RPI4 Extender - reference implementation

Introduction - RDK Extender

- RDK Extender profile is a Yocto based RDK miniature build with opensource OpenSync agent
- OpenSync agent is cloud agnostic and it forms mesh orchestrated by Plume cloud
- RPI4 target is chosen for extender profile since this target is chip and widely available
- Two external Wi-Fi dongles are used for 2.4GHz and 5GHz radio support
- OpenSync's minimum requirement on the WiFi radio is the support for **2AP and 1 Station** interface
- Conceptually, RPI4 extender can be used with different Gateway devices(which has OpenSync agent). But currently validated with TurrisOmnia RDKB GW
- Prerequisite: Need to contact Plume to acquiring TLS certificate and backhaul credential

Scope of the work

- Onboarding RPI Extender to Router over Wi-Fi
- RPI4 extender should appear online in Plume NOC
- Extension of Internet to mobile from Router over Wi-Fi

High level Design / Architecture

RPI4 Extender build(32-bit) instructions:

```
repo init -u https://code.rdkcentral.com/r/manifests -b rdkb-2023q3-dunfell -m rdkb-pod-extsrc.xml
or
repo init -u https://code.rdkcentral.com/r/manifests -b rdkb-2023q3-dunfell -m rdkb-pod-nosrc.xml
repo sync -j4 --no-clone-bundle
<UPDATE 0001-Update-bhaul-credential.patch in meta-cmf-broadband layer>
MACHINE=raspberrypi4-rdk-extender source meta-cmf-raspberrypi/setup-environment
bitbake rdk-generic-extender-image
```

- Reference (rdk-next build instruction): RPI 4B Model Reference Platform: Extender build instructions

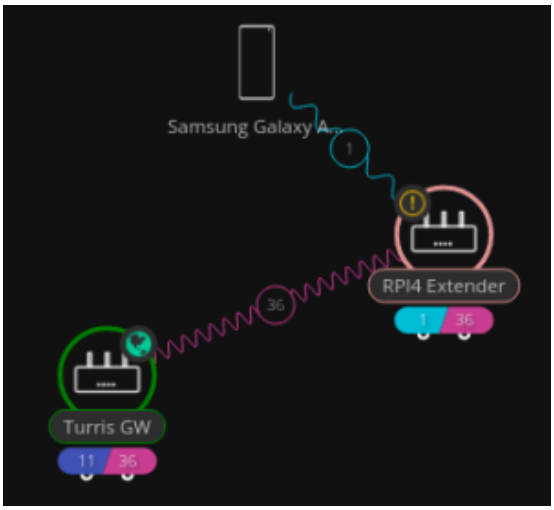
OpenSync version details:

Ported OpenSync version is 4.4.0.

OpenSync components	Branch
OpenSync Core component	osync_4.4.0
Platform-RDK	osync_4.4.0
RPI Vendor component	main

Sanity Test cases :

S.No	Sanity tested on	Status	Comments
1	Image should be stable	Pass	
2	OpenSync service and its manager should be running	Pass	
3	RPI Extender onboarding over Wi-Fi	Pass	
4	Able to Ping www.google.com from RPI Extender	Pass	
5	Wifi Extension of Internet to mobile from GW	Pass	Currently through 2.4GHz Radio, While 5GHz radio is used for backhaul connectivity



Known issues/Observations:

- Due to Wi-Fi dongle's limited capability, using 5GHz radio for backhaul connectivity and 2.4GHz radio for Home AP
- Backhaul to GW is established only using 5GHz station interface but not using 2.4GHz station interface
- Could not connect mobile with 5GHz Home AP since 5GHz radio station interface is used for backhaul connectivity (may be due to hardware)
- Extender's (2.4GHz)HomeAP channel number is not matching with GW's (2.4GHz)HomeAP channel number (need to check plume cloud team)

References :

REFPLTB-2650 - Bringup OpenSync4.4 in RPI4 Extender

REFPLTB-2724 - Home AP is not running in RPI Extender

User Stories/EPIC

key	summary	type	created	updated	due	assignee	reporter	priority	status	resolution

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Technical support

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