

WIRELESS BACKHAUL

This 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: 04/17/2019

1. PROJECT GROUP NAME

Wireless Backhaul – Frequency Agile Modular White Box Backhaul System

2. PURPOSE

This group will focus on a frequency agile modular wireless backhaul system concept. Objective is to create a modular outdoor wireless radio equipment which can support different bands from conventional microwave frequency bands 5-42 GHz and mmWave frequency bands greater than 60 GHz. Approach will be modular, which means the proposed solution will be field upgradable when frequency band change or add is required or just capacity increment is needed by adding more frequency channels.

When modularity of hardware is achieved with the required changes in the software (Data plane and Modems), it is required to be Open source software to convert the solution to White Box Wireless Backhaul.

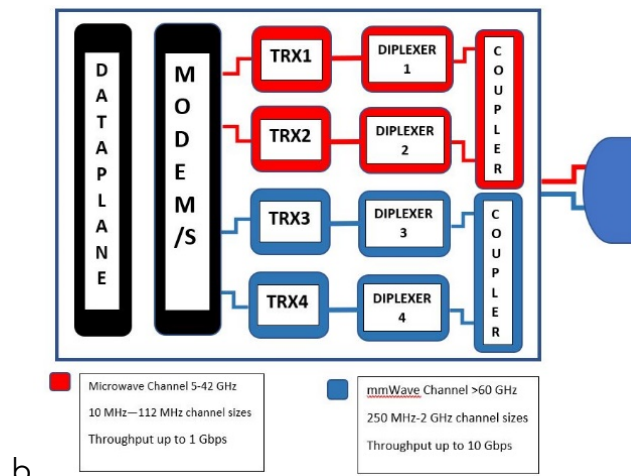
Third Step is to enhance the capability of White Box Wireless Backhaul to incorporate router functionality and make it a Unified White Box Transport solution at the cell sites.

Ultimate step which is dependent on Partner’s interest to further enhance this Unified White Box Transport solution to add RAN portion and make it a Unified Cell site Solution Box.

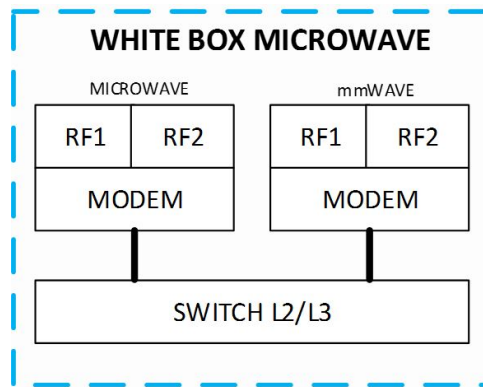
3. PROJECT GROUP SCOPE

The project scope will be focusing on TIP principles of Open Source, disruptive solutions and unconventional approach. This project will complement other TIP initiatives, especially from a Backhaul perspective.

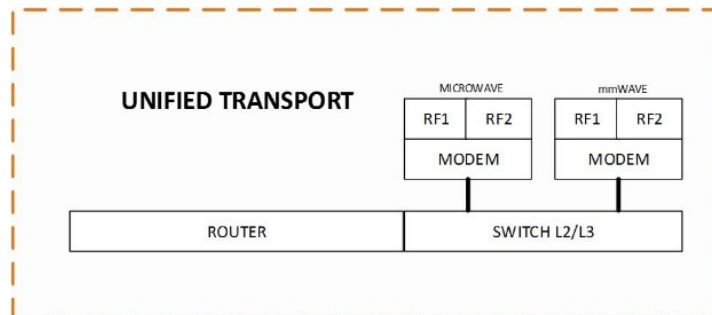
- i. Requirements for modularity of Radio Frequency components based on different frequency bands, microwave and mmWave.
- ii. Design requirements for modular diplexer and coupler which will be connected to the antenna flange/s and to RF Transceivers.
- iii. Develop software and hardware requirements of Modems and Data plane to combine more than one frequency bands.
- iv. Different frequency bands require different channel sizes and different modulation schemes required to work as one bandwidth pipe if L1 or L2 LAG is in use, requirements need to be developed.
- v. Create a features list for this solution, need to be part of the software solution supported by modular hardware, e.g. Adaptive Code Modulation, channel forwarding etc.
- vi. The solution needs to support two channels to four channels, multi core, dual frequency band hardware.
- vii. Modular hardware should be field upgradable or changeable to support new frequency bands or capacity requirements.



- viii. The solution will be modular hardware with the support of software is required to become Open Source software supported solution to become White Box Wireless Backhaul.



- ix. White Box Wireless Backhaul should be able to support L2 and L3 functionalities to combine cell site router and microwave to develop "Unified Transport Solution"
- x. Unified Transport Solution should be able to control RF requirements (capacity monitoring, QoS, weather conditions, etc.) and communicate these changes with router side of the box to have lossless and error free communication.



4. PROJECT GROUP DELIVERABLES

0-6 months Deliverables:

- i. Create key requirements for modularity of Radio Frequency components to support different frequency bands, microwave and mmWave.
- ii. Architecture and design requirements for one Multi Core dual band one box radio hardware.
- iii. Recommendations of software and hardware requirements for modular field upgradable backhaul solution.
- iv. List of supported frequency bands, frequency channel sizes and

modulation schemes.

- v. Create list of software supported features for Wireless Backhaul system.
- vi. Validity and use case determination for two to four channel requirements from two different frequency bands.

6-12 months Deliverables:

- vii. Develop radio chassis design to meet the field upgradable requirements.
- viii. Create requirements of parameters need to be exchanged between router portion and wireless portion to meet seamless transmission based on wireless conditions and vice versa.
- ix. Prototype development, list of KPI collection and verification of full modularity functionality of the product.

12-18 months Deliverables:

- x. Lab trials to integrate this proposed product with other pieces of a cellular network.
- xi. Field Trials to verify and tested the modularity, capacity requirements, Open source software to support all features requested in earlier stages.

5. PATENT LICENSING

The patent license for all Contributions, Draft Specifications and Final Specifications within this Project Group shall be:

[Check one box]

- RAND License Option**, as set forth in Section 5.2.1 of the Telecom Infra Project IPR Policy.
- Royalty-free License Option**, as set forth in Section 5.2.2 of the Telecom Infra Project IPR Policy.

6. FINAL DELIVERABLE COPYRIGHT LICENSING

Project Group agrees to grant the following copyright license for the Final Specification:

[Check one box]

- Creative Commons Copyright Attribution 4**, Each Project Group Contributor agrees that its Contributions are subject to the Creative Commons Attribution 4.0 International license

- <http://creativecommons.org/licenses/by/4.0/legalcode>.

□ **Full Release of Copyright into the public domain**, Each Project Group Contributor agrees to release its Contributions to the public domain and waive all copyrights associated with them.

7. INITIAL PROJECT CHAMPIONS

Facebook, Aviat Networks.

8. CHAIR AND(OR) CO-CHAIR OF PROJECT GROUP

Chair

Dimitris Siomos, Deutsche Telekom (DT)

Co-Chair

Norman Yeoh, Axiata

9. PARTICIPATION CRITERIA

- i. Network Operators are required to contribute in development of technical requirements and framework of the architecture of hardware and/or software side of this solution.
- ii. Vendors are required to understand the requirements, from hardware and software perspective and provide their technical expertise to support and betterment of proposed solution.