

# O-RAN Alliance

## Next Generation Research Group (nGRG)

### Overview

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The Networking Channel - O-RAN Alliance: Next Generation Research Group panel

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# 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

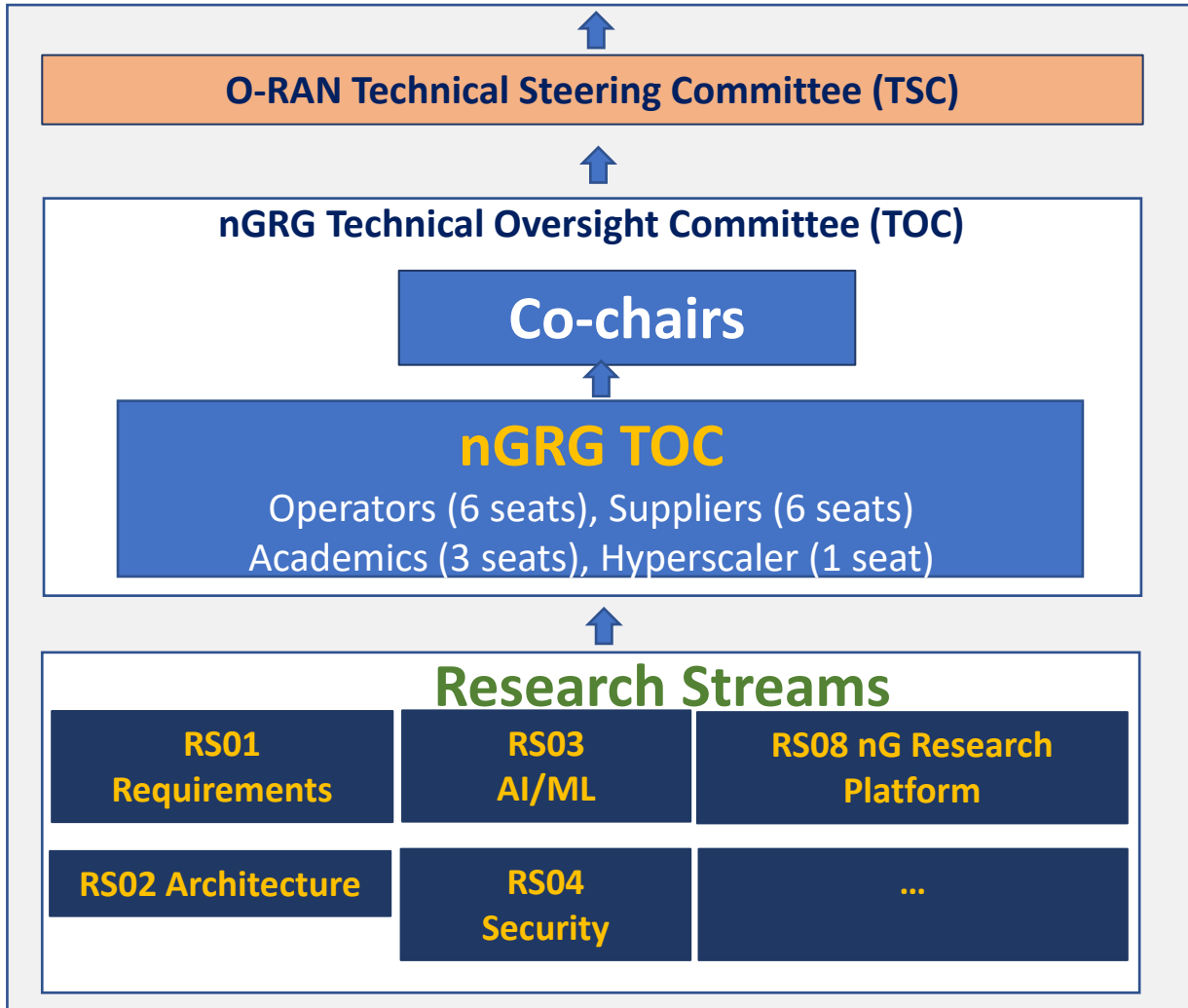
- Publish **white papers and research reports** based on the outcomes of the studies in the Group
- **Recommend appropriate actions** through white papers
- **Sponsor** topical workshops, seminars, and summits with appropriate partners

# 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 Structure



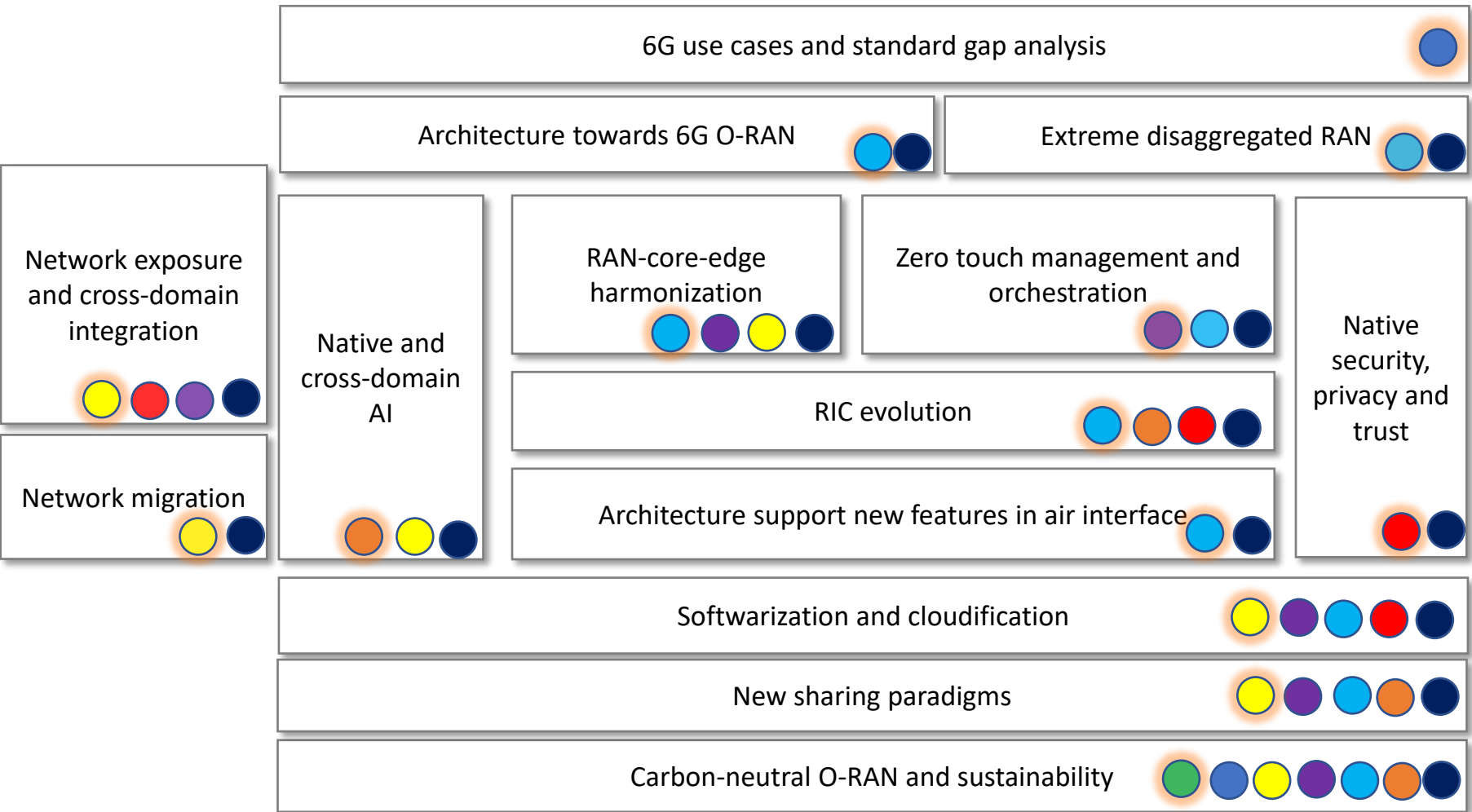
## nGRG Technical Oversight Committee



### Academics


- **Prof. Vincent Poor**, Princeton University, USA
- **Prof. Khaled Ben Letaief**, Hongkong University of Science and Technology, China
- **Prof. Hans Schotten**, TU Kaiserslautern, Germany

# nGRG Research Topics



## nGRG Research Streams (RS)

-  **RS01: Requirements**
-  **RS02: Architecture**
-  **RS03: AI/ML**
-  **RS04: Security**
-  **RS05: Management**
-  **RS06: Cross domain**
-  **RS07: Sustainability**
-  **RS08: nG Research Platforms**

 Main research stream of a research topic

# nGRG Research Streams

**RS01: Requirements**

**6G use cases and standard gap analysis**

- What 6G use cases and requirements must be considered?
- What are 5G standard gaps towards these requirements?

**RS02: Architecture**

**Architecture towards 6G O-RAN**

- What are key architecture principles?

**Extreme disaggregated RAN**

- How does disaggregation play role in future RAN?

**RIC evolution**

- What are gaps in RIC to meet 6G use cases?

**RAN-core-edge harmonization**

- What is the trend for RAN-CN NF and edge AF integration?

**Architecture support for new features in air interface**

- What enhancements are needed to support JCS, CF-MIMO, RIS...?

**RS05: Management**

**Zero touch management and orchestration**

- How should O-RAN evolve on network management?
- What are gaps regarding OAM/SMO orchestration and automation?

**RS04: Security**

**Native security, privacy and trust**

- What is native security design in O-RAN?
- What are key areas regarding security, privacy and trust in new O-RAN design?

**RS03: AI/ML**

**Native and cross-domain AI**

- What is native AI design in 6G O-RAN?
- How to integrate AI cross-domain?

**RS06: Cross domain**

**Softwarization and cloudification**

- What are key problems in RAN cloudification?

**New sharing paradigms**

- How does 6G O-RAN deal with spectrum and infrastructure sharing?

**Network exposure and cross-domain integration**

- What are trends for cross-domain integration with verticals?

**Network migration**

- How to migrate from 5G/5Gadv, WiFi to 6G O-RAN?

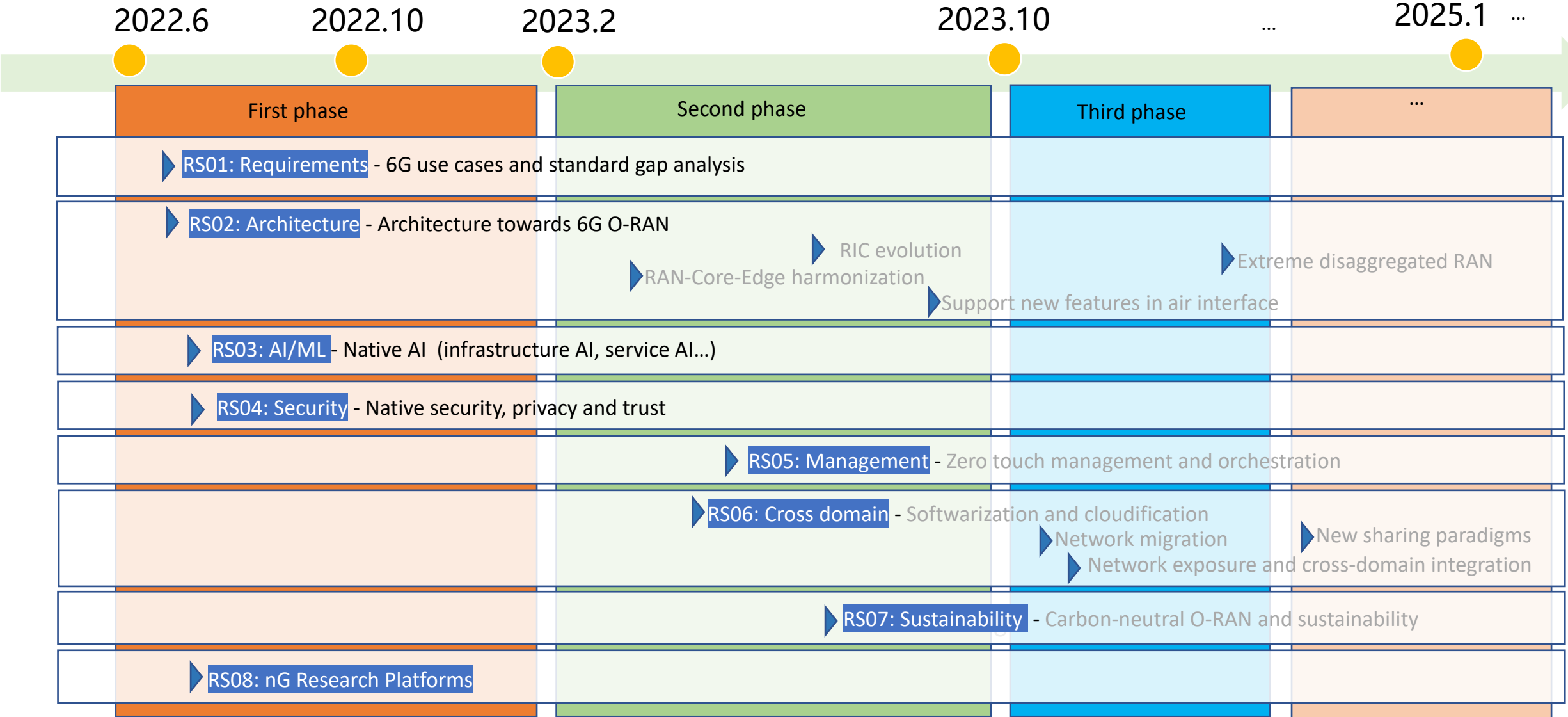
**RS07: Sustainability**

**Carbon-neutral O-RAN**

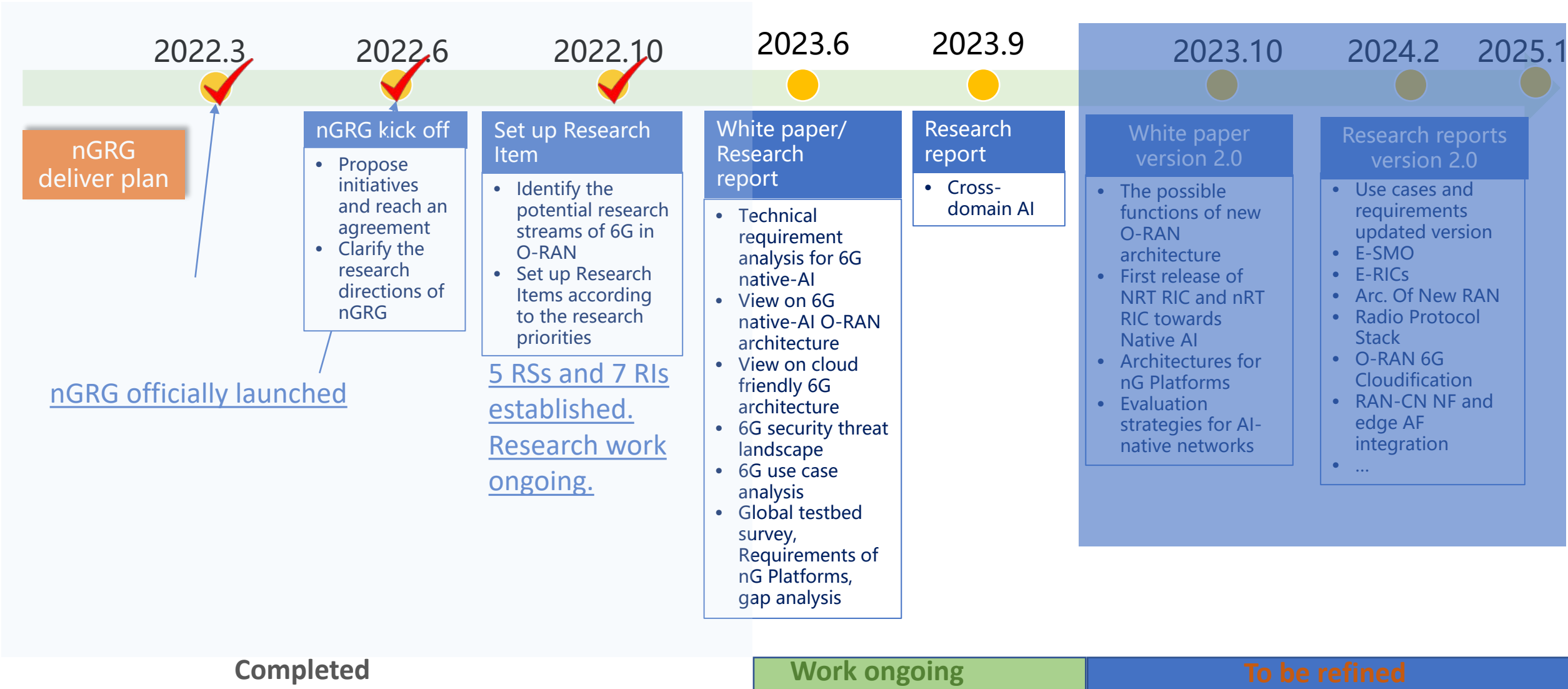
- Energy efficiency aspects in 6G O-RAN

**RS08: nG Research Platforms**

# Research Stream Priority Consideration







# Timeline





# Ongoing Research Streams

|      | Research stream                        | Leader(s)   | Status and planned activities  |
|------|--|---|--|
| RS01 | 6G use cases and standard gap analysis |    | 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          |    | Aim at exploring the area of network architecture and key architectural principles   |
| RS03 | Native AI and cross domain AI          |    | Aims at research on how to support native AI and cross domain AI in 6G O-RAN   |
| RS04 | Native security                        |   | 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                   |  | 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         | <ul style="list-style-type: none"><li>• <b>5 research streams</b> (RS) and <b>7 research items</b> (RI) ongoing, focusing on O-RAN key research priorities.</li><li>• First wave of <b>white papers</b> and <b>research reports</b> starts from June 2023, covering use cases and requirements, cloud friendly and native AI architecture, native AI operational requirement, native security, etc.</li></ul>   |
| Specific partnership | <ul style="list-style-type: none"><li>• Strong <b>partnership</b> with global 6G industry associations, to keep the alignment of technical development for 6G pre-std work.<ul style="list-style-type: none"><li>• Information exchange with NGMN, NextG Alliance, 6G-IA, ITU-T FG Autonomous Networks, IEEE Future Network Initiative, FCC TAC 6G WG, etc</li></ul></li></ul>  |
| nGRG events          | <ul style="list-style-type: none"><li>• nGRG workshop series:<ul style="list-style-type: none"><li>• 1st nGRG workshop (Visit the <a href="#">Link</a> for records) held on Oct. 20, 2022; <b>19</b> invited speakers and panelists, <b>130+</b> attendees;</li><li>• 2nd nGRG workshop (Visit the <a href="#">Link</a> for records) held on Feb. 16. 2023; 15 invited speakers and panelists; 5 6G associations from Europe, USA, and Asia, <b>140+</b> attendees</li></ul></li><li>• <b>nGRG special session</b> in Open RAN Summit (Madrid, Oct. 26, 2022)</li><li>• Regular <b>industry/academic talks</b> at nGRG plenary meetings</li></ul> |



# Thank you!

**For more information, please contact:**

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