TELECOM INFRA PROJECT

OPENRAN

This Amended and Restated Project Group Charter establishes the scope, intellectual property and copyright terms used to develop the materials identified in this Project Group. Only Participants that execute this Working Group Charter will be bound by its terms and be permitted to participate in this Project Group and shall be considered "Contributors" in the Project Group as defined in the Telecom Infra Project IPR Policy document.

TIP Board of Directors Approval Date: September 14, 2020

1. PROJECT GROUP NAME AND TYPE

NAME: OpenRAN

TYPE: Product Group

2. PURPOSE

TIP's OpenRAN program develops disaggregated and interoperable 2G/3G/4G/5G NR Radio Access Network (RAN) solutions based on service provider requirements using general purpose hardware, software-defined technologies and open interfaces based on industry standards.

OpenRAN's mission is to accelerate innovation and commercialization in the RAN space with multi-vendor interoperable products and solutions that are easy to integrate in an operator's network and are verified for different deployment scenarios.

Key OpenRAN tenants include:

1. **Disaggregation**, of RAN HW & SW on vendor neutral, GPP based platforms
2. **Open Interfaces**, Implementations using open interface specifications between components (e.g. RU/CU/DU) with vendor neutral hardware and software defined functions
3. **Multiple Architecture** Options
    a. An all integrated RAN with disaggregation at SW and HW level
    b. A split RAN with RU, BBU (DU/CU)
    c. A split RAN with RU, DU and CU

4. **Flexibility -** Multi vendor solutions enabling a diverse ecosystem for the operators to choose best-of-breed options for their 2G/3G/4G and 5G deployments
5. **Solutions implemented** on either Bare Metal or Virtualized or Containerized Platforms
6. **Innovation** via Adoption of New Technologies (AI/ML, CI/CD, etc.)
7. Supply Chain **Diversity**

3. GOAL

The goal for this Project Group is to accelerate the development, implementation and commercialization of disaggregated OpenRAN product solutions that satisfy Operator market needs.

The project group will strive towards the following goals:

1. Accelerating RAN disaggregation
2. Aggregating MNO Demand Signal
3. Developing Common Requirements
4. Align Vendor Roadmaps
5. Lowering integration cost and risks
6. Delivering easy to consume Deployment and Operational guidelines
7. Facilitating Adoption and Proliferation of OpenRAN solutions

The project group will work collaboratively to define Deliverables (defined in Section 5) for OpenRAN products for use in TIP validation activities including TIP Field Trials and to support product listings on the TIP Exchange. In order to support the creation of the Deliverables and support the Purpose, the Project Group will work with ecosystem partners and external organizations such as 3GPP, O-RAN Alliance etc. via third party collaboration agreements with TIP which will be subject to TIP's Liaison Policy (https://cdn.brandfolder.io/D8DI15S7/as/q7rnyo-fv487k-ebhzgl/Liaison_Policy_-_Telecom_Infra_Project.pdf)

4. SCOPE

The proposed Deliverables will encompass all possible RAN streams, 2G, 3G, 4G, 5G. Each of the proposed workstreams will be addressing the building blocks (HW/SW) or distinct deployment use cases, as well as specifically identified design challenges on the radio side, e.g. indoor small cells, outdoor macro for mid to high capacity, and suitable wireless system architectures (both standalone and non-standalone) for the aforementioned building block requirements and deployment use cases, both of which are based on operator input. The workstreams will be identified as subgroups.

The Deliverables will address the requirements to integrate HW and SW components to deliver integrated and verified RAN models. The Deliverables will also set forth the guidelines and requirements for implementing and testing products in connection with the Deliverables. In

addition to referencing industry developed or third party software in the Deliverables, the project group may collaboratively develop software within a TIP software project to support the TIP Deliverables. The TIP OpenRAN project group is not focused on developing interface specifications to design a handset or user equipment. Any change of Scope would require a re-charter of this project group.

5. WORKSTREAMS AND DELIVERABLES

Each of the workstreams identified below will be addressing the building blocks (HW/SW) or distinct deployment use cases and design challenges on radio side and in various segments, e.g. indoor small cells, outdoor macro for mid to high capacity, and network management.

The following workstreams are envisioned for the Project Group focusing on specific segments and components. This is not an exhaustive list and may be expanded to support industry need and in line with the Scope noted above. Any such expansion within Scope that does not require additional types of Deliverables will not require this PG Charter to be re-chartered:

Segments: Focused on integrated RAN solutions for specific network use cases to reduce deployment scenario complexities

- **Outdoor Macro:** Deployment segment addressing coverage and capacity with outdoor macro base station solutions.
  - **Peri-Urban/Rural:** Initial focus on legacy 2G/3G, 4G and 5G in future
  - **Urban:** Future workstream for dense Urban Deployment with a combination of macro, pico, and small cell variants
- **Indoor:** Indoor coverage with Small cells for 4G/5G

Components: Focused on improving the performance of individual OpenRAN technology components, SW and HW

- **RIA**: AI/ML Use Cases for MaMIMO, RRM, and SON
- **NMS**: FCAPS for OpenRAN, data model, and APIs
- **RU**: Defining Radio Unit Whitebox HW for 4G/5G
- **DU/CU**: Defining DU/CU Whitebox HW for 4G/5G

Proposed Project Group Deliverables: The following table defines the proposed Deliverables that the project group will draft and publish along with the TIP IPR terms and approval procures. Each project group will manage the finalization and publication of their Deliverables as noted below:

No.	Deliverable	IPR Treatment	Approval Procedures

1	Use Case Definition and High-Level Requirements	Document IPR Policy	Versions by consensus of the Project Group; final approval by the Technical Committee
2	Architecture Design and Detailed Requirements Document	Document IPR Policy	Versions by consensus of the Project Group; final approval by the Technical Committee
3	Minimum Viable Product (MVP) Definition Document (Operator or vendor)	Document IPR Policy	Versions by consensus of the Project Group; final approval by the Technical Committee
4	White Papers or Case Study	Document IPR Policy	Initial version may be created in the Project Group, TIP Community Lab, or Field Trials; consensus driven approval in the Project Group, Lab or Trial; final approval by the Technical Committee if the PG chooses to publish
5	Test Specifications for use in Lab and Trial activities, Test Reports, Lab Exit Reports, Field Trial Exit Reports	Document IPR Policy	Initial version may be created in the Project Group, TIP Community Lab, or Field Trials; consensus driven approval in the Project Group, Lab or Trial; final approval by the Technical Committee if the PG chooses to publish
6	Playbook	Document IPR Policy	Versions by consensus of the Project Group; final approval by the Technical Committee
7	Software (developed to support Requirements; sample applications; or commercial implementations)	TIP IPR Policy and TIP CLA; Document IPR Policy for supporting documentation	Prior to the development of software, the project group will form an official software project approved by the TIP BOD with an approved software license consistent with the TIP IPR Policy. The software project will follow the terms outlined in the TIP IPR Policy, the TIP CLA, and any other project-related procedures outlined prior to Board approval.

6. INITIAL CHAMPIONS

Initial supporting partners include Vodafone, T-Mobile, Intel, China Unicom, Ooredoo, Smartfren, TPG, Dish, Deutsche Telekom, BT, Airtel, Vodafone Idea.

7. LEADERSHIP

PROPOSED CHAIRS

Vodafone and T-Mobile

WORKSTREAM LEADS

- **DU/CU:** Vodafone, T-Mobile, Intel
- **RU:** Vodafone
- **RIA:** Vodafone, T-Mobile, BT
- **Outdoor Macro:** Ooredoo, TPG, Smartfren, Vodafone
- **Indoor Small Cell:** China Unicom, T-Mobile

ACCEPTANCE

Contact Name

Contact Title

Email Address

Telephone Number (Include Country Code)

Company Name

Company Address, City, State, Country, Postal Code

Company Web Page URL

Primary services or products the company provides

Signature

Date

Signed by (print name)