IEEE P802.1CF  
OMNIRAN

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| MIF Problem in OmniRAN | | | | |
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Abstract

This contribution describes some initial ideas on multiple interfaces issues in OmniRAN.

1. Multiple Interfaces

The terminal in 802.1CF architecture may have multiple interfaces that are simultaneously connected. When multiple interfaces are connected to different 802 technologies then this causes no issues for OmniRAN as it is a well known case. A typical case is a laptop having an Ethernet and a Wi-Fi interface. Ethernet interface connected to an Ethernet LAN and Wi-Fi interface connected to an Access Point which is connected to 802.11 Distribution System (DS). This is shown in Figure 1.

* 1. OmniRAN Case

Potential OmniRAN case could be when multiple interfaces are connected to the same 802 technology.



1. —MIF Terminal Case 1

Figure 2 shows this case where the terminal with two interfaces connected to the same 802 technology.



1. MIF Terminal Case 2

Traditionally 802.11 APs are connection to a Distribution System (DS) in which 802.11 frames are exchanged. . For Internet connection, the DS needs a portal which interfaces to 802.3. The portal does all adaptations needed between 802.3 and 802.11.

In the figure the terminal has an 802.11 interface and 802.3 interface. 802.11 interface sends/receives 802.11 frames and 802.3 interface sends/receives 802.3 frames. MAC header in 802.11 frames and 802.3 frames carry different fields. When a MAC frame needs to be sent over the 802.3 interface the frame header needs to be translated into 802.3 frame format. Likewise when a received 802.3 frame needs to be sent to the terminal over 802.11 interface, a reverse translation needs to happen. In this case the AP does the adaptation.

Frame format incompatibility is one issue with this architecture. There could be other issues.

A variant of the architecture shown in Figure 2 is that the terminal is connected to another terminal on one link and to a different technology on the other link. This is shown in Figure 3.



1. —MIF Terminal Case 3

The type of connectivity shown in Figure 3 in some cases such as data center top-of-rack (TOR) switches to alleviate congestion requires high bandwidth and short range air interface such as in 802.11ad or 802.11ac or the upcoming 802.11ax.

There are two related activities one in 802.1 Interworking Task Group and the other in 802.11 which we will describe shortly next in this contribution.

* 1. 802.1Qbz

As part of 802.1 Interworking project, 802.1Qbz task group is working on Enhancements to Bridging of 802.11.

802.1Qbz is enhancing bridging for 802.11 media. It’s aim is to define procedures that enable 802.11 media to be used as a link connecting to as well as a link providing access to Bridged LAN or Virtual Bridged LAN.

802.11 media and a bridge can connect:

Portal Convergence: An 802.11 Portal can provide connectivity between a bridge connected to an 802.11 Distribution System.

Infrastructure Convergence: 802.11 APs are associated to virtual point to point bridge MAC layer instances providing Internet connectivity to the APs. In this case, virtual instances serve as an 802.11 Distribution System to the connected APs.

Non-AP Station Convergence: A non-AP 802.11 station is directly connected to the bridge. The station itself handles 802.3 frame format and 802.11 frame format convergence. This case is as in Figure 3.

* 1. 802.11ak

802.11ak task group in 802.11 is working on enhancements for transit links within bridged networks. These links are also called General Links (GLK).

802.11 media has now reached gigabit per second ranges and it has to be carried with 802.1Q bridges. Example uses of gigabit per second 802.11 media are in home entertainement systems, in data centers for TOR switch to TOR switch connectivity, in enterprise networks such as for providing wireless backhaul from APs and in industrial control networks for providing multiple wired and wireless links to a moving device with one station such as a robot, an assembly line pallet, etc.

802.1ak intends to eliminate the need for a Portal in 802.11 Distribution System. This is achieved by replacing the Distribution System by an 802.11Q conformant device or network.

Change MSDU Encoding. Currently in 802.11, Logical Link Control (LLC) Protocol Discrimination (LPD) is used. 802.1Q on the other hand uses EtherType Protocol Discrimination (EPD).

LPD is a method for identifying the protocol contained in a frame in which the first three octets are a destination LSAP, a source LSAP, and a Control octet (LLC).

EPD is a method for identifying the protocol contained in a frame in which the first two octets are an EtherType.

LPD encoding wastes 6 octets. Because of this GLK will be based on EPD MSDU encoding.

802.11 uses 802.1D priorities for Priority-based Flow Control (PFC). 802.1D priorities differ a bit from 802.1Q priorities.

A Basic Service Set (BSS) containing both GLK and non-GLK terminals (stations STA) is called a mixed BSS. Otherwise it is a segregated BSS. Currently, 802.11ak supports only segregated BSS and also GLK stations use only EPD MSDUs.

**References:**

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IEEE 802.1Qbz/D1.1. Enhancements to Bridging of 802.11 Media, December 2013.

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IEEE 802.11ak/D0.01 Enhancements for Transit Links within Bridges Networks, March 2014.