



Proposal: ONAP Istanbul: Feature Requirement
ONAP/3GPP & O-RAN Alignment:
A1 Policy Function Extensions

29 March 2021

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Wiki: [O-RAN A1 Policies in ONAP, ONAP/O-RAN-SC/SMO Meetings](#)

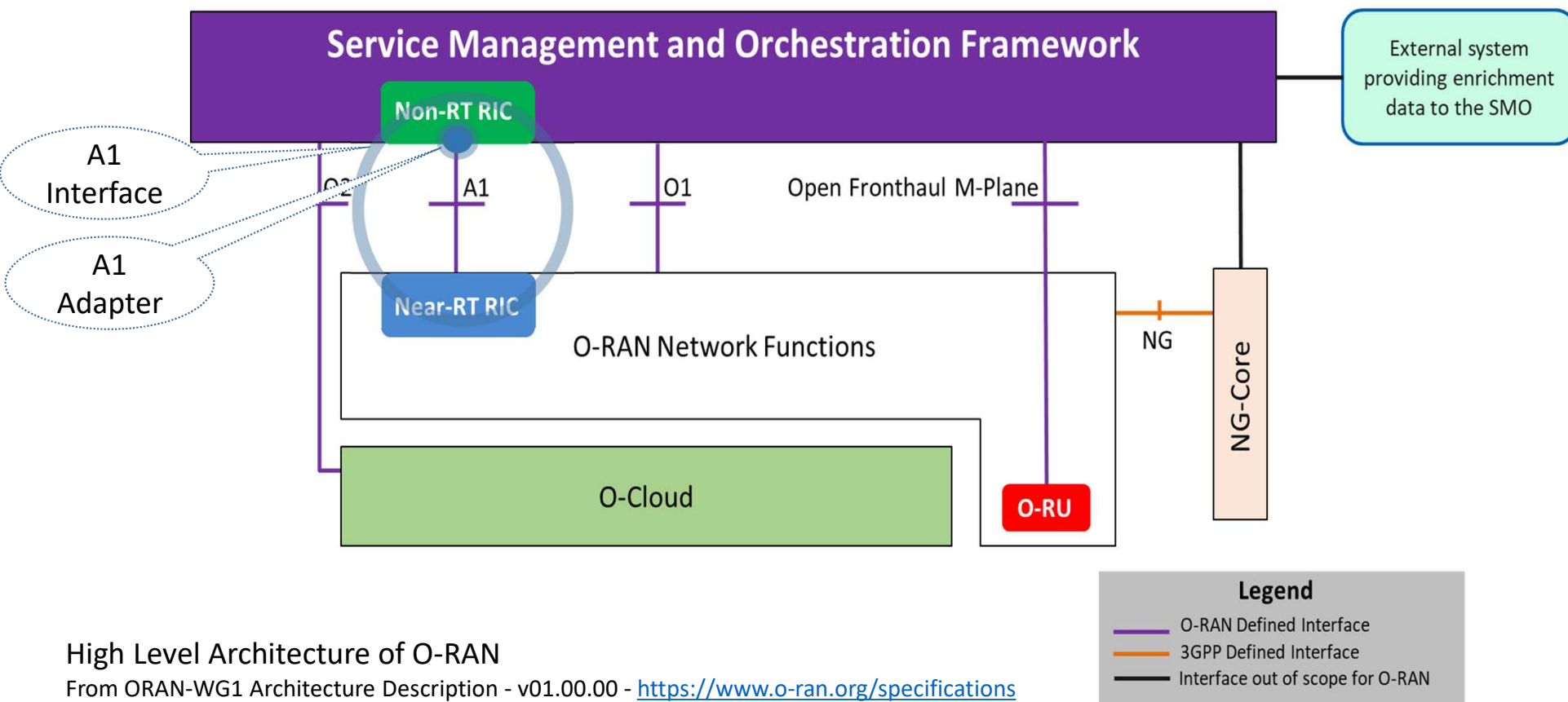


Background

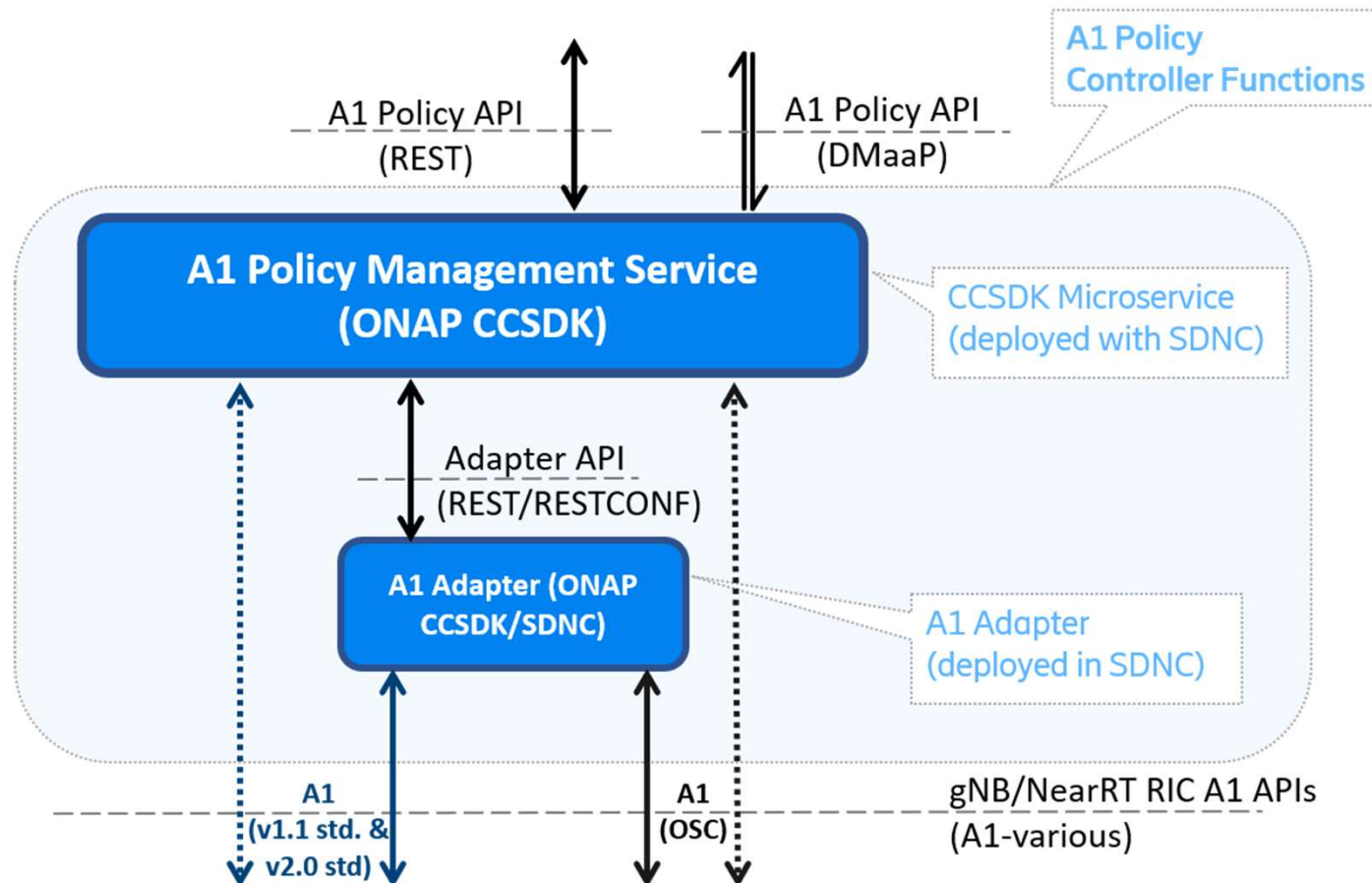
O-RAN A1 Interface

- The O-RAN architecture introduces a new management interface - “A1 interface” - between the network management system and the radio access network (RAN)
 - A1-AP (Application Protocol) specified by O-RAN Alliance WG2
- A1 interface enables vendor-agnostic policy-based guidance (“A1 Policies”) to be sent to underlying RAN elements from the management system.
 - *“A1-EI” will also support transmission of enrichment information from the management platform to the RAN elements (Currently out of scope in ONAP)*
 - *“A1-ML/AI” may also assist with ML Model management in the RAN (Still being defined – currently out of scope in ONAP)*
- The A1 interface connects Non-RealTime-RIC logical function in OAM/SMO layer with the Near-RealTime-RIC logical function in the RAN.

A1 in O-RAN Architecture for Disaggregated RAN



A1 Adapter & A1 Policy Management Service in ONAP



A1 Adapter in Frankfurt

- Implemented as an SDNC/CCSDK extension to terminate & expose A1 interface
 - [\(Frankfurt\) A1 Adapter in ONAP](#) & [\(REQ-38\): 5G / ORAN & 3GPP Standards Harmonization](#)
- Provided:
 - DMaaP northbound interface (Deprecated)
 - REST (pre-spec OSC A1) southbound interface

A1 Adapter & A1 Policy Management Service in Guilin

- Implemented as an SDNC/CCSDK extension to terminate A1 interface & support A1 Policy Management
 - [\(Guilin\) ONAP/3GPP & ORAN Alignment: A1 Adapter extensions](#) & [REQ-352: Extend ORAN A1 Adapter and add A1 Policy Management](#)
- A1 Adapter (CCSDK) redeveloped & merged capability from OSC (O-RAN Source Community)
 - Converge ONAP & O-RAN-SC A1 Adapter/Controller functions in ONAP SDNC/CCSDK
 - Integrated with SDNC – deployed in standard ONAP/OOM deployment
- Unified REST & DMaaP NBI for managing A1 Policies (A1 Policy Management Service – CCSDK)
 - Operations:
 - Query A1 Policy Types in near-RT-RICs
 - Create/Query/Update/Delete A1 Policy Instances in near-RT-RICs
 - Query Status for A1 Policy Instances
 - Maintain transient cache of RAN's A1 Policy information
 - Support RAN-wide view of A1 Policy information
 - Streamline A1 traffic
 - Enable (optional) re-synchronization after inconsistencies / near-RT-RIC restarts
- Added support for multiple A1 versions (southbound) including standardized A1 protocol (O-RAN Alliance A1-AP v1.1)
- Added support for multiple near-RT-RICs (with multi-version support)
- Added support for TLS/HTTPS REST for southbound A1 interfaces (and NBIs)

- **Fully developed, integrated & delivered with CCSDK/SDNC Guilin**

A1 Adapter & A1 Policy Management Service in Honolulu

- Added support for A1 Application Protocol v2.0 (O-RAN Alliance Specification) (*A1 Policy parts only*)
 - Improved support for A1 Policy types, Streamlined API, Status callback notifications, other small changes
- Improved integration with ONAP CSIT process & Robot framework.
- REST-based A1 Policy Management Service Configuration interface
 - currently: file-based, k8s config-map, consul
- Streamlined A1 Policy Management Service NBI (REST & DMaaP) v2.0
 - Maintain but deprecate existing NBI
- Improved OOM integration
 - More flexible deployment & configuration options required
- HTTP/HTTPS proxy support in A1 Policy Management Service (A1 Southbound only)
- More consistent logging



Proposal

A1 Policy Function Extensions

Business Requirements for ONAP Rel 1

Executive Summary: This feature requirement enhances A1 Policy Management for the O-RAN A1 interface capabilities provided in Rel 6, 7 & 8. Work will continue by extending & evolving support for using A1 Policies to manage 5G RAN elements by providing intent based policies for optimization of the RAN network performance. Planned enhancements for Rel 9 include support of new A1 interface versions to align with new versions & improvements to O-RAN alliance specifications.

Business Impact: Continuing the convergency between ONAP and ORAN for A1 interface to used by all service providers and avoid duplicate development efforts.

Business Markets: Enhanced A1 capabilities will be usable by any service provider deploying and using ONAP.

Funding/Financial Impacts: A1 interface provides a flexible way for the operator to manage wide area RAN network optimization, reducing capex investment needs.

Organization Mgmt, Sales Strategies: There is no additional organizational management or sales strategies for this use case outside of a service providers "normal" ONAP deployment and its attendant organizational resources from a service provider.

Key Contacts : [John Keeney](#), Michela Bevilacqua, Zu Qiang

Improvements proposed

- O-RAN Alliance A1 Specification evolution (A1-AP & A1-TP)
- A1 Policy State Management & Persistent Storage in A1 Policy Management Service
 - Support failover, restart, etc.
- HTTP/HTTPS proxy support in A1 Adapter (A1 Southbound only)
- Improved A1-REST response code transit through A1 Adapter
- Support updated RESTCONF spec (RFC 8040 - used in ODL) between A1 Policy Management Service & A1 Adapter
 - RFC 8040 : <https://tools.ietf.org/html/rfc8040>
 - Older RESTCONF (<https://tools.ietf.org/html/draft-bierman-netconf-restconf-02>) being phased out.
- Re-align OOM configuration for near-RT-RICs in A1 Policy Management Service config
- Add more fine-grained near-RT-RIC in A1 Policy Management Service REST runtime config interface
- Improved documentation & testing

- A1 Policy Management participant for use in ONAP Control Loops (*Stretch – TBC*)
- Support A1 Policy operations in SON usecases (RAN Slicing & PCI – *TBC*) (*Stretch – TBC*)

Other Considerations 1/2

Affected ONAP Functions:

- SDNC / CCSDK only

Integration of bordering ONAP components:

- Demonstrations with other Use cases, Components, PoCs
- Integration with other use cases & functions (Stretch)

Interfaces:

- Northbound Interface
 - As before (Honolulu)
 - Continue deprecating A1-PMS v1 NBI (REST & DMaaP)
- Southbound Interfaces
 - As before (Honolulu)
 - OSC A1 v2.1 (Existing)
 - O-RAN A1 v1.1 (Existing)
 - O-RAN A1 v2.0 (Existing)
 - O-RAN A1 v3.0 (Planned – small evolution)
- Internal Interface (A1 Policy Management Service <-> A1 Adapter)
 - RESTCONF: Add support for RFC 8040 RESTCONF version (See earlier Slide)

Other Considerations 2/2

Modelling Impacts:

- None

Test:

- Improved integration with ONAP CSIT & Robot testing functions
 - Includes tests against OSC A1 Simulator & includes a full test suite (including some CSIT test)

Other Impacts:

- Update Documentation with evolved A1 interface aspects
- Update Integration & Existing Test requirements

Usage outside ONAP:

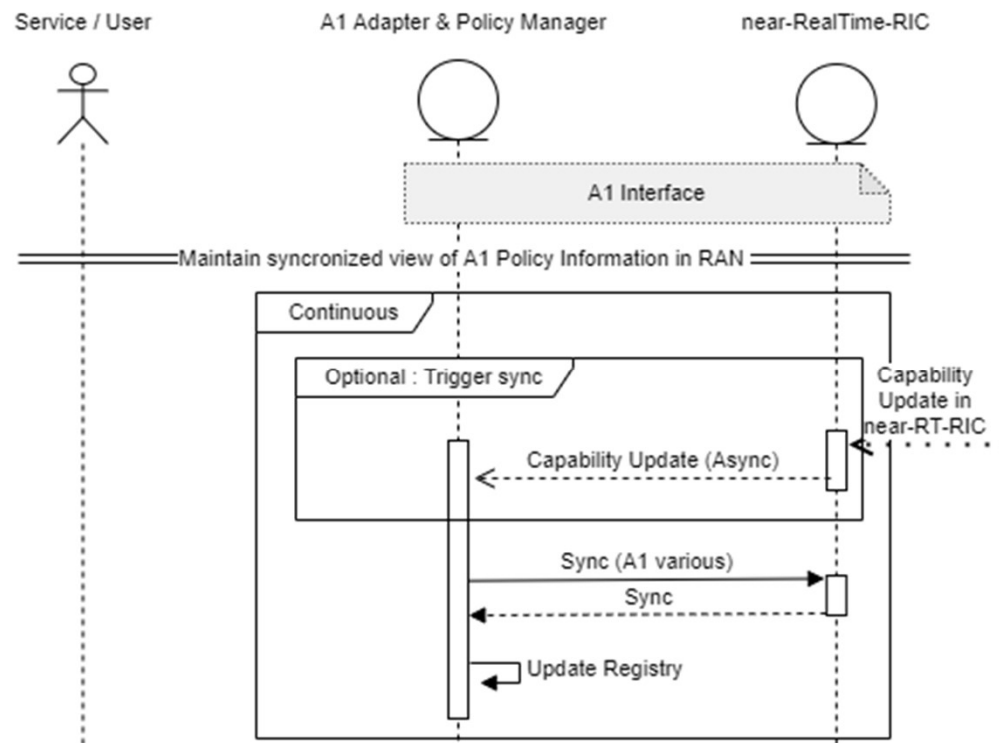
- Used in O-RAN SC NONRTRIC Project (Downstream)
- Southbound Interface: O-RAN A1 Interface + Information Model (A1-AP & A1-TP) is specified and maintained by O-RAN Alliance

Participating Companies

- Ericsson
- *Others - TBC*

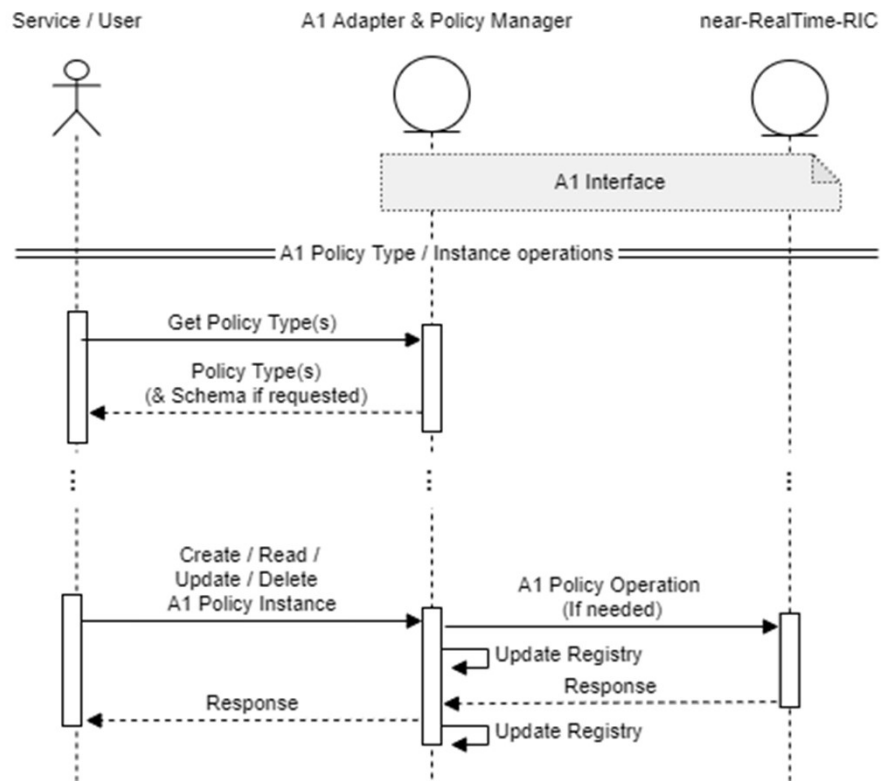
Flow chart / use cases (1/3) – As per earlier releases

- Synchronize A1 Policy Information in RAN



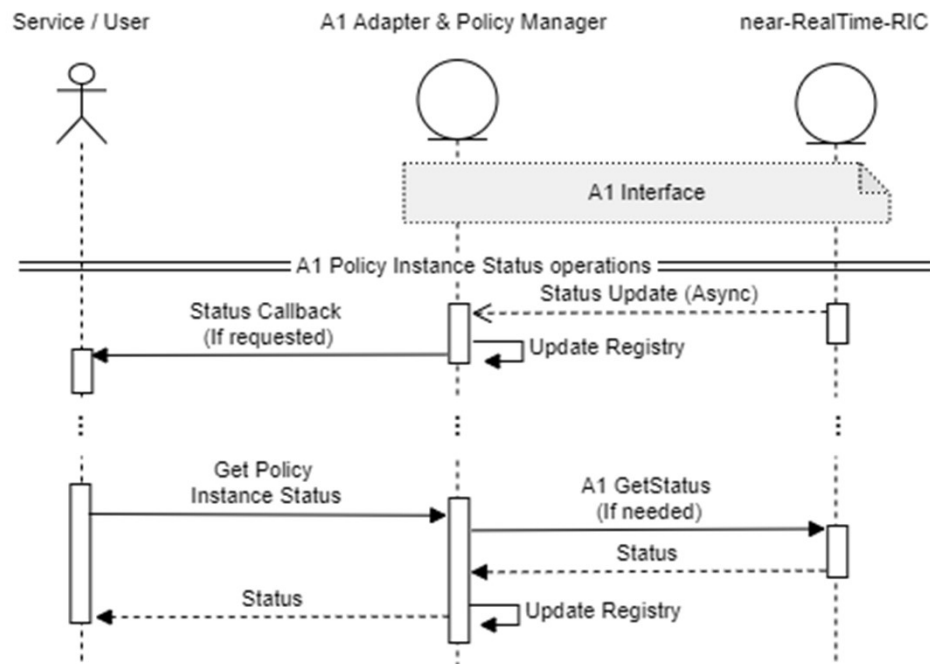
Flow chart / use cases (2/3) – As per earlier releases

- A1 Policy Type / Instance Operations



Flow chart / use cases (3/3) – As per earlier releases

- A1 Policy Instance Status Operations





ONAP

OPEN NETWORK AUTOMATION PLATFORM

Thank You!