

# *ONAP/3GPP & O-RAN Alignment:* **A1 Adapter and Policy Management Extension**

ONAP Honolulu 5G use case

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Ericsson

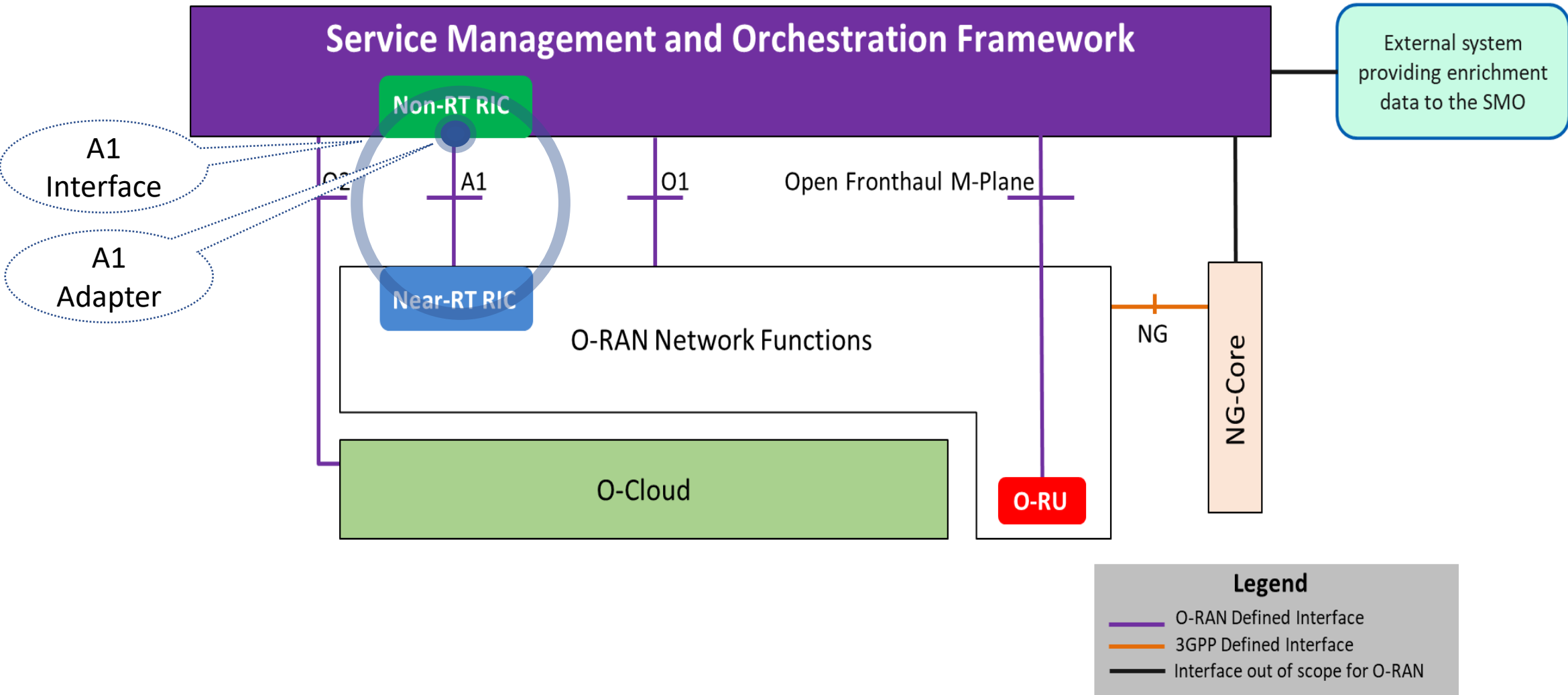
*Wiki: [R8 A1 Adapter and Policy Management Extension](#), [ONAP/O-RAN-SC/SMO Meetings](#)*

*Jira: [REQ-457](#), [ONAPARC-642](#), [CCSDK-2991](#)*

# 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 (Still being defined – 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



## High Level Architecture of O-RAN

From ORAN-WG1 Architecture Description - v01.00.00 - <https://www.o-ran.org/specifications>

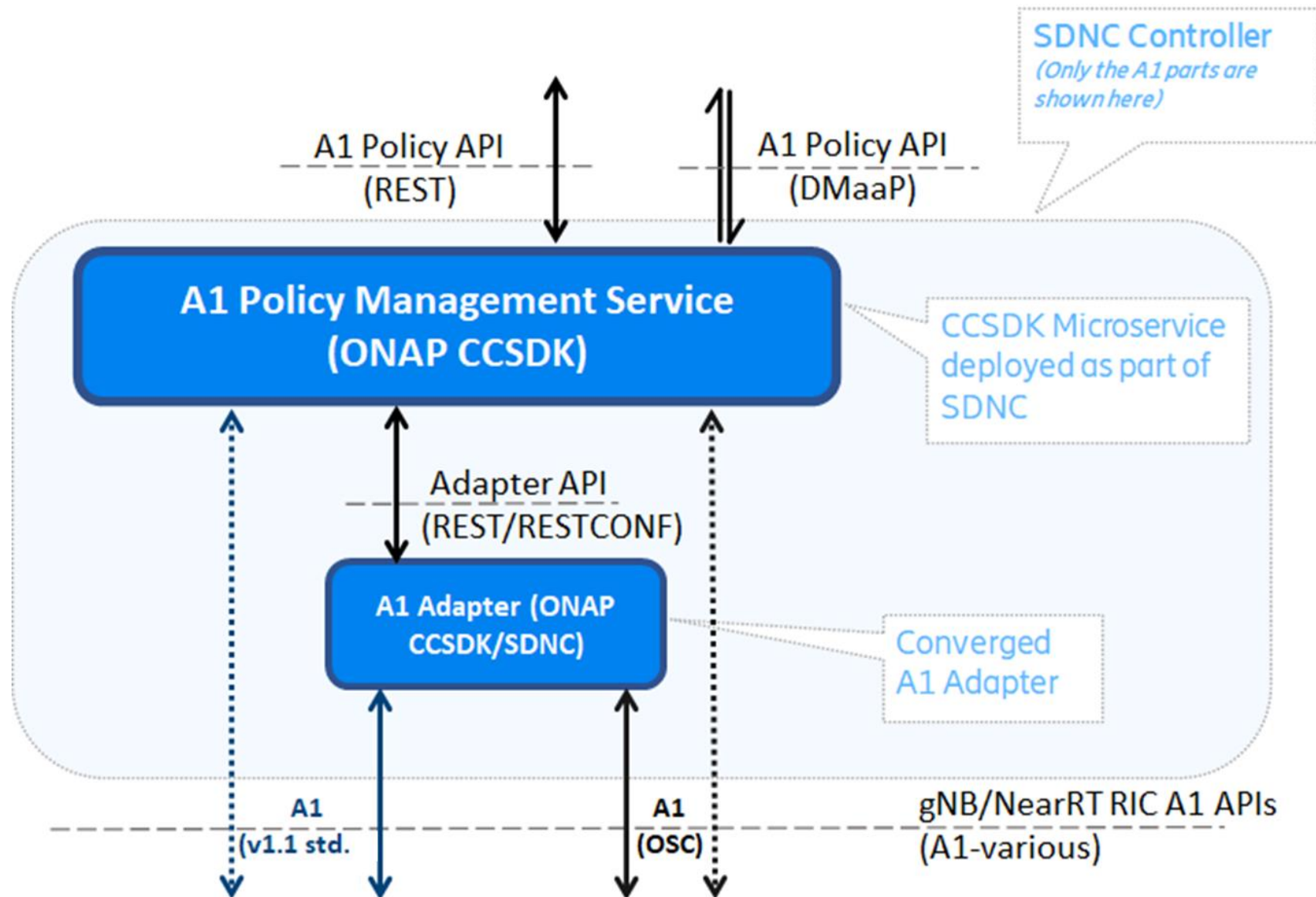
# A1 Adapter in Frankfurt

- 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 Guilin & Honolulu

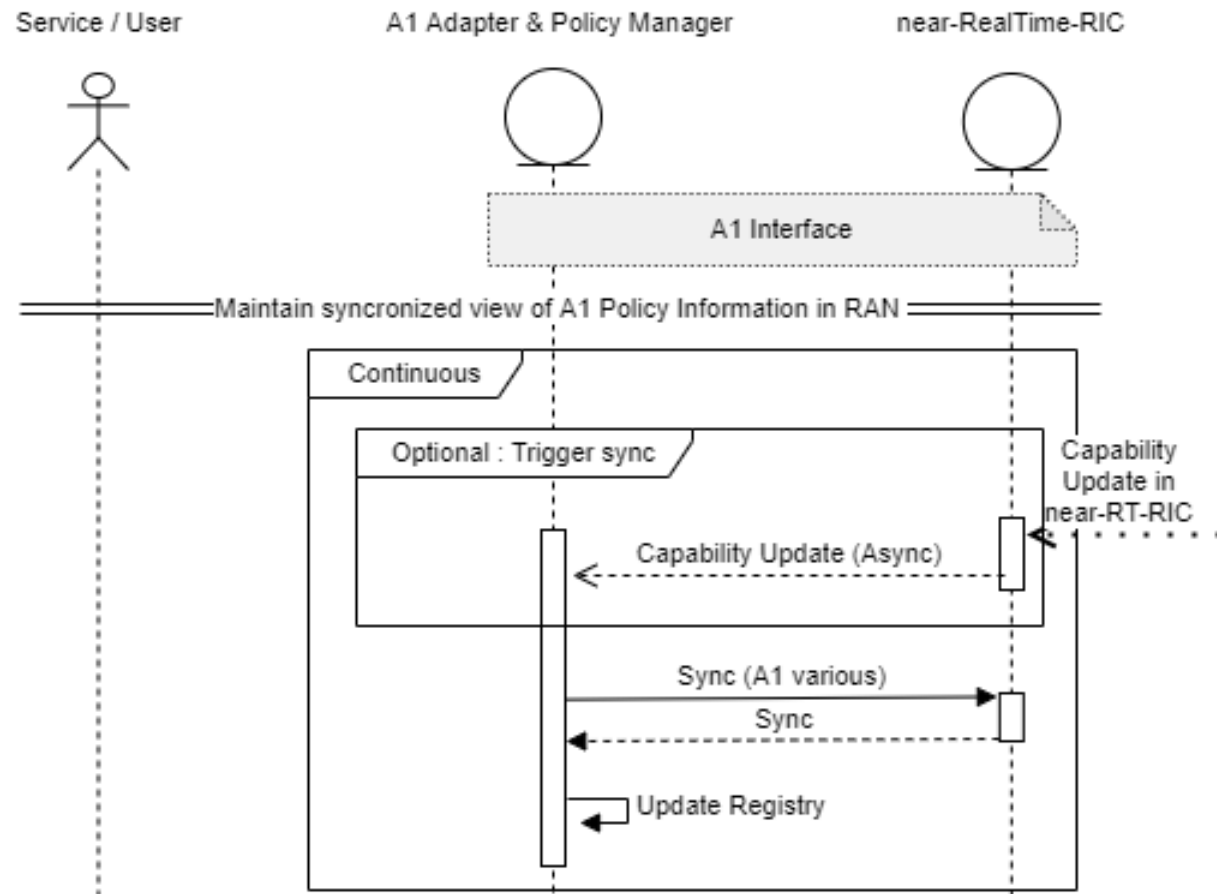


# A1 Adapter & A1 Policy Management Service in Honolulu - Proposed

- Add 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
  - *A1 Application Protocol v2.1 (O-RAN Alliance Specification) release planned during Honolulu.*
- 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 Security Cert management
  - Better align with AAF & CMP to manage certs (A1 & NBIs)
- Improved OOM integration
  - More flexible deployment & configuration options required
- HTTP/HTTPS proxy support (A1 Southbound)
- More consistent logging
- *Stretch: Attempt demo integration with other user use-cases/PoCs/projects (TBC)*
  - *OOF-SON use case*
  - *E2E Slicing use case*
  - *TOSCA Defined Control Loop*
  - *Configuration Persistence Service*

# Flow chart / use cases (1/3)

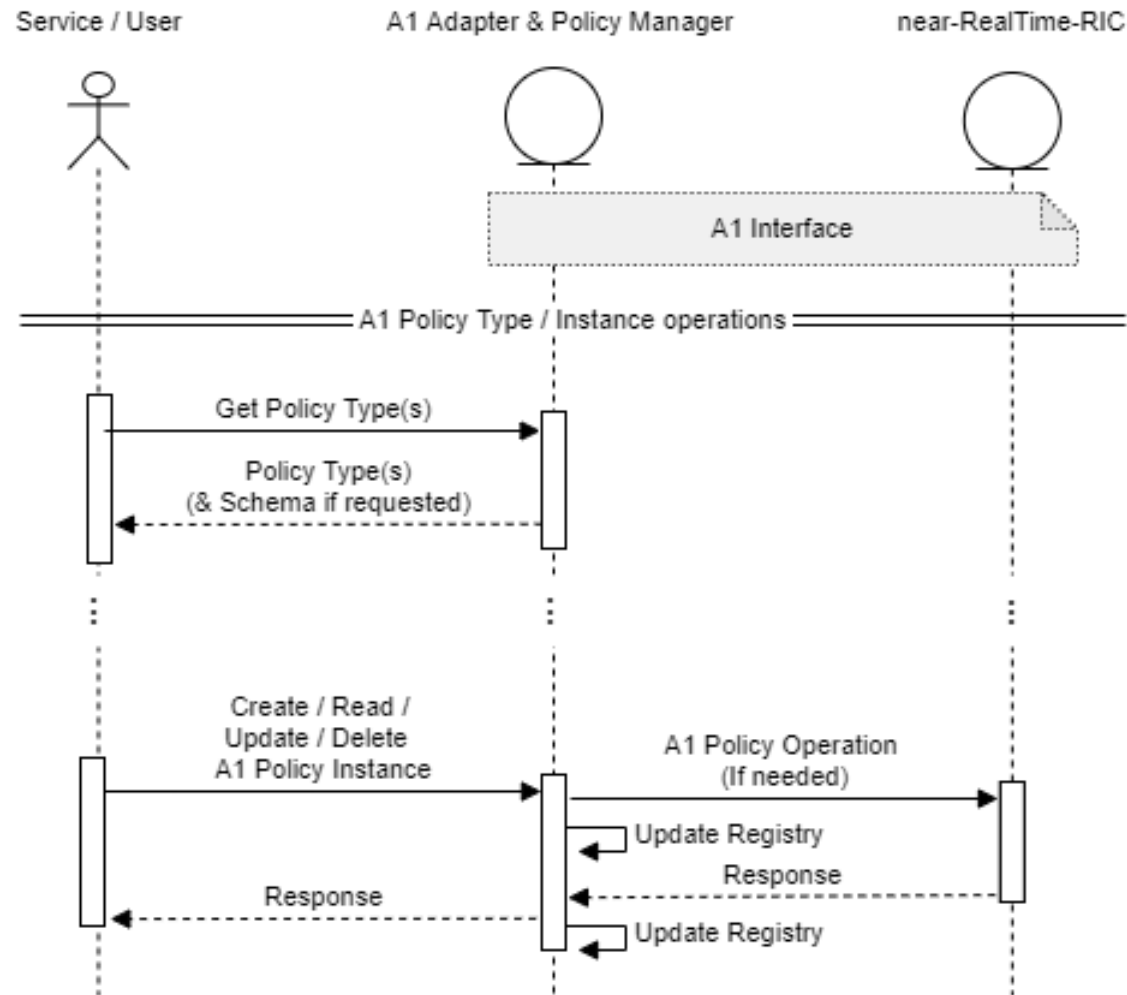
- Synchronize A1 Policy Information in RAN





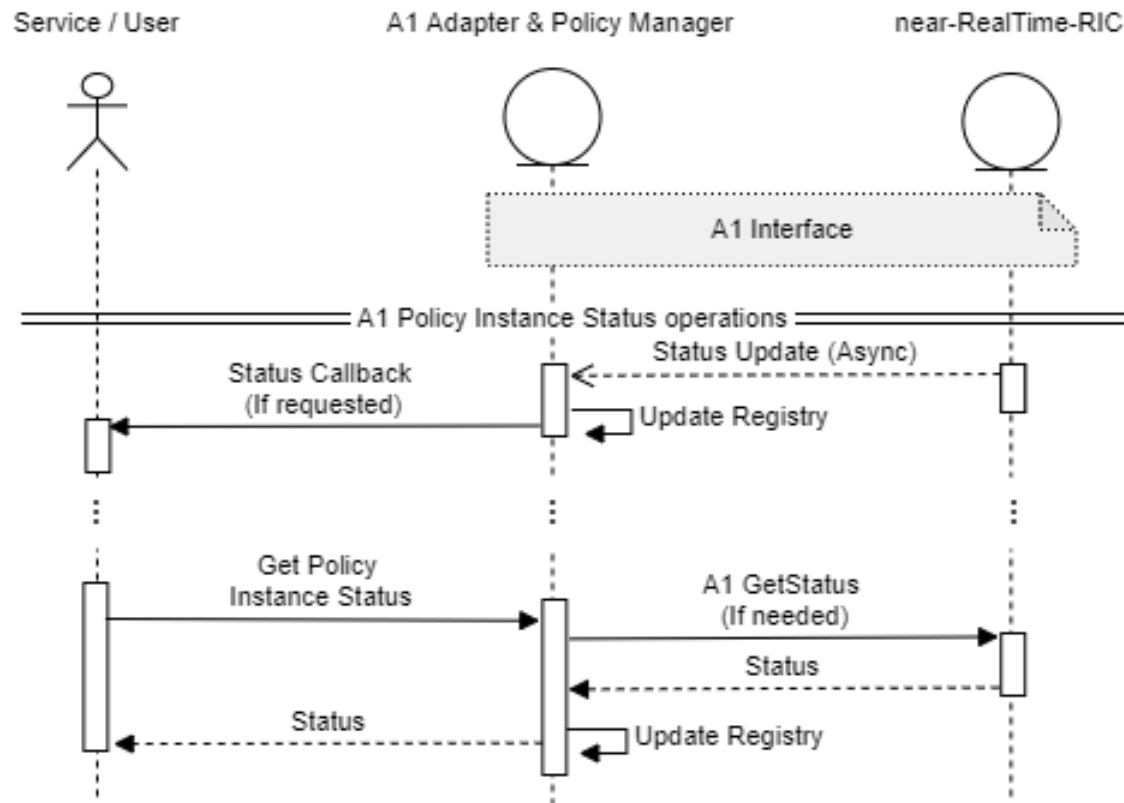
# Flow chart / use cases (2/3)

- A1 Policy Type / Instance Operations



# Flow chart / use cases (3/3)

- A1 Policy Instance Status Operations



# Other Impacts 1/2

## **Affected ONAP Functions:**

- SDNC / CCSDK only

## **Integration of bordering ONAP components:**

- Honolulu: None required – Studies only
  - Stretch Goal: demonstrations with other Use cases, Components, PoCs
- Istanbul: Integration with other use cases & functions

## **Interfaces:**

- Northbound Interface – See earlier slide
  - A1 Policy Management Service REST & DMaaP NBIs (existing)
  - Update A1 Policy Management Service REST & DMaaP NBIs (new)
- Southbound Interfaces – See earlier slide
  - OSC A1 v2.1 (Existing)
  - O-RAN A1 v1.1 (Existing)
  - O-RAN A1 v2.0 (New)
  - O-RAN A1 v2.1 (Planned – not confirmed yet)

## **Usage outside ONAP:**

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

# Other Impacts 2/2

## **Modelling Impacts:**

- None

## **Test:**

- Guilin: tests against OSC A1 Simulator & includes a full test suite (including some CSIT test)
- Honolulu: improved integration with ONAP CSIT & Robot testing functions

## **Other Impacts:**

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

# Business Driver

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

## **Executive Summary:**

O-RAN has defined A1 interface specification in the context of the management of 5G RAN elements to provide intent based policies for optimization of the RAN network performance. This requirement enhances the support for Managing and Mediating O-RAN A1 Policies in ONAP. This extends work contributed in Rel 6 - Frankfurt ([REQ-38](#)) and Rel 7 - Guilin ([REQ-352](#)). A1 Adapter functionality was introduced in Frankfurt. In Guilin The A1 adapter was improved and a A1 Policy Management Service was added.

Planned enhancements for Rel 8 include: support of new A1 interface version in alignment to O-RAN alliance, common logging/audit. improved CSIT and OOM alignment, easier configuration, an improved NBI, and improved security cert management.

**Business Impact:** Continuing the convergence between ONAP and ORAN for A1 Policy interface to used by all service providers.

**Business Markets:** Enhanced A1 Policy capabilities, once developed, 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.



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Thank You!