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Developer & Testing Forum

ONAP：Alignment study of ONAP/ORAN with 3GPP SA5 in OAM

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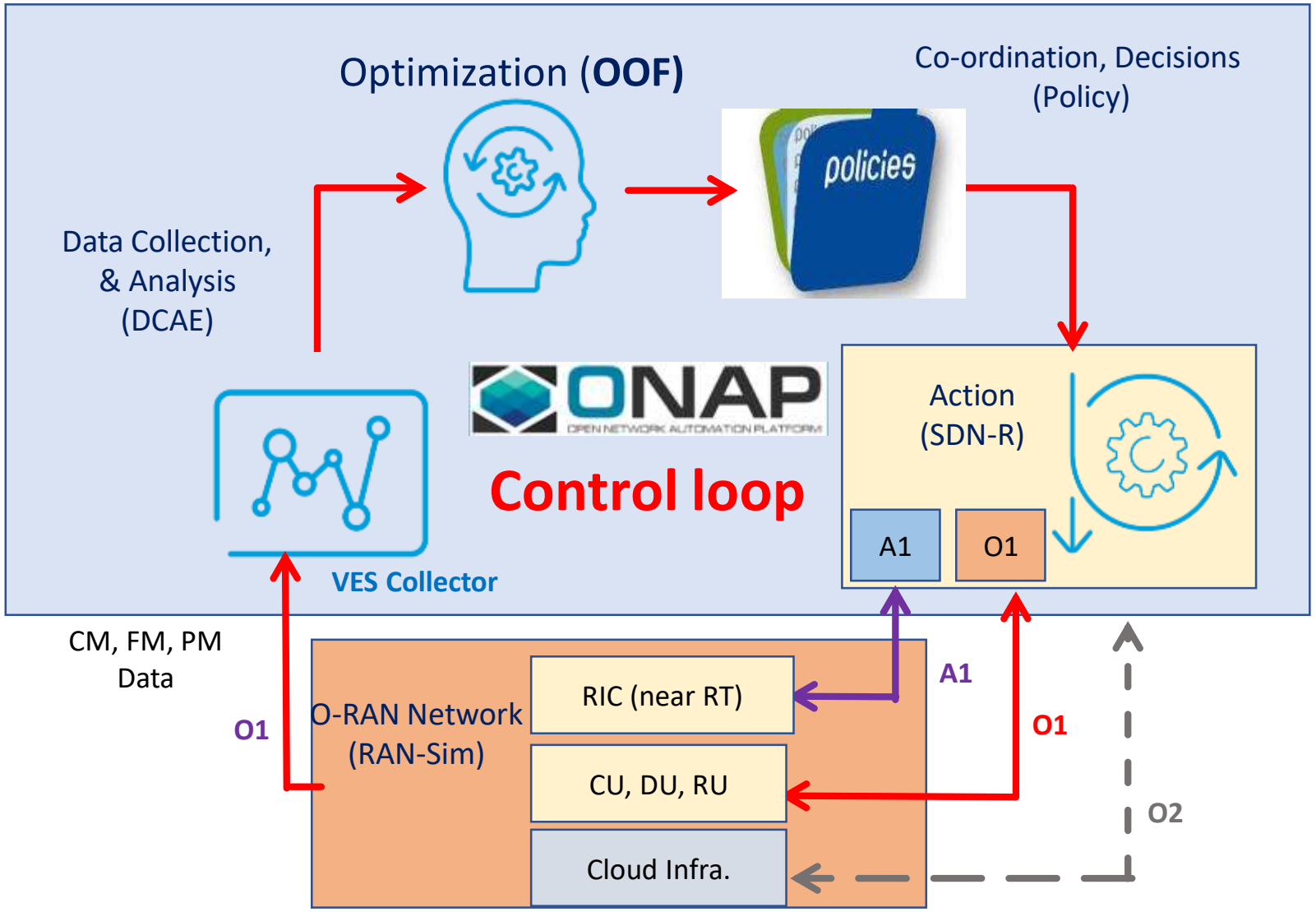
Outline

1. Current state of research in 3GPP, ORAN and ONAP
2. Potential alignment study between ONAP/ORAN and 3GPP

Our observations

- **Observation 1:** There is an overlap in the research conducted by 3GPP and ONAP/ORAN.
- **Observation 2:** The research conducted by ONAP and ORAN on next-generation networks has some valuable insights for the architecture and interfaces studied by 3GPP.

ONAP-based SON: Target - with O-RAN O1, A1, O2



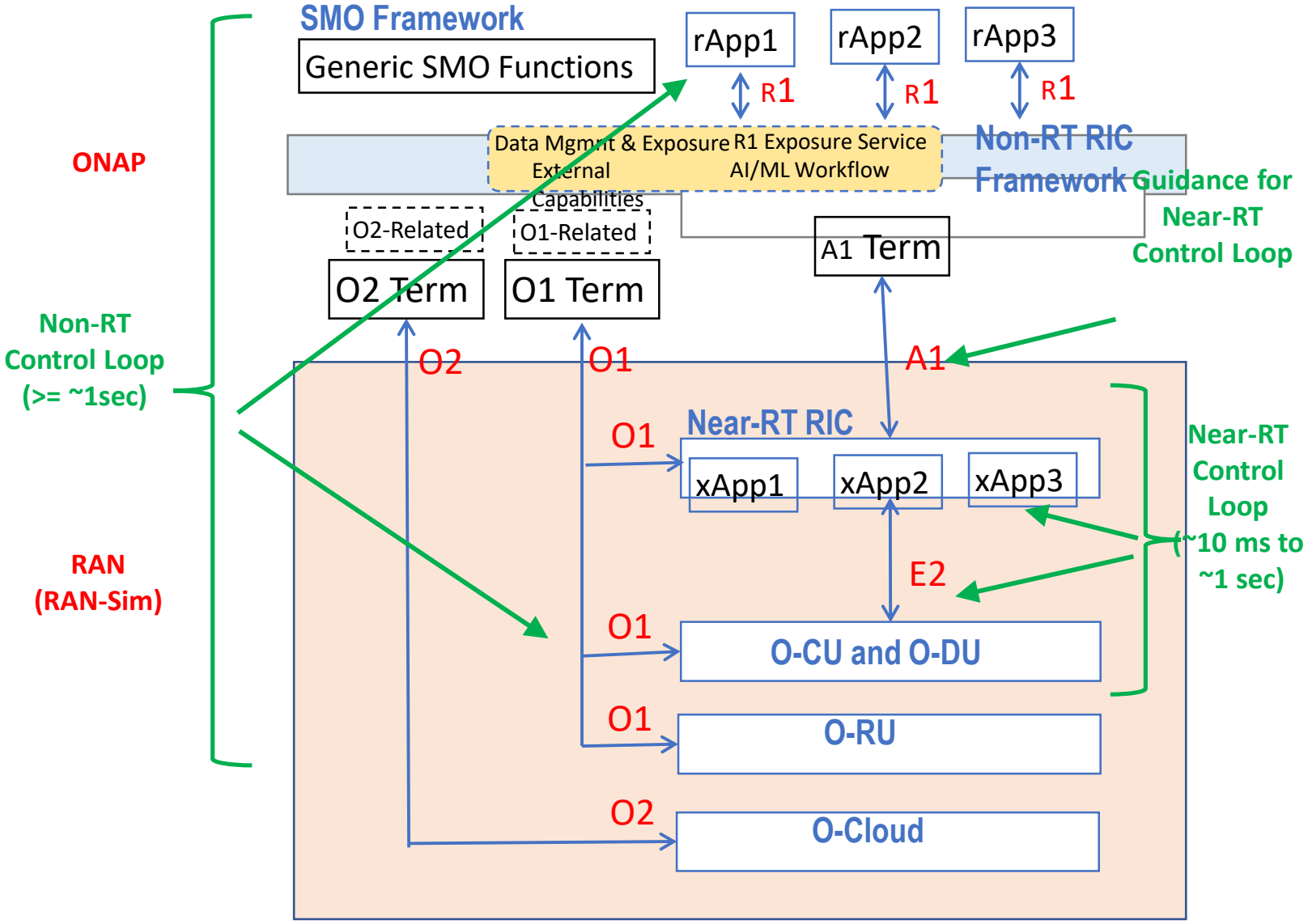
- SON ⇔ Control Loop (CL)
- ONAP: Open-source platform, with basic open-source code
- Companies can use framework to add proprietary SON solutions, including optimization algorithms, etc.

- OOF-SON use case has built a foundation for ONAP/O-RAN integration
- Radio network uses common netconf/yang model

Data flows

- SDN-R to RAN: netconf-based configuration
- RAN to DCAE: VES format for FM alarms, PM KPI, CM Notification
- RAN to SDN-R: Netconf ack

ONAP / O-RAN Control Loops



- Non-RT Loop
  - Time scale: ~ secs/mins
  - Direct config of CU/DU
  - Policy Guidance, Coordination
- Near-RT Loop
  - Near-Real-Time (~100ms)
  - Based on E2 service models
- SON examples
  - Non-RT: Changes based on operational state, averaged behavior
  - Near-RT: Changes based on radio channel, mobility

ORAN Working Group Composition

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Use Case（WG1）

WG1: Use Cases and Overall Architecture Workgroup

Open interface(WG4&WG5)

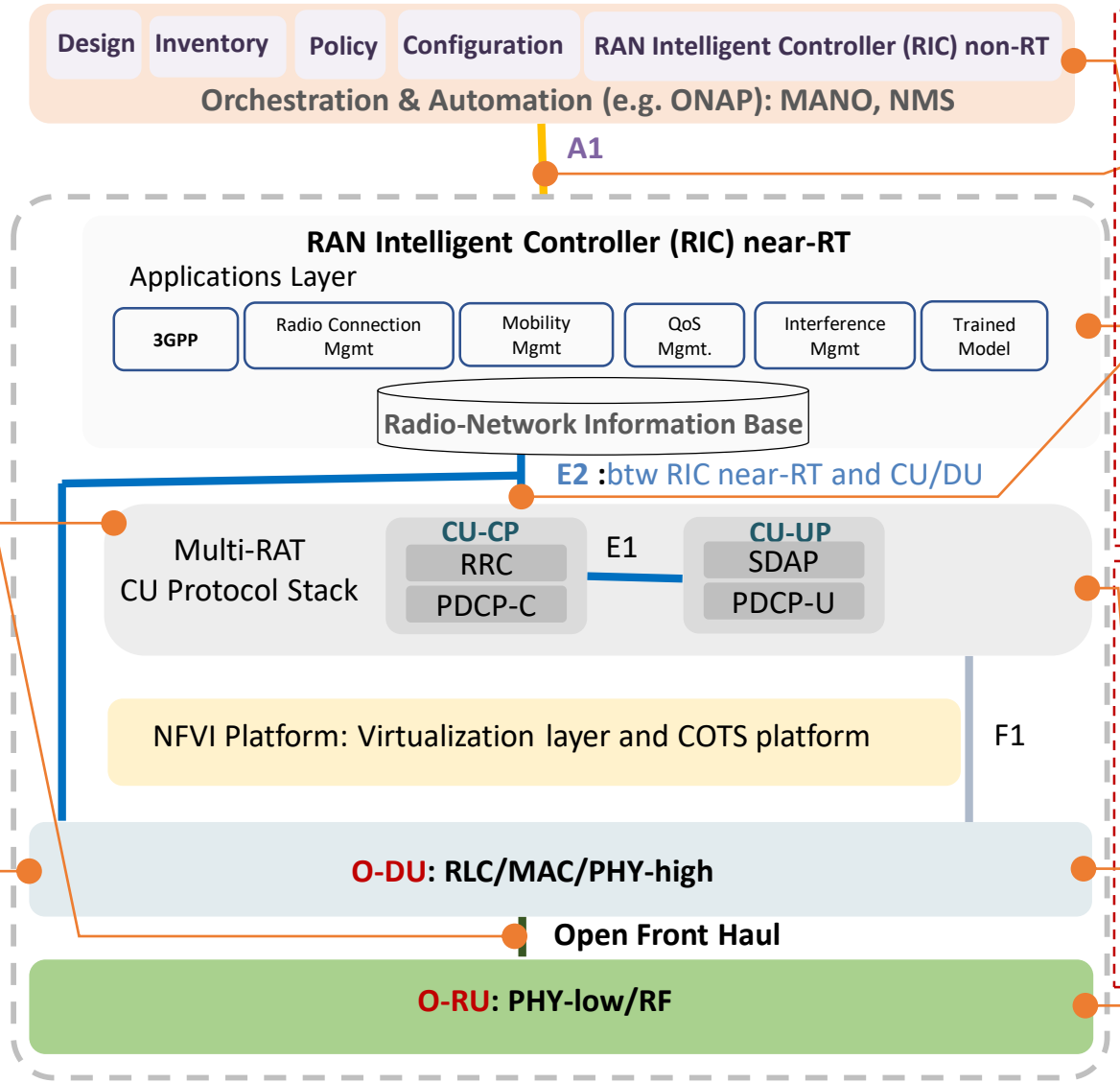
WG4: Open Fronthaul Interfaces Workgroup

WG5: Open F1/W1/E1/X2/Xn Interface Workgroup

Open source software (WG8 & TOC)

WG8: Stack Reference Design Workgroup

TOC: Establish an open-source community for the various working groups within O-RAN.



AI/ML for RAN（WG2&WG3&WG10）

WG2: RIC(non-RT) & A1 interface
WG3: RIC(near-RT) & E2 Interface

- Define the functions of RIC
- Define new interface
  - A1：interface between Non-RT RIC and Near-RT RIC
  - E2：interface between Near-RT RIC and CU

WG10: OAM

- Define the architecture of OAM
- Define O1 interface

Virtualization and white-box hardware (WG6&WG7)

WG6: Cloudification and Orchestration

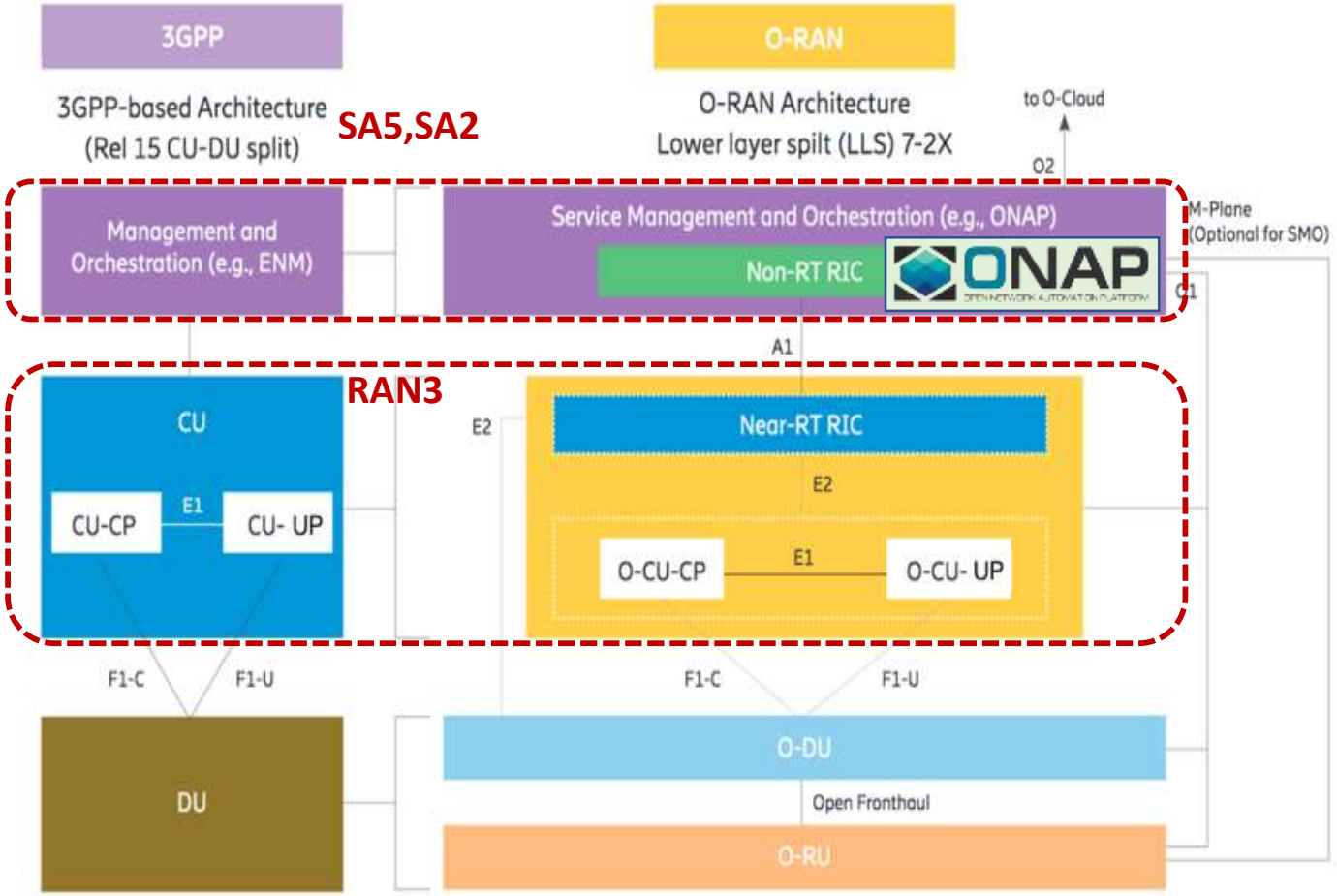
- Define the virtualization layer and hardware
- Includes CU and DU
- Decoupling hardware and software

WG7: White-box hardware

- Define hardware reference design
- Includes O-CU/O-DU/O-RU

WG9:Open X-haul Transport Workgroup

Comparison of Architectures Between ONAP/ORAN and 3GPP



O-RAN ALLIANCE

O-RAN WG	TSC & Focus Group
WG1 (Use Cases & Architecture)	OSFG (Open Source)
WG2 (Non-RT RIC and A1 Interface)	OSC TOC
WG3 (Near-RT RIC and E2 Interface)	SDFG (Standard Development)
WG4 (Open Fronthaul Interfaces)	TIFG (Test & Integration)
WG5 (OpenInterface)	MVP-C (Minimum Viable Plan)
WG6 (Cloudification and Orchestration)	**nGRG (next-Gen Research) TOC**
WG7 (White-box Hardware)	ACOP (Process & Procedure)
WG8 (Stack Reference Design)	ACOIE (Industry Engagement)
WG9 (Open X-haul Transport)	
WG10 (OAM)	
WG11 (Security)	

3GPP SA5 OAM Timeline

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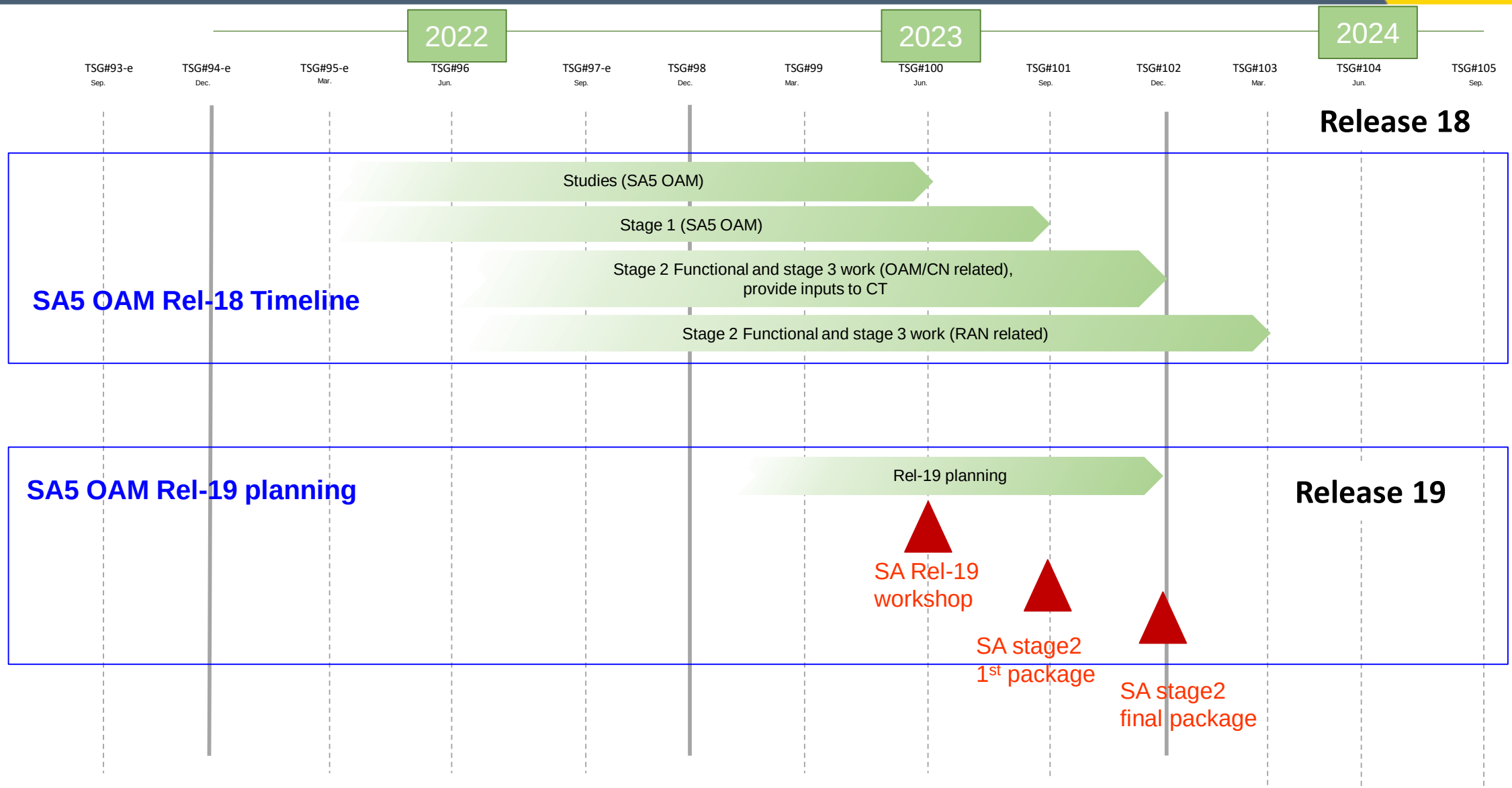

Related Researches in 3GPP SA5

Key technologies	R-18 WI	R-19 new topic
AI/ML	**1. AI/ML management** **2. Management Data Analytics (phase 2)** **3. Management Aspects related to NWDAF**	**Management Aspects related to NWDAF (phase 2)** • Potential enhancement for the performance measurements related the ML model provided by NWDAF; • Potential CM enhancements for NWDAF to support the new features introduced in Rel-18; • Evaluate the efficiency of the network data collection of NWDAF; **AI/ML management (phase 2)** • Study the management aspects of AI/ML functionalities in SA1, SA2, SA3, SA5, SA6, and RAN1; • Study the AI/ML management and operation capabilities to support different types of AI/ML technologies (FL, RL, Generative AI…); • Evaluation of energy consumption/efficiency impacts associated with AI/ML solutions; • Trustworthiness aspects related to the AI/ML functionalities.

Related Researches in 3GPP SA5

Key technologies	R-18 WI	R-19 new topic
E2E management and orchestration	**1. Intent driven Management Service for mobile network** **2. Study on intent-driven management for network slicing** **3. Study on enhancement of autonomous network levels** **4. Study on evaluation of autonomous network levels**	**Closed Control Loop Management** • Dynamic CCL creation; • Multi-vendor CCL management; • Conflict Detection and Resolution; • CCL scope (RAN UE throughput optimization, fault management, network coverage optimization).
		Intent driven Management Service (phase 3) • Left-over topics from R-18, including experience assurance, intent-driven Closed Loop control, Intent-driven SON orchestration and Intent-driven for MDA; • New scenarios for intent driven management for mobile network (UAV, traffic assurance); • Intent handling state management.
		Effectiveness of zero-touch orchestration and management • Measurements and indicators for the effectiveness of ZTO; • Management capabilities and potential requirements to support the effectiveness measurement; • E2E AI flow management and orchestration capabilities to optimize ZTO.

Potential alignment study between ONAP/ORAN and 3GPP

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	Near-term	Long-term
■ **Architecture**	• **WG2:** Awareness and cooperation on consistency between 3GPP OAM and O-RAN SMO/NonRT RIC Architecture alignment in SA2. • **WG4:** More agile processes for cooperation on information models (copyright handling, upstreaming / downstreaming for YANG and Stage 2 aspects) • **WG5:** DU-DU interface support for carrier aggregation	• **WG2/WG3:** RIC awareness in 6G from the start • **WG1/WG3:** Advanced RAN Automation – OAM/SMO + O-RAN Non-RT RIC alignment (SA2, SA5), e.g., O1 alignment • **WG3:** RAN policy control building on O-RAN Near-RT RIC (RAN3), e.g., E2
■ **AI/ML**	• **WG2:** Description of AI/Ml workflow	• **WG1/WG10:** Full alignment of NWDAF with O-RAN information modeling approaches • **O-RAN nGRG:** Some research could align with 3GPP on topics such as native-AI architecture, cross-domain AI collaboration, and DT-RAN.

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Thank you!