of Network Slices depending on the energy source of the operator site
- ✓ Use case #11: Handling of power shortages
- ✓ Use case #12: Cell proximity-based energy saving
- ✓ Use case #13: Per-network slice gNB and 5GC NF Energy Consumption

# Rel-19 SA5 Summary Information in forge

- 📶 SA5 Rel-19 ongoing topics
  - 📶 Details of SA5 Rel-19 approved WIDs/SIDs :  
<https://forge.3gpp.org/rep/sa5/MnS/-/wikis/SA5/Rel-19-Moderated-Topics>
  
- 📶 Stage 3 forge links: <https://forge.3gpp.org/rep/sa5/MnS>
  - 📶 Management and Orchestration APIs:
    - 📶 OpenAPI solution is captured in [https://forge.3gpp.org/rep/all/5G\\_APIs](https://forge.3gpp.org/rep/all/5G_APIs) (3GPP unified stage3 repository) and <https://forge.3gpp.org/rep/sa5/MnS/-/tree/Rel-19/OpenAPI> (SA5 stage3 repository)
    - 📶 YANG solution is captured in <https://forge.3gpp.org/rep/sa5/MnS/-/tree/Rel-19/yang-models> (SA5 stage3 repository)
    - 📶 Balazs Lengyel (Ericsson) as YANG Code moderator
    - 📶 Sean Sun (Nokia) and Ruiyue Xu (Huawei) as YAML Code moderator
  
  - 📶 Charging APIs:
    - 📶 OpenAPI solution to be captured in [https://forge.3gpp.org/rep/all/5G\\_APIs](https://forge.3gpp.org/rep/all/5G_APIs) (3GPP unified stage3 repository) and <https://forge.3gpp.org/rep/sa5/CH/-/tree/Rel-19/OpenAPI> (SA5 stage3 repository)
    - 📶 ASN.1 solution to be captured in <https://forge.3gpp.org/rep/sa5/CH/-/tree/Rel-19/> (SA5 stage3 repository)
    - 📶 Chen Shan (Huawei) as Charging YAML Code moderator
    - 📶 Robert Törnkvist (Ericsson) as Charging ASN.1 Code moderator
  
  - 📶 Stage 3 forge is supported by MCC and Miguel Angel Reina Ortega (ETSI) as code master.

# Content



- 3GPP SA5 introduction
- Release 19 working progress
- Release 20 work planning

# For Information:

## SA 5G-A/6G Rel-20 Workshop Plan (Ref:SP-240952)



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### 5G-Advanced in Rel-20 for TSG-SA (SA#106):

- 5G-Advanced timelines :
  - Stage-1 freeze: Jun 2025
  - Stage-2 freeze: Jun 2026 (>=80%); Sep 2026 (100%)
  - Stage-3 freeze: Mar 2027
  - ASN.1/OpenAPI freeze: June 2027
- Dedicated agenda and discussion for 5G-Advanced in Rel-20 will be arranged in December 2024 as part of SA#106
  - Targeting a 1-day “workshop” for 5G-Advanced within SA#106. [Details TBD]
  - SA#106: Start 0900 Tuesday, Finish 1600 Friday.
- Rel-20 prioritization to take place after Dec 2024
  - 1-step Prioritization (June, 25), or 2-step Prioritization (Mar, 25 + June, 25)? [TBD no later than Dec]

### 6G Workshop Plan:

- Dates: March 10<sup>th</sup> – 11<sup>th</sup> (Monday – Tuesday), collocated with TSG#107 meetings.
- Workshop timings
  - Parallel RAN/SA sessions starting from Monday afternoon to Tuesday early afternoon
    - Monday: 1400 – 1800
    - Tuesday: 0900 – 1530
  - Joint RAN/SA/CT session
    - Monday morning: 0900 - 1230
    - Tuesday 1600 – 1800: summary of the workshop

### 6G Workshop: SA Agenda (SA#107):

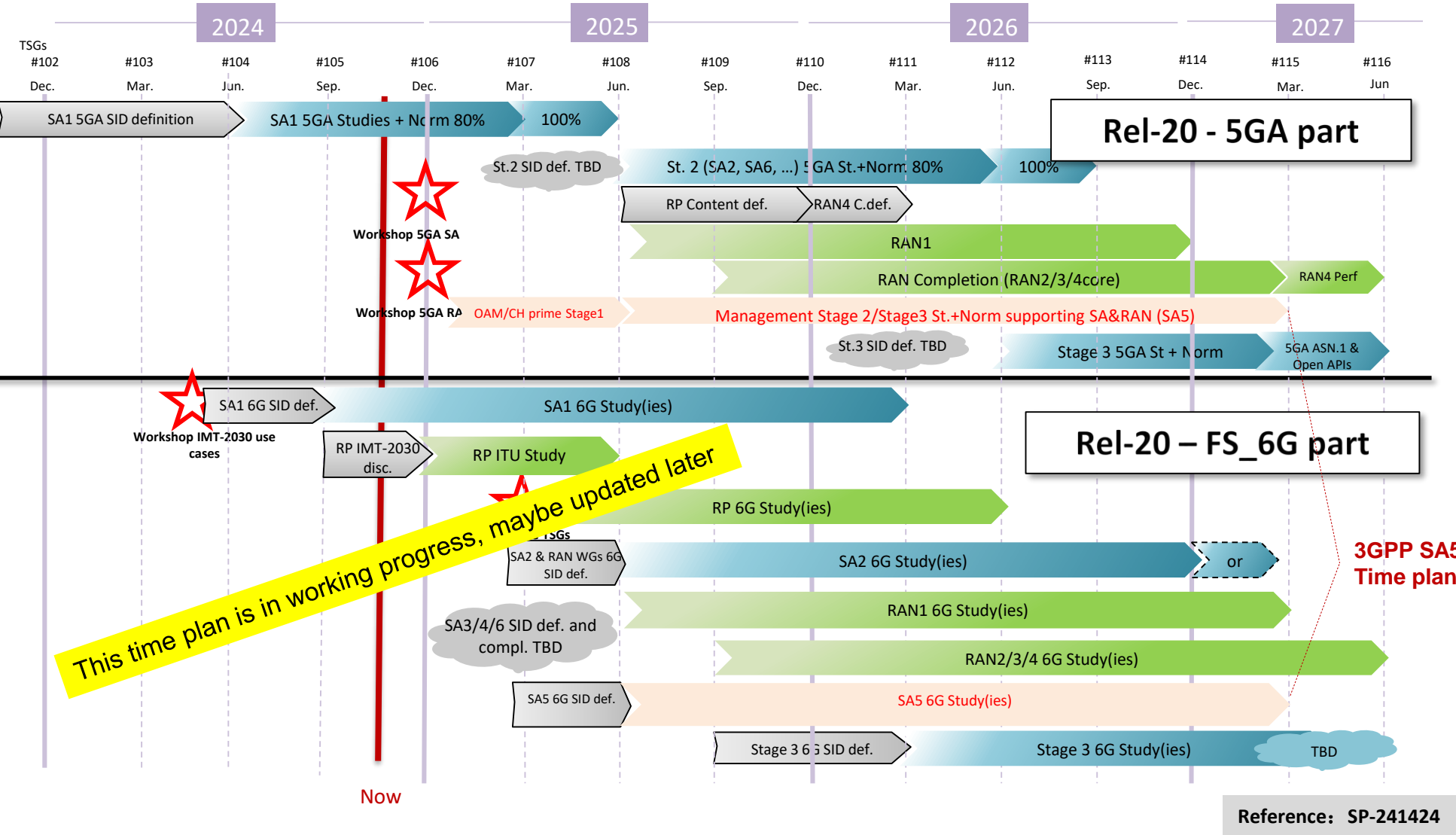
- Draft preliminary Agenda for SA
  - Opening of the workshop (Monday 0900 local time)
  - Contributions from 3GPP members
    - Contributions on 6G technologies with a focus on System/CN aspects, 6G Stage-2 study organization, etc. [Details TBD]
    - Up to one contribution per company
      - 6G usecases related papers may be submitted for information but will not get handled.
  - Chairman's summary and open discussion
    - No individual contributions, please. TSG Chairs will prepare the summary
  - Closing of the workshop (Tuesday 1800 local time)
- Contributions
  - Individual contributions are invited for the parallel sessions
    - Contributions are welcome from 3GPP members and MRPs / verticals only
    - A subset of the contributions will be selected for presentation, with details TBD
  - TSG chairs will prepare a summary for the joint session
    - No individual contributions, please

# Release 20 timeline– figure with SA5 (recommended by SA5 leaders)



## Release 20 timeline

Note: All starting dates are indicative



### OAM/CH prime feature:

- Start of Rel-20 study: Jan.2025 (SA#107/SA5#159)
- End of Rel-20 work: Mar.2027 (SA#115/SA5#172)

### OAM/CH support to network feature (SA5 is ready to support network features pending the availability of inputs from other WGs. )

- Start of Rel-20 study: Jun.2025 (SA#108/SA5#161)
- End of Rel-20 study: Mar.2027 (SA#115/SA5#172)

3GPP SA5 Time plan

Reference: SP-241424

This time plan is in working progress, maybe updated later

# Detailed Rel-20 time plan with 5GA/6G



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## Overall Plan:



### OAM/CH prime feature:

- Start of Rel-20 study: Jan.2025 (SA#107/SA5#159)
- End of Rel-20 work: Mar.2027 (SA#115/SA5#172)



### OAM/CH support to network feature (SA5 is ready to support network features pending the availability of : other WGs. )

- Start of Rel-20 study: Jun.2025 (SA#108/SA5#161)
- End of Rel-20 study: Mar.2027 (SA#115/SA5#172)

This time plan is in working progress, maybe updated later

## 5GA:



### OAM/CH Prime:

- OAM/CH prime Stage-1 freeze: Jun 2025 – (same as SA1 stage-1 freeze)
- Stage-2 freeze : Jun 2026 (>=80%); Sep 2026 (100%) – (same as SA2 stage-2 freeze)
- Stage-3 freeze : Mar 2027 – (same as CT stage-3 freeze)



### OAM/CH support network features:

- OAM/CH support Stage-1 freeze : Dec 2025 – (6 months later than SA1 stage-1 freeze)
- Stage-2 freeze: Sep 2026 (>=80%); Dec 2026 (100%) – (3 months later than SA2 stage-2 freeze)
- Stage-3 freeze : Mar 2027 – (3 months earlier than CT OpenAPI/ASN.1 freeze)

## 6G SI Approval:



### OAM/CH Prime:

- SA5 SI approval: TSG#108 (Jun 2025) – (same as SA2 SI approval)



### OAM/CH support:

- SA5 SI approval: TSG#110 (Dec 2025) – (6 months later than SA2 SI approval)

## 6G SI completion:



### OAM/CH Prime:

- SA5 6G SI completion: Dec 2026 or Mar 2027 (To be confirmed at future TSG meeting)



### OAM/CH support:

- SA5 6G SI completion: Dec 2026 or Mar 2027 (To be confirmed at future TSG meeting)

# SA5 Rel-20 capacity summary



## SA5 capacity:

- 📶 Max TUs: 124 (OAM) / 80 (Charging)
  - 📶 Additional buffer TUs: 61(OAM)/40(CH)
- 📶 Max number of SIs/WIs: 10~15 (OAM) / 6~10 (Charging)
  - 📶 Note: one feature made up of SI+WI is counted as one item
- 📶 Max TUs per Feature: 12~8 TU



## Assumptions

- 📶 Start: Jun 2025, End: Mar 2027 (21 months)
- 📶 One track for OAM and One track for Charging
- 📶 Number of meetings: 10
- 📶 Expected total TUs per meeting (for all releases): 18.5 (OAM) / 12 (Charging)
- 📶 Total TUs (for all releases): 185 (OAM) / 120 (Charging)
- 📶 TUs for maintenance of past releases: 35 (OAM) / 18 (Charging)

This time plan is in working progress, maybe updated later



# Potential Rel-20 management features workshop (planned)



**Plan for management Feature Workshop (details to be updated according to the availability of inputs):**



**The scope of the workshops is 5GA related new management features including OAM/CH prime features and management support to new network features.**

1. January 15~16 2025 (online) : Online presentation on potential topics and directions (4 TUs).
  - Deadline for inputs: Jan.10<sup>th</sup> 2025 23.59UTC.
2. February 2025 (SA5#159): Contributions more focused on concrete topics, especially on management prime features (2 TUs)



## **Draft Agenda**

1. Opening of the workshop
2. Contributions from 3GPP member companies
  - 📶 Contributions on potential Rel-20 management use cases and requirements, etc.
  - 📶 Up to one contribution per company
3. Chairman's summary and open discussion
4. Closing of the workshop



Please feel free to contact Chair if you plan to provide presentation, and it will be helpful to make better planning for this activity.

# 3GPP SA & SA5 meeting calendar (2025)



Meeting info	DateTime	Location	Release dates	Other WGs (potential colocation)
SA5#159	17 Feb 2025- 21 Feb 2025	Sophia Antipolis, FR		
SA#107	10 Mar 2025- 14 Mar 2025	Incheon, South Korea	6G workshop	
SA5#160	07 Apr 2025- 11 Apr 2025	Goteborg, SE		SA2/3/4/5/6
SA5#161	19 May 2025- 23 May 2025	Fukuoka, Japan		SA WGs
SA#108	09 Jun 2025- 13 Jun 2025	Europe		
SA5#162	25 Aug 2025- 29 Aug 2025	Goteborg, SE		SA WGs/CT WGs
SA#109	15 Sep 2025- 19 Sep 2025	China	Rel-19 freeze	
SA5#163	13 Oct 2025- 17 Oct 2025	China		SA2/3/4/5/6 and CT1/3/4 WGs
SA5#164	17 Nov 2025- 21 Nov 2025	US		CT WGs, SA WGs, RAN WGs
SA#110	08 Dec 2025- 12 Dec 2025	US		

📶 6 f2f SA5 meeting planned in 2025, 3 meetings in Europe, 1 in Japan, 1 in China, 1 in US.

📶 Please book your hotel/flight when you received official meeting invitation

Thank you!