Amber Release (Nov 2019)

Amber release page for the O-RAN Software community

Welcome to the Amber release page (press release) for the O-RAN Software community

This page contains all the information specific to the Amber release and frozen code (code freeze = Nov-30-2019) and documentation. The main trunk will continue on to support future releases.

This release is the first release and is in partnership with the O-RAN Alliance. The specification and software are being worked at the same time and the software is considered pre-specification software.

The projects have limited capabilities which will increase over future releases.

See Requirements and Software Architecture under Committees and Projects for more details on current activites.

Initial release capabilities include contributions under the following projects:

- Non-real-time RIC (A1 Interface) (NONRTRIC)
- Near real-time RIC Platform (E2 Interface) (RICP)
- Near Real-time RIC X-APPs (RICAPP)
- OAM (O-1 Interface)
- O-RAN Central Unit (OCU)
- O-DU High
- O-DU Low
- Dashboard (OAM)
- Simulators (SIM)
- Infrastructure (INF)
- Integration and Test (INT)
- Documentation (DOC)

O-RAN ALLIANCE, WORKING WITH THE LINUX FOUNDATION, ANNOUNCED THE O-RAN SOFTWARE COMMUNITY'S FIRST SOFTWARE CODE RELEASE, "AMBER"

Get Amber

- Source code: O-RAN-SC-Amber-R1.1.tar.gz
- Per-repository details: Releasing Amber Tasks

Documentation

- Developer Documentation
- Wiki

Table of Projects

Amber Release Timeline

Amber Timeline

Learn Amber

- Documentation home: http://docs.o-ran-sc.org
- Video tutorials and demos:
  - O-DU HIGH Demo
  - INT demo for Near Realtime RAN Intelligent Controller platform
  - INT demos Open Testing Framework
    - Building work flow
    - Debugging work flow
    - Running virtual test head
  - INT demo for using nanobot for automated testing
  - INT demo for using RAN load generator
  - MC xApp demo video (simulator mode)

Near Real-Time RIC xApps (RICAPP)	Near Real-Time RIC Platform (RICP)	Non Real Time RIC (NONRTRIC)
Primary Goals: Support near-real-time radio resource management via development and deployment of a series of xApps that interact with one another and the external components via A1, O1, and E2 interfaces (O-CU/O-DU) **Scope**: Planned xApps: (1) Admission Control; (2) Measurement Campaign; (3) UE Manager; (4) ML xApp; (5) KPI Monitor Active participation from AT&T, Nokia, Samsung	**Primary Goals**: Support near-real-time radio resource management, managing O-CU's and O-DU's via E2 messages, receiving A1 intent and policy guidance messages from the non-RT RIC, O1 configuration requests, and emitting O1 measurement data to ONAP. **Scope**: Platform Components: (1) xApp and Config Manager; (2) A1 xApp mediator; (3) Routing Manager; (4) Subscription Manager; (5) E2 Manager; (6) E2 Termination; (7) Redis RAN R-NIB; (8) Redis xApp DB2; (9) Resource Manager; (10) Logging and OpenTracing support; (11) Prometheus support; (12) VES Agent / VESPA; and (13) API Gateway	**Primary Goals**: Support non-real-time radio resource management, higher layer procedure optimization, policy optimization in RAN, and providing guidance, parameters, policies and AI/ML models to support the operation of near-RealTime RIC functions in the RAN to achieve higher-level non-real-time objectives. **Scope**: (1) A1 controller (mediator, Endpoint); (2) Coordinate/Host A1 Policy Management Services; (3) Coordinate AI /ML models – in RAN (E2 nodes and near-RT RIC) and non-RT RIC; (4) Data Enrichment coordinator; and (5) rApp Host and SMO Application Coordinator.
PTL Matti Hiltunen (AT&T)	**PTL** Thoralf Czichy (Nokia)	**PTL** John Keeney (Ericsson)

Amber	14 Epics defined; 5 Completed; 8 in-progress; 0 Blocked; 1 Deferred to Rel B 5 xApps being worked for Amber: Admission Control (AC) Measurement Campaign UE Manager ML-based AC KPI monitor xApp interaction methods Using RIC Message Router (RMR) Using Shared Data Layer (SDL) Planning for use of ML in xApps
Documentation and Project Coordination	Wiki Jira Gerrit Meetings
Project Relations	OAM O-CU O-DU

Amber	36 Epics defined Key Progress & Open Issues E2: Implements WG3 General Aspects and Principles Amber release with support for E2 Insert, report, control and subscription messages A1: No alignment with WG as yet O1: LCM via xApp manager providing REST APIs RMR RIC-internal transport function Integrated with Akraino REC Edge Stack
Documentation and Project Coordination	Wiki Jira Gerrit Meetings
Project Relations	OAM O-CU O-DU

Amber	9 Epics, 10 user stories and 3 tasks defined (all remain open) None were originally targeted for completion in Amber!
	
	• Initial A1 Adapter/Controller
	  ○ OSGI bundled to integrate with ONAP CCSDK/SDNC
	  ○ Implements a subset of the A1 Policy LCM functions based on a "pre-spec" version of A1 protocol
	  ○ Prototype RESTCONF-based NBI for A1 mediation interface to allow messages to be sent up/down A1 interface
	• Dashboard extension to manage Policy Types and Policy Instances
	  ○ Based on existing near-RTRIC "RIC Dashboard"
	• Initial Near-RealTime RIC A1 simulator/test-stub
	  ○ Implements server-end of A1 (Policy) interface for test. demo & simulation purposes

Documentation and Project Coordination	Wiki JIRA Gerrit Meetings
Project Relations	OAM O-CU O-DU

O-RAN Distributed Unit High Home (O-DU High)

Primary Goals: The O-DU (High) project provides reference implementation according to the O-RAN WG8 documents. It provides the implementation of F1AP, RLC, MAC, Scheduler modules and API between them.

Scope: Develop software deliverable for the A-release as per SW requirements specifications, leveraging seed code of 5GNR RLC and MAC protocol functions and developing F1AP module, CU stub and L1 Stub.

PTL	Sachin Srivastava (Radisys)

O-DU (ODU-LOW)

Primary Goals: The O-RAN-SC-ODU LOW project provides reference implementation of ODU-LOW according to the O-RAN AAL specification (WG8) documents. The reference design will follow the open interface toward ODU HIGH, RRU and Accelerator, provide physical layer signal processing functionality according to 3GPP .

Scope: According to the ORAN-WG8.AAD specification, PHY layer functionality is realized as High-PHY in O-DU and Low-PHY in O-RU. Some of the PHY functionalities may be realized using hardware acceleration. O-DU Low project will focus on the High-PHY and fronthaul library modules that reside in O-DU. NR FAPI being standardized by Small Cells Forum (SCF) will be used for defining L1 and L2 interactions.

PTL	Zhimin Yuan (Intel)
Amber	4 Epics(2 Done, 2 To Do), 3 tasks (1 Done, 2 In Progress), 1 defer to release B

Operations, Administration, and Maintenance (OAM)

Primary Goals: The O-RAN-SC-OAM project provides reference implementation according to the O-RAN OAM (WG1) documents. In addition we provide a common MnS-Consumer for development and module test purposes. The assumption is that the projects for the Managed Functions can concentrate on the more important control and user-plane functionality.

Scope: According to the O-RAN-SC-OAM-Architecture document all ManagedElements containing one or more Managed Functions (near-real-time-RIC, O-CU-CP, O-CU-UP, O-DU and O-RU) implement and provide a logical O1-interface to all contained Managed Functions. The O-RAN-OAM-interface specification defines a NetConf-Server for Configuration Management (CM) a http-client for Fault Managment (FM), Performance Management (PM) and other events

Amber	6 Epics identified 5 in-progress 0 Blocked 1 Deferred to Rel B O-DU-OAM-Agent – Work In Progress Initial bring up of the system and layer configuration. MAC-PHY (FAPI) Interface Discussions with the O-DU Low team is in progress. Test code development is WIP for initial PHY configuration message. F1AP: Following messages between CU and DU are being developed. F1 SETUP REQUEST F1 SETUP RESPONSE GNB-DU CONFIGURATION UPDATE GNB-DU CONFIGURATION UPDATE ACKNOWLEDGE
Documentation and Project Coordination	Wiki Jira Gerrit Meetings (common meeting with O-CU, O-DU High, O-DU Low and Sim) ASN 1 tool
Project Relations	Near-RT RIC Platform Non-RT RIC OAM O-CU-CP O-CU-UP O-DU Low

Documentation and Project Coordination	Wiki Jira Gerrit Meetings (TBD)
Project Relations	ODU High OCU SIMULATION

PTL	Martin Skorupski (highstreet technologies)
Amber	7 Epics(1 Done, 6 To Do), 11 stories (6 Done, 5 In Progress), 4 tasks (In Progress)
Documentation and Project Coordination	wiki jira gerrit meetings
Project Relations	Non-RT RIC SIM Near-RT RIC Platform

O-RAN Simulators (SIM)

Infrastructure (INF)

Primary Goals: Provide the infrastructure to vO-CU and vO-DU, include the VM and Container solutions. Enable the AAL (accelerator abstract layer) for the RAN application VNF/CNF.

Active participation from Windriver and Lenovo.

PTL	Xiaohua Zhang (Windriver)
Amber	4 Epics defined and in-progress; 2 Deferred to Rel B • [INF-A-F01] Akraino blueprint for RIC • [INF-A-F02] VNF/CNF Orchestration (Inspur) • [INF-A-F03] Acceleration Abstraction Layer (AAL) • [INF-A-F04] Real time platform to deploy the O-CU and O-DU

Documentation (DOC)

Primary Goals: To create documentation for the O-RAN Software Community (OSC) component. platform. O-RAN repositories create a variety of content depending on the nature of the project.Status

PTL	weichen ni
Amber	Documentation homepage: http://docs.o-ran-sc.org
Documentation and Project Coordination	Wiki Jira Gerrit Meetings (TBD)
Project Relations	ALL projects

Primary Goals: The O-RAN Simulators projects are meant to provide simulators needed to stimulate or respond to messages generated by O-RAN elements being developed. They are more robust that a simple test stub in which they can provide a controlled injection of messages or responses to messages over O-RAN and 3GPP interfaces. Simulators eventually will also support a Virtual Test Head (VTH) API which allow them to be integrated into test suites, managed by the OTF capabilities in the Test and Integration projects, which can be applied to non open source systems in order to verify the elements compliance to standard interfaces.

Scope: The project aims to provide simulation solutions to all the projects that have such a need. The project can be split according to the type of interfaces it simulates:

- A1
- E1
- E2
- F1
- FH
- O1

The project structure is flexible and it can be changed according to the needs of the other projects.

PTL	Alex Stancu (highstreet technologies)
Amber	4 Epics defined (1 [Done], 3 not entered in JIRA, 1 [Backlog])
Documentation and Project Coordination	Wiki Jira Gerrit - A1 - E1 - E2 - F1 - FH - O1 - Meetings: TBD
Project Relations	Near-RT RIC Platform OAM

Documentation and Project Coordination	Wiki Jira Gerrit Meetings
Project Relations	OAM O-CU O-DU

Integration and Testing (INT)

Project Scope:

Integration:

- Integrating software deliverables by O-RAN software projects (INF, O-DU, O-CU, RICPLT, RICAPP, NONRTRIC, OAM, and SIM) into full O-RAN system with coherent deployment tooling and platform technologies;
- Completing system level release objectives (e.g. demos, end-to-end stories) identified by O-RAN Alliance TIGF and O-RAN SC RSAC.

Testing:

- Developing software testing tools, strategies, and flows for controlling quality and integrity of the O-RAN SC software deliverables;
- Conducting integrated and system level testing for gating functionalities and quality of O-RAN SC software releases

CICD:

- Leveraging Linux Foundation tool chain, incorporating automated work flows and processes into O-RAN SC software development, integration, deployment, releasing, and quality control.

PTL	user-d3360
Amber	19 epics, 14 completed - Additional details
Documentation and Project Coordination	- Home: Wiki - JIRA: Jira - Gerrit: https://gerrit.o-ran-sc.org, /it /* repos - Weekly Meetings: Meetings
Project Relations	All Projects