O-RAN Stack Reference Design
Specs → Architecture → Implementation

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Agenda

• O-RAN WGs and Role of Reference Designs
• Stack Reference Design
• OSC RAN Implementation – The journey so far
• Challenges and Opportunities
• The Road Ahead
O-RAN Alliance WGs

Use Cases
Architecture
Interfaces
Infrastructure
Security
Mgmt & Orchestration
Service Models
Testing & Integration

Working Groups and Focus Groups

Publications

White papers
Technical Reports
Implementation Specs
Ref Design Specs
Data Models
Test Specifications
O-RAN Reference Design Specs – Hardware and Software

• White Box Hardware – WG7
  • Open HW Reference Design for reduced cost
  • Decoupling of HW and SW
  • Multiple Reference Design based on deployment scenarios

• Stack Reference Design (Software) – WG8
  • L1, L2, and L3 software architecture and design for O-CU O-DU
  • API definitions to internal components
  • API definitions to external
  • API definitions for OAM
O-RAN WG8 Stack Ref Design Specs

**WG8 AAD Design Spec**

- **Stage 1**: Use cases and O-RAN Arch
  - WG1, MVP-C

- **Stage 2**: Feature Description, Node Arch, Interfaces
  - WG3, WG4, WG5, WG6, WG11

- **Stage 3**: Call flows, APIs, Data Models, Profiles
  - WG3, WG4, WG5, WG6, WG11

**Test profiles and Test cases**

- Test strategies
- Test profiles and Test cases

**OSC Releases**

- O-DU and O-CU Implementation
- O-CU/O-DU/O-RU E2E Tests (OSC labs, TIFG, OTIC)
O-RAN WG8 AAD Specs – Focus and content

- Building Blocks of O-DU
  - Layer 1 (High-PHY) block and definitions
  - Layer 2 (RLC, MAC, Scheduler) modules
  - Interfaces
  - OAM

- Building Blocks of O-CU
  - Layer 3 (RRC, SDAP, eGTP) modules
  - Interfaces
  - OAM

- APIs for internal for O-CU and O-DU
  - APIs for internal modules
  - MAC-Scheduler APIs
  - Reference to SCF FAPI for MAC to High-PHY interface

- Call Flows

- MVP Feature based additions
O-RAN WG8 IOT Specs – Focus and content

• IOT spec badged by O-RAN TIFG

• Focus on O-CU/O-DU/O-RU based testing – Interfaces and call flow

• Test bed

• Test Profiles

• 75+ test cases covering O-CU and O-DU specific features and call flows

• MVP Feature based test cases
CU and DU implementation in O-RAN OSC

- **O-CU**
  - O-CU Binary (from Radisys) or Lab testing

- **O-DU-High**
  - O-DU SW Development from Rel A to now
  - Project Technical Lead: Radisys

- **O-DU-Low**
  - FlexRAN O-DU PHY Binary
  - Project Technical Lead: Intel
OSC O-DU: Supported Features

- O-DU implementation with O1, O2 and E2 interfaces
- RLC, MAC, Scheduler and OAM modules
- TDD (100 MHz) and FDD (20 MHz) operation modes
- Round Robin scheduler with multi-UE support
- RAN Slicing framework
- Multi-bearer support
- Mobility: Inter-CU and Intra-CU handover
- DRX
- E2AP v03.00 support
**OSC CU/DU Development and Testing**

**Progress so far**

**Development**
- Streamlined OSC plan and release
- Maturity of OSC practices under LF
- O-DU development in steady phase
- Implementation aligned to O-RAN Specs

**Integration and Testing**
- Base setup and configuration in US and Taiwan labs
- O-DU-High and O-DU Low (FAPI) integration done
- Basic Fronthaul (CUS) integration done
- Testing UE initial access

**Challenges**

**Development**
- Need more development bandwidth
- O-CU development/collab strategy
- Testing with different PHY

**Integration and Testing**
- Stable and continuous lab access for E2E debugging
- Support for test equipment
- Availability of key engineers across teams and labs
The Road Ahead

- Collaboration is key
  - O-RAN OSC and OAI can accelerate development of key capabilities
  - Demonstration of joint capabilities in industry forums

- Lab
  - Sharing lab infrastructure can expedite testing
  - Expertise sharing across labs

- Participation
  - We need a larger and more vibrant dev community across projects
  - Increasing the user base and feedback loop is very critical
Thank You