O-RAN next Generation (nGRG) Initiative

May 2023

Vikas Dixit – AVP (Reliance Jio)

6G India 2023 International Conference

Agenda

- O-RAN Overview
- nGRG Mission
- nGRG Research Stream
- Ongoing nGRG work and Achievements

O-RAN Overview

O-RAN Details

History : xRAN + cRAN = oRAN

- xRAN forum, founded in June 2016 by AT&T,DT,SK Telcom & Dr. Sachin Katti, Professor at Standford University.

- cRAN forum, founded in 2009 by China Mobile to proposed in the industry the concept of Centralized, Collaborative, Cloud and Green Radio Access Network (C-RAN)

- xRAN forum and cRAN forum merged to create oRAN forum on 27th Feb 2018. Idea is to create carrier-led effort to drive new levels of openness in the radio access network of next-generation wireless systems. (http://www.eleconomista.es/empresas-finanzas/noticias/8967973/02/18/xRAN-Forum-Merges-With-CRAN-Alliance-to-Form-ORAN-Alliance.html)

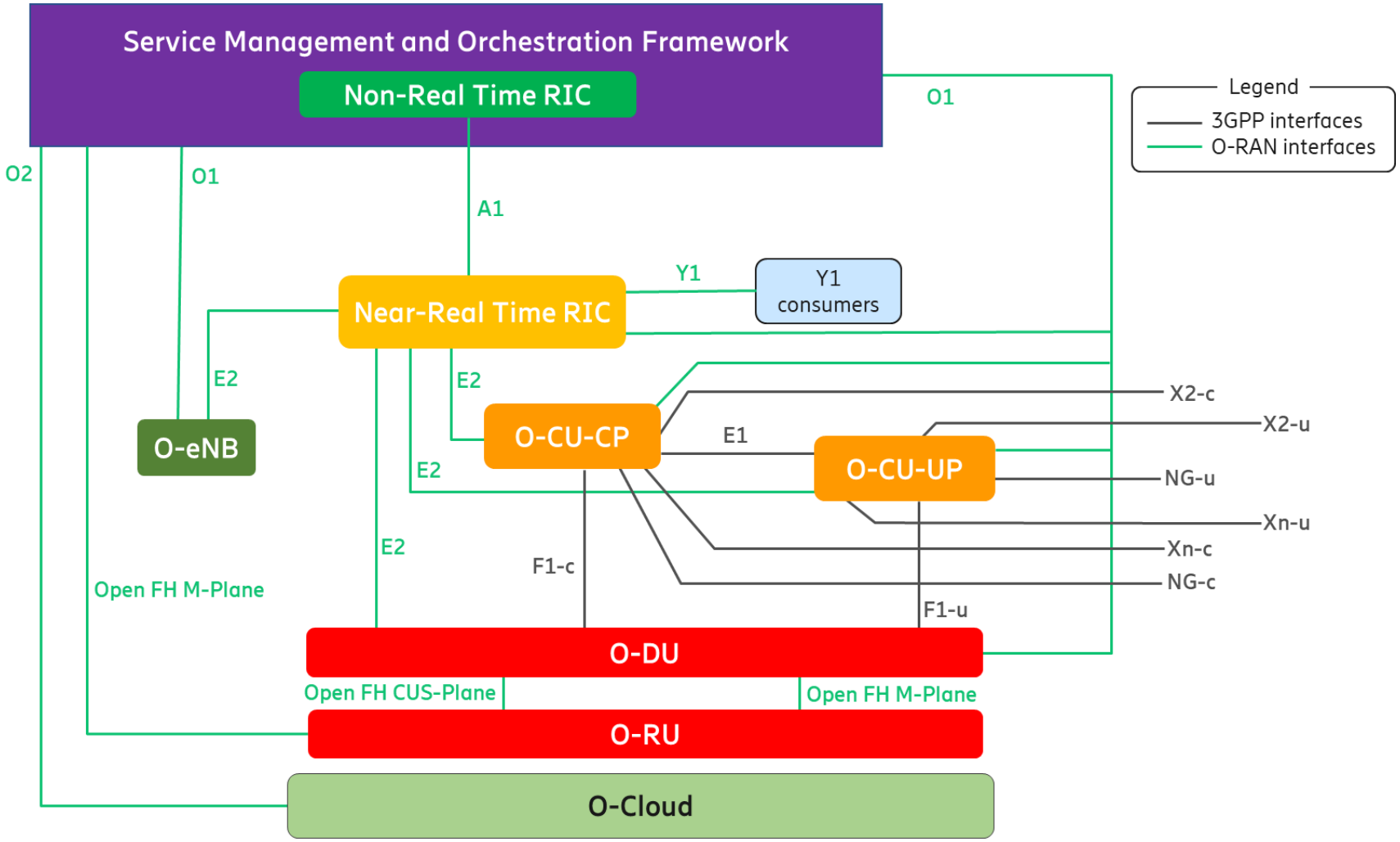
What is O-RAN ?

- https://www.o-ran.org/
- O-RAN ALLIANCE is Transforming the Radio Access Networks Industry Towards Open, Intelligent, Virtualized and Fully Interoperable RAN
- O-RAN ALLIANCE (or just O-RAN) is a world-wide community of mobile operators, vendors, and research & academic institutions operating in the Radio Access Network (RAN) industry
- Global Alliance:
  - 324 (Companies, Universities, Government Bodies etc)
  - Around 2K delegates from different organizations

What is O-RAN ?

- The new O-RAN standards will enable a more competitive and vibrant RAN supplier ecosystem with faster innovation to improve user experience.
- O-RAN-based mobile networks will at the same time improve the efficiency of RAN deployments as well as operations by the mobile operators.
- To achieve this, O-RAN ALLIANCE is active in 3 main streams:
  - The specification effort => new standards for open and intelligent RAN
  - O-RAN Software Community => open software development for the RAN (in cooperation with the Linux Foundation)
  - Testing and integration effort => supporting O-RAN member companies in testing and integration of their O-RAN implementations

O-RAN Architecture

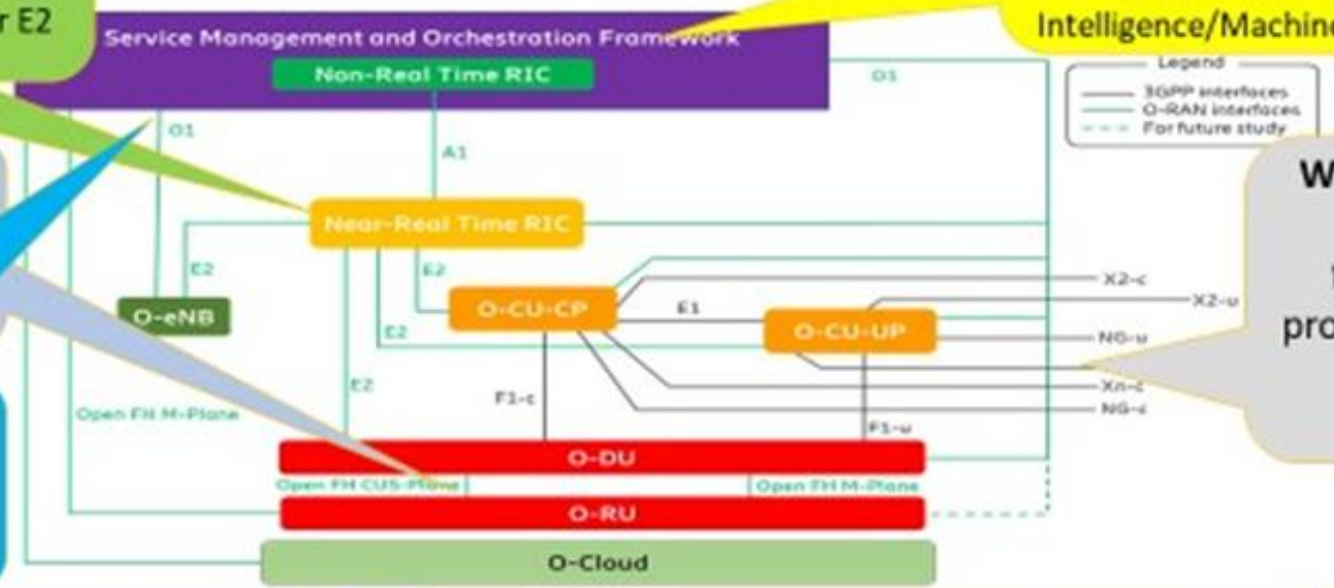


O-RAN WGs

WG3: Near-Real-time RAN Intelligent Controller and E2 Interface Workgroup
Defines Near-RT RIC Architecture, E2 Specifications and Test Specifications for E2 interface

WG1: Use Cases and Overall Architecture
It has overall responsibility for the O-RAN Architecture and Use Cases.

WG2: Non-real-time RAN Intelligent Controller and A1 Interface Workgroup
non-real-time intelligent radio resource management, higher layer procedure optimisation, policy optimisation in RAN, and providing Artificial Intelligence/Machine Learning models to Near-RT RIC.



WG4: Open Fronthaul
Defines FH interface Specifications (CUS and M Plane)

WG5: Open F1/W1/E1/X2/Xn interface Workgroup
fully operable multi-vendor profile specifications (which shall be compliant with 3GPP specification)

WG10: OAM for O-RAN
Defines OAM requirements, OAM architecture and the O1 interface.

WG6: Cloudification and Orchestration Workgroup
Decouple RAN Software from underline hardware platforms, use commodity hardware platform to host RAN functions

WG7: White-Box Hardware Workgroup
Specify and release a complete reference design to foster a decoupled software and hardware platform.

WG11: Security Workgroup
The WG11 is responsible for defining the requirements and specifying the architectures and protocols for security and privacy in O-RAN systems.

WG8: Stack Reference Design Workgroup
Develop the software Architecture, Design and release plan for O-CU,O-DU based on 3GPP & O-RAN Specifications for NR

WG9: Open X-haul Transport Workgroup
Focus on transport domain, transport equipment, physical media and control/management protocols for transport network

nGRG Overview

O-RAN Details

nGRG Mission

Ambition

- Provide a forum to facilitate O-RAN related 6G research efforts and to publish research findings
- Leverage industry and academic 6G research efforts and determine how O-RAN may evolve to support 6G and beyond, considering regional research efforts, ITU-R, and 3GPP development
- Achieve O-RAN sustainability from 4G/5G to 6G and beyond
- Consider the impact of 6G on O-RAN areas of interest and work with Industry Partners to unify the 6G technology path/timeline to avoid incompatibility b/w O-RAN and other SDOs

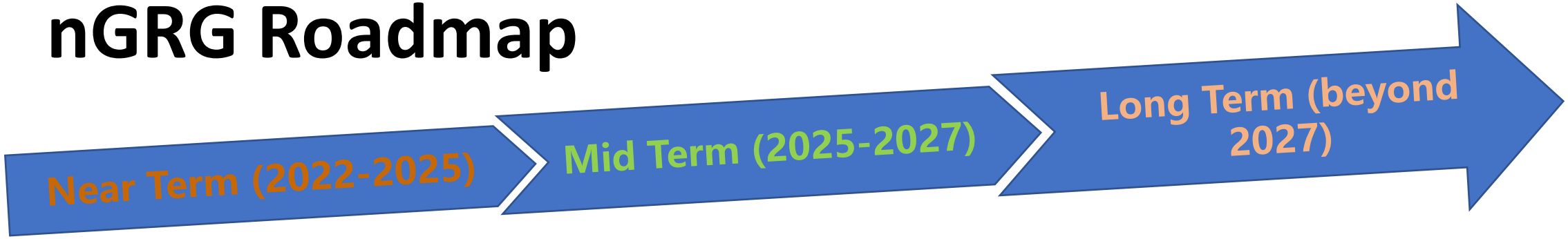
Operations

- Define the O-RAN nG research agenda and key priorities
- Establish research streams based on defined research priorities, and solicit research items under corresponding research streams
- Organize regular discussions and reviews of the progress/outcomes of research streams
- Study interworking of O-RAN solutions across different technologies

Outcomes

- Publish white papers and research reports based on the outcomes of the studies in the Group
- Recommend appropriate actions through white papers
- Sponsor topical workshops, seminars, and summits with appropriate partners

nGRG Roadmap

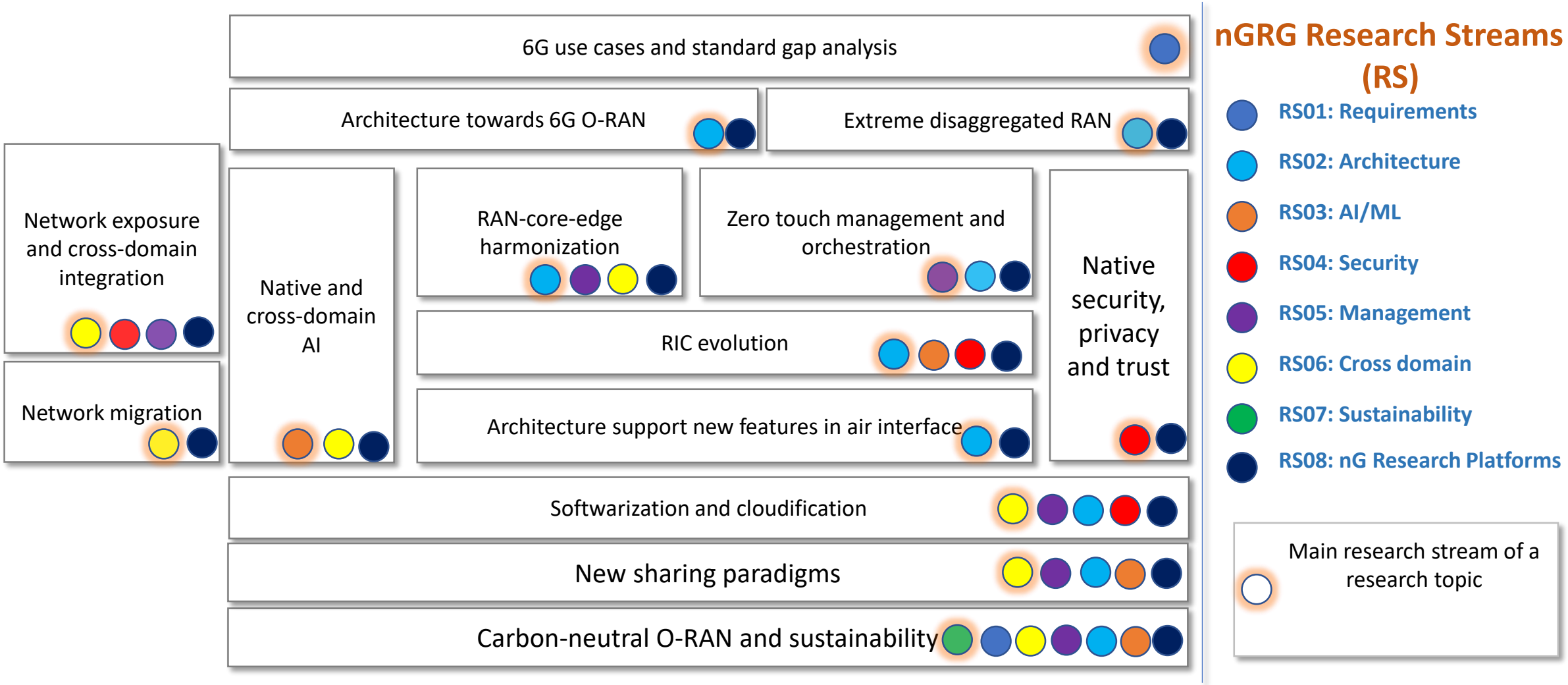


- **Near Term (2022-2025):** Align with Industry Partners and perform a high-level impact analysis of potential 6G technology trends and the ITU-R Vision for the next IMT on the O-RAN architecture and establish research items based on defined research priorities and the outputs include white papers and research reports.

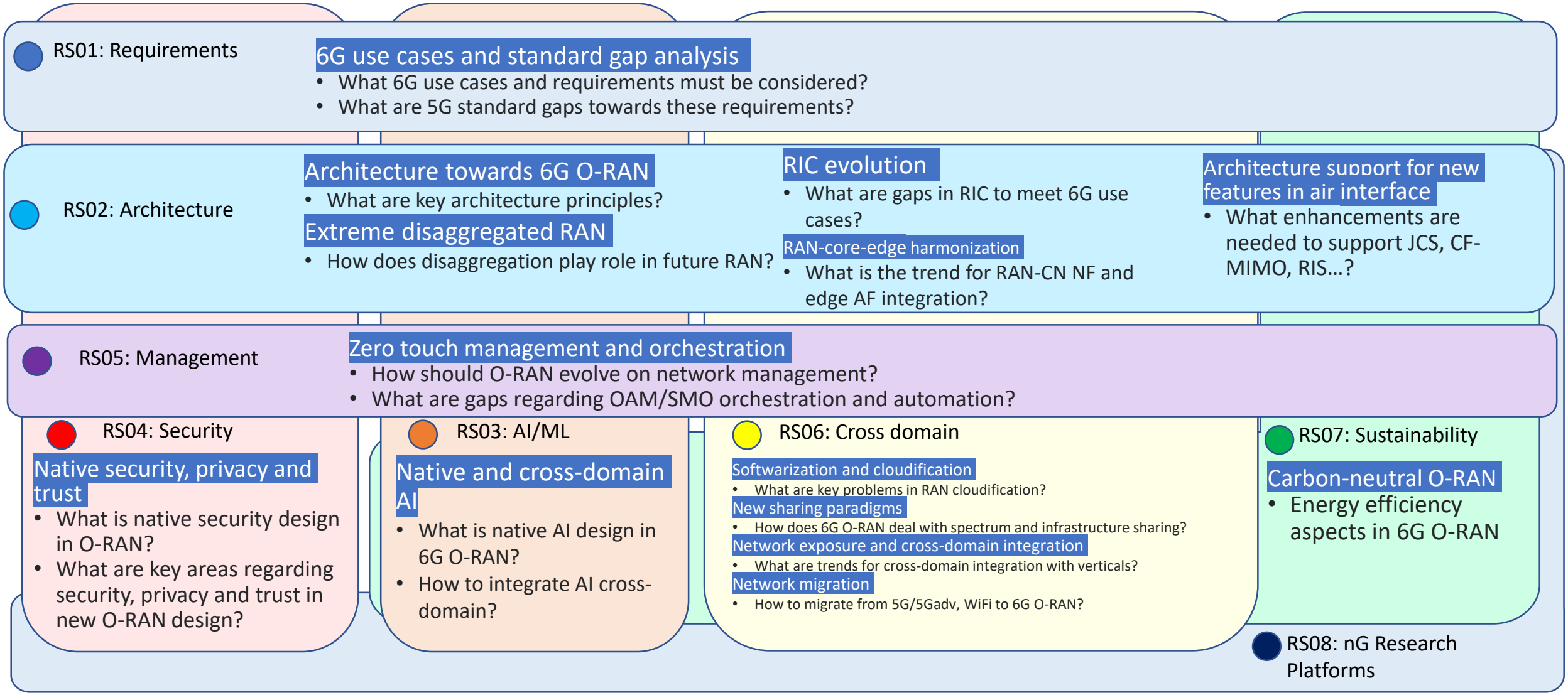
- **Mid Term (2025-2027):** Based on the research findings, provide inputs to O-RAN WGs/FGs to prepare for O-RAN 6G standards studies and to coordinate O-RAN 6G collaborations with other SDOs.

- **Long Term (beyond 2027):** Align with other 6G research organizations, SDOs, and programs through liaisons via O-RAN SDFG and collaborate with O-RAN TIFG/IEEE/NSF etc. on potential 6G testbeds.

nGRG Research Topics



nGRG Research Streams



Ongoing Research Streams

	Research stream	Leader(s)	Status and planned activities
RS01	6G use cases and standard gap analysis	Jio, SK telecom, T-Mobile	Aim at exploring the area of 6G use cases and perform an analysis of the potential gaps in the O-RAN standards to enable them. The outcome of the work may take the form of research reports and/or white papers
RS02	Architecture towards 6G O-RAN	China Mobile, NOKIA, Qualcomm	Aim at exploring the area of network architecture and key architectural principles
RS03	Native AI and cross domain AI	China Telecom, Lenovo, Jio, VTT	Aims at research on how to support native AI and cross domain AI in 6G O-RAN
RS04	Native security	Jio, DELL, Qualcomm	Focus on the security landscape associated with nG work across the Telecom industry, academia, research institutions and industry alliances and its relevance to areas of interest of the O-RAN Alliance.
RS08	nG research platform	KEYSIGHT TECHNOLOGIES, VIAVI, AT&T, verizon	Explore requirements for the evaluation of nGRG concepts and influence the research platforms/testbed in industry and academia towards prioritized nGRG research areas aligned with O-RAN Alliance principles

Ongoing Work and Achievements

Current work	• **5 research streams** (RS) and **7 research items** (RI) ongoing, focusing on O-RAN key research priorities. • First wave of **white papers** and **research reports** starts from June 2023, covering use cases and requirements, cloud friendly and native AI architecture, native AI operational requirement, native security, etc.
Specific partnership	• Strong **partnership** with global 6G industry associations, to keep the alignment of technical development for 6G pre-std work. • Information exchange with NGMN, NextG Alliance, 6G-IA, ITU-T FG Autonomous Networks, IEEE Future Network Initiative, FCC TAC 6G WG, etc

nGRG events	• nGRG workshop series
	  • 1st nGRG workshop held on Oct. 20, 2022; **19** invited speakers and panelists, **130+** attendees;
	  • 2nd nGRG workshop is planned on Feb. 16. 2023; 15 invited speakers and panelists; 5 6G associations from Europe, USA, and Asia
	• **nGRG special session** in Open RAN Summit (Madrid, Oct. 26, 2022)
	• Regular **industry/academic talks** at nGRG plenary meetings

Thank you

Vikas Dixit (vikas1.dixit@ril.com)