

Non-RealTime RIC in O-RAN Software Community

OSC Non-RealTime RIC project (NONRTRIC)

Update to O-RAN Alliance / RSAC

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08 June 2020

Non-RealTime RAN Intelligent Controller (*NONRTRIC*) project in OSC

The NONRTRIC project provides:

- Concepts
- Architecture
- Reference implementations

... for Non-RealTime RIC functionality as defined and described by the O-RAN Alliance architecture.

All implementations will be demonstrated in open community labs to prove functionalities and to give feedback to the O-RAN working groups

Coordinates:

- Issue tracker / Backlog: JIRA: <https://jira.o-ran-sc.org/projects/NONRTRIC/issues>
- Code Repositories: Gerrit:
 - <https://gerrit.o-ran-sc.org/r/admin/repos/nonrtric>
 - <https://gerrit.o-ran-sc.org/r/admin/repos/portal/nonrtric-controlpanel>
 - <https://gerrit.o-ran-sc.org/r/admin/repos/sim/a1-interface>
- Documentation & Discussion: Wiki: <https://wiki.o-ran-sc.org/display/RICNR>
- Team Status & Planning Meetings: <https://wiki.o-ran-sc.org/display/RICNR/Meetings>

NONRTRIC Project started July 2019

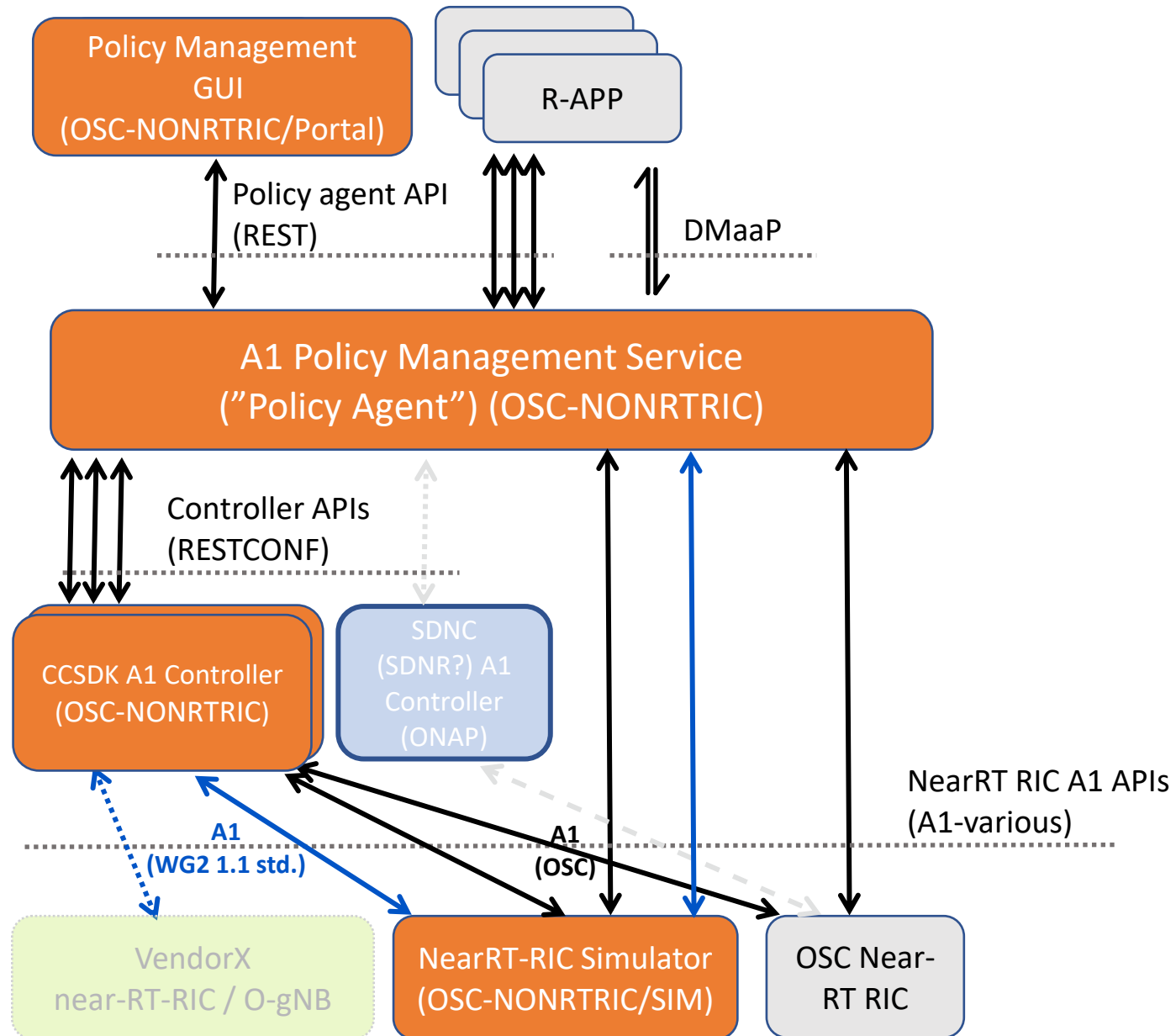
- Team: PTL: John Keeney (Ericsson Software Technology - EST)
- Full team of developers from EST, some initial input from Samsung, observers from other companies, and lots of guidance from AT&T

OSC: NONRTRIC project status – at a glance

(June 2020)

- Improved NONRTRIC functionality being finalised for OSC “Bronze” Release (Early June)
 - OSC A1 Adapter (controller – mediation)
 - OSC A1 Policy Management Service (controller – A1 policies)
 - OSC Non-RT-RIC Control Panel (GUI – for A1 Policy management)
 - OSC A1 Simulator (a stateful test stub to simulate near-RT-RIC end of A1 interface)
- NONRTRIC functions support multiple A1 versions
 - O-RAN A1-AP v1.1 & OSC pre-spec A1
- ONAP continues as the chosen SMO in OSC – so ONAP/OSC alignment tasks continue
- Ongoing integration tasks with other OSC projects
 - OAM, Portal, SIM, INT (dep & test), near-rt-ric (ric-app), near-rt-ric (ric-plt)
- *Bronze: Major focus on performance, reliability, scalability, compliance, quality.*

NONRTRIC Project – OSC “Bronze”



Functions (Bronze)

A1 Adaptor / Controller

Mediation point for A1 interface termination in SMO/NONRTRIC

- Implemented as OSGI Feature/Bundles
 - A1 REST southbound
 - RESTCONF Northbound
 - NETCONF YANG > RESTCONF adapter
 - Mapping logic / Provider
- Can be included in an any SDNC/CCSDK persona

A1 Policy Management Service (“Policy Agent”)

SMO Service above A1 Adaptor/Controller that provides:

- Unified REST & DMAAP APIs for managing A1 Policies in all near-RT-RICs
- Synchronized view of registered ‘services’ (e.g. R-APP, GUI, etc)
- Synchronized view of policy instances for each ‘service’
- Synchronized view of policy instances in all near-RT-RICs
- Synchronized view of policy types in all near-RT-RICs
- Policy Query API (e.g. per near-RT-RIC, per ‘service’, per policy type)
- Unified near-RT-RIC ID to near-RT-RIC address mapping
 - will also act as adaptor to A&AI, CMDBs etc. to “find” near-RT-RICs - *soon*
- Initial “O1 *ManagedElement*” mapping database & interface to find appropriate near-RT-RIC for RAN elements
 - will also act as adaptor to A&AI, RuntimeDB, other CMDBs etc. - *soon*
- Monitors all near-RT-RICs and recovers from inconsistencies
 - e.g. near-RT-RIC restarts
- Support for different Southbound connectors on a per near-RT-RIC basis
 - e.g. different A1 versions, different near-RT-RIC versions, different A1 adapters, different or proprietary A1 controllers/EMSs

Policy Management GUI / NONRTRIC Control Panel

Graphical user interface

- View and Manage A1 policies in the RAN (near-RT-RICs)
- Interacts with the Policy agent's NBI (REST API)
- Graphical A1 policy creation/editing is entirely model-driven, based on policy type's JSON schema
 - WG2 A1 v1.1: Limited Policy Type / Schema support means reduced model-driven editing
- Implementation:
 - Frontend: Angular framework
 - Backend Java Springboot application

Near-RT-RIC A1 Simulator

Stateful A1 test stub

- Used to create multiple stateful A1 providers (simulated near-RT-RICs)
- Implemented as a Python application
- Swagger-based northbound interface, so easy to change the A1 profile exposed

Current Tasks

NONRTRIC tasks for OSC “Bronze” (Jun 2020)

Design & Development (Features & Functionality):

- Deployment – Support for Docker & Kubernetes
- Multi-version support – including WG2 A1 v1.1 & OSC A1 v2.1
- HTTPS & IPv6 supported for all interfaces
- Performance / Scalability / Latency / Memory improvements
 - 30-120ms roundtrip time
 - 1000s of policies per near-RT-RIC
 - 1000s of (simulated) near-RT-RICs

NONRTRIC tasks for OSC “Bronze” (Jun 2020)

Design & Development (Usecases):

- R-APPs / usecases / e2e integration tasks
 - Health Check: https://wiki.o-ran-sc.org/download/attachments/3604609/RSAC_Bronze_HealthCheck_UseCase.docx?api=v2
 1. “Hello World!” R-APP
 2. OTF Test framework workflow
 - ML-based Traffic Steering: https://wiki.o-ran-sc.org/download/attachments/3604609/RSAC_Bronze_Use%20Case-Traffic%20Steering%20QoE.doc?api=v2
 - Major issues with limited functionality in ONAP to achieve SMO & R-APP requirements!
 - Very reduced scope for Bronze release
 - Significant work required to support even rudimentary O1 observability for these use cases ... !
 - Ruled out of scope for Bronze

NONRTRIC tasks for OSC “Bronze” (Jun 2020)

Scoping and alignment:

- Support/Align with WG2 activities
- ONAP Alignment:
 - Work together with O-RAN initiatives in ONAP (Frankfurt & Guilin), e.g. [SDNC/SDN-R sub-project](#), O1 mediation, Frankfurt/Guilin 5G usecases: [Mobility Standard Harmonization with ONAP](#), [ONAP/3GPP & ORAN Alignment: A1 Adapter extensions Frankfurt/Guilin Release Requirements: REQ-38 5G / ORAN & 3GPP Standards Harmonization](#), [ONAP A1 Adaptor REQ-352 - Extend ORAN A1 Adapter and add A1 Policy Management](#), etc.
 - Trying to formally align processes for ONAP Guilin / OSC Cherry upstream / downstream
 - Need to formally align ONAP platform development, OSC platform extensions, and OSC non-code deliverables for application assembly

NONRTRIC tasks for OSC “Bronze” (Jun 2020)

Infrastructure/Procedural:

- OSC Release C Requirement/Epics planning
- Improve documentation/user-guides
- Repo re-alignment
- Release preparation tasks: documentation, automated integration testing, CSIT, assembly & packaging, demo preparation, etc.

Cherry / Guilin Plans

Tentative Proposed NONRTRIC focus for OSC “Cherry” (Dec 2020)

- ONAP Architecture alignment – SMO/NONRTRIC platform functions
- A1 Adaptors – converge & improve
- Start gathering requirements for R-APP platform / API / R-APP LCM
 - Alignment with Non-RealTime-RIC Architecture study re. R-APPs
 - Identify / Investigate overlapping activities related to R-APP support in SMO
- Investigate initial approach for A1 Enrichment Information
- Extended E2E use cases beyond Bronze functionality
- Requirement gathering & initial test/integration with ML supporting functions in SMO
- Requirement gathering & initial test/integration with data collection & coordination functions in SMO
- Requirement gathering & initial test/integration with CMDB (if progressed in ONAP), Topology & Inventory functions in SMO

- *Others*
 - *Progress with UE-id -> near-RT-RIC Topology mapping (On Hold – pending UE-id & SMO topology progress)*
 - *LCM for xApps (Scope discussions ongoing)*

Long-term Project-Internal Requirements (Working copy)

For existing Functions

Controller & A1 Policy Management Service

- shall use the O-RAN (WG2) A1 interface for policy management towards Near-RT RIC
- shall use the OSC A1 interface for policy management towards Near-RT RIC
- shall support a northbound REST interface for R-APPs for policy management
- shall support a northbound Dmaap interface for policy management
- shall be able to read the list of configured Near-RT RICs
- shall maintain a mapping between Near-RT RIC and its associated RAN entities
- shall maintain a consistent view of policies, policy types and policy status between the R-APPs and the Near-RT RIC
- shall supervise R-APPs alive status
- shall supervise Near-RT RICs alive status

GUI / NONRTRIC Control Panel

- Manual policy management shall be supported via a GUI

Usecases

- Policy health check use case towards Near-RT RIC shall be supported as an R-APP
- Traffic steering use case towards Near-RT RIC shall be supported as an R-APP

A1 Simulator

- shall provide O-RAN (WG2) A1 interface for policy management from A1 Controller
- shall provide OSC A1 interface for policy management from A1 Controller
- Shall maintain a stateful collection of Policy types & instances
- Shall provide realistic responses to A1 operations

JIRA (Epics) 08 June 2020

Key	Summary
✓ NONRTRIC-1	▶ ⚡ [RICNRT-A-F10] Enable the RPGF to send policy guidance to the xApp via the A1 interface - As a
✓ NONRTRIC-6	▶ ⚡ Options for A1 termination in NONRTRIC controller - Most likely SDNC for now Need to consider
✓ NONRTRIC-16	▶ ⚡ Build/Test/Integration environment for NONRTRIC project - Create means for testing all levels
✓ NONRTRIC-24	▶ ⚡ Make policy feedback available
NONRTRIC-27	▶ ⚡ NONRTRIC - Manage policies over the A1 i/f
NONRTRIC-92	▶ ⚡ NONRTRIC - Policy agent
NONRTRIC-95	▶ ⚡ NONRTRIC - Supporting Bronze Health-Check Use Cases - The NONRTRIC support the O-RAN-SC
NONRTRIC-99	▶ ⚡ NONRTRIC - O-RAN ONAP Alignment
NONRTRIC-103	▶ ⚡ NONRTRIC - Supporting Bronze Traffic Steering Use Cases - The NONRTRIC supports the O-RAN
NONRTRIC-114	▶ ⚡ NONRTRIC - Testing in Bronze Release - Testing in Bronze Release
●8 NONRTRIC-157	▶ ⚡ Documentation for NONRTRIC
NONRTRIC-172	▶ ⚡ Enrichment Information Coordinator - Enrichment Information Coordinator

<https://jira.o-ran-sc.org/projects/NONRTRIC>

Release Timelines

O-RAN Software Community "B" Release Revised - Sprint Calendar 2020

Mile Stones	M0:09/20				M1:06/17				M2:07/08				M3:08/12				M4:09/30				RC0:10/21		RC1:11/04		Release C:11/13							
	Week 2	Week 2	Week 2	Week 2	Week 2	Week 2	Week 2	Week 2	Week 2	Week 2	Week 3	Week 3	Week 3	Week 3	Week 3	Week 3	Week 3	Week 3	Week 3	Week 3	Week 4	Week 4	Week 4	Week 4	Week 4	Week 4	Week 4	Week 4				
Mon	2-Dec	9-Dec	16-Dec	6-Jan	13-Jan	20-Jan	27-Jan	3-Feb	10-Feb	17-Feb	24-Feb	3-Mar	10-Mar	17-Mar	24-Mar	31-Mar	7-Apr	14-Apr	21-Apr	28-Apr	5-May	12-May	19-May	26-May	2-Jun	9-Jun						
Fri	7-Dec	14-Dec	21-Dec	11-Jan	18-Jan	25-Jan	1-Feb	8-Feb	15-Feb	22-Feb	1-Mar	8-Mar	15-Mar	22-Mar	29-Mar	5-Apr	12-Apr	19-Apr	26-Apr	3-May	10-May	17-May	24-May	31-May	7-Jun	14-Jun						
Task Description	Sprint Planning and Design								Dev Sprint 1				Dev Sprint 2 - Sprint 1 Demo				Dev Sprint 3 - Sprint 2 demo				Dev Sprint 4 - Sprint 3 Demo				ETE -1, 2, 3 - Sprint 4 Demo				ETE -4		"B" Release	
	Epics Identified	User Stories/Task Identified & Review		Map Epic and Sub Task Identified	Sprint Grooming	Test Planning & Preparation of Test Cases				IST Sprint-1				IST Sprint-2				IST Sprint-3				IST Sprint-4				Release Preparation						
	Maintenance Release				Preliminary Documentation																Finalize Documentation											
O-RAN Alliance	WG Input				WG Review												WG Review								O-RAN Demo				Documentation Review			O-RAN Hand Off

From <https://wiki.o-ran-sc.org/display/REL/Releases>

O-RAN Software Community "Cherry" Release Revised - Sprint Calendar 2020

Mile Stones	M0:				M1:			M2:					M3:						M4:			RC0:		RC1:	Release:			
	Week 21	Week 22	Week 23	Week 24	Week 25	Week 26	Week 27	Week 28	Week 29	Week 30	Week 31	Week 32	Week 33	Week 34	Week 35	Week 36	Week 37	Week 38	Week 39	Week 40	Week 41	Week 42	Week 43	Week 44	Week 45	Week 46		
Mon	15-Jun	22-Jun	29-Jun	6-Jul	13-Jul	20-Jul	27-Jul	3-Aug	10-Aug	17-Aug	24-Aug	31-Aug	7-Sep	14-Sep	21-Sep	28-Sep	5-Oct	12-Oct	19-Oct	26-Oct	2-Nov	9-Nov	16-Nov	23-Nov	30-Nov	7-Dec		
Fri	20-Jun	27-Jun	4-Jul	11-Jul	18-Jul	25-Jul	1-Aug	8-Aug	15-Aug	22-Aug	29-Aug	5-Sep	12-Sep	19-Sep	26-Sep	3-Oct	10-Oct	17-Oct	24-Oct	31-Oct	7-Nov	14-Nov	21-Nov	28-Nov	5-Dec	12-Dec		
Dev Sprints	Maintenance/Defect Release Dev					Maint. Release	No Activity	Dev Sprint 1			Dev Sprint 2 - Sprint 1 Demo			Dev Sprint 3 - Sprint 2 demo			Dev Sprint 4 - Sprint 3 Demo			Sprint 4 Demo			Defect Management		No Activity			
Test Sprints	Maintenance Test Release					Test Planning & Preparation of Test Cases					IST Sprint-1			IST Sprint-2			IST Sprint-3			IST Sprint-4			End 2 End Test		No Activity			
SW Req. Task Description	Epics Identified	User Stories/Tasks Identified & Review	Map Epics and US/Task	Sub Tasks identified & Review	Sprint Planning and Design			Software and Project Documentation															Release Preparation		Release			
O-RAN Alliance	WG Input Specification Freeze				WG Review									WG Review										O-RAN Demo		Documentation Review		O-RAN Hand Off

From <https://wiki.o-ran-sc.org/display/REL/Releases>

O-RAN Software Community "D" Release Revised - Sprint Calendar 2021

Mile Stones	M0:				M1:			M2:				M3:				M4:			RC0:		RC1:	Release:				
	Week 21	Week 22	Week 23	Week 24	Week 25	Week 26	Week 27	Week 28	Week 29	Week 30	Week 31	Week 32	Week 33	Week 34	Week 35	Week 36	Week 37	Week 38	Week 39	Week 40	Week 41	Week 42	Week 43	Week 44	Week 45	Week 46
Mon	2-Jan	9-Jan	16-Jan	6-Jan	13-Jan	20-Jan	27-Jan	3-Feb	10-Feb	17-Feb	24-Feb	3-Mar	10-Mar	17-Mar	24-Mar	31-Mar	7-Apr	14-Apr	21-Apr	28-Apr	5-May	12-May	19-May	26-May	2-Jun	9-Jun
Fri	7-Jan	14-Jan	21-Jan	11-Jan	18-Jan	25-Jan	1-Feb	8-Feb	15-Feb	22-Feb	1-Mar	8-Mar	15-Mar	22-Mar	29-Mar	5-Apr	12-Apr	19-Apr	26-Apr	3-May	10-May	17-May	24-May	31-May	7-Jun	14-Jun
Dev Sprints	Maintenance/Defect Release Dev					Maint. Release	No Activity	Dev Sprint 1			Dev Sprint 2 - Sprint 1 Demo			Dev Sprint 3 - Sprint 2 demo			Dev Sprint 4 - Sprint 3 Demo			Sprint 4 Demo		Defect Management		No Activity		
Test Sprints	Maintenance Test Release					Test Planning & Preparation of Test Cases					IST Sprint-1			IST Sprint-2			IST Sprint-3			IST Sprint-4		End 2 End Test		No Activity		
SW Req. Task Description	Epics Identified	User Stories/Tasks Identified & Review	Map Epics and US/Task	Sub Tasks identified & Review	Sprint Planning and Design			Software and Project Documentation															Release Preparation		Release	
O-RAN Alliance	WG Input Specification Freeze				WG Review									WG Review								O-RAN Demo		Documentation Review		O-RAN Hand Off

From <https://wiki.o-ran-sc.org/display/REL/Releases>

O-RAN Alliance WG2

Alignment Status

O-RAN WG2 Alignment

- WG2 - A1 spec
 - Liaising with near-RealTime RIC project to align toward Release 1.X spec
 - Providing feedback on possible improvements/simplifications to spec
 - Support for majority of v1.1. spec
 - Aiming for complete alignment
 - Call-back notifications currently not yet handled
- Non-RealTime RIC function
 - Aligned with WG2's objectives/ambitions for Non-RealTime RIC Function
 - Architecture Study
 - Closely following ongoing study
 - Aim for full alignment once study is completed
 - Still at a very early stage ...
 - Started with A1 mediation/controller function and A1 policy management service
 - Additional functionality at discussion/architecture/design stage
- Interaction with other functions
 - Close working relationship with other OSC projects to achieve alignment/feedback/requirements
 - Close observation of activities in other WGs
- Use-cases
 - Requirements from OSC usecases are influencing/guiding development roadmap
 - Other usecases to be confirmed – will be driven by requirements, resources, supporting functions



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