Cambium Networks™

ePMP Force 300-25

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Force 300-25: What is it?

- First ePMP 802.11AC Wave 2 product
- Part of the ePMP3000 family
- Naming signifying the “300” series equating to 11AC and 25dBi gain
- Serves a dual purpose
  - Cost effective Point to Point (PTP) solution
  - Point to Multipoint (PMP) high gain subscriber working with the ePMP3000 Access point
- First product integrating 802.11AC Wave 2 based System on a Chip (SoC
- Most competitor products use 802.11AC Wave 1 with a two chip solution

Force 300-25: Why?

- ePMP is designed to leverage lower cost point WiFi based chipsets
- 802.11AC Wave 2 is the natural progression for ePMP roadmap
- Wave 1 enables the following:
  - 80MHz channel bandwidth
  - 256QAM
- Wave 2 enables the following
  - 80MHz channel,
  - 80+80 operation(*Not applicable to F300),*
  - 256QAM
  - Non contiguous channel bonding (*Not applicable to F300*)
  - MUMIMO operation

Applications:

- F300-25 designed to leverage and be a MUMIMO capable subscriber module
- F300-25 designed to reach 256QAM operation and 80MHz capabilities based on channel and interference conditions.

Force 300-25: Under the hood

Physical:

- Note a heavier feed horn design with additional heat sinking
- Same ease of installation as the Force 200
- Bracket mountable on either side
- Overall runs warmer due to higher power processor
- Specifications can easily go to -40C operation with cold start heater circuit and future run time heater operation

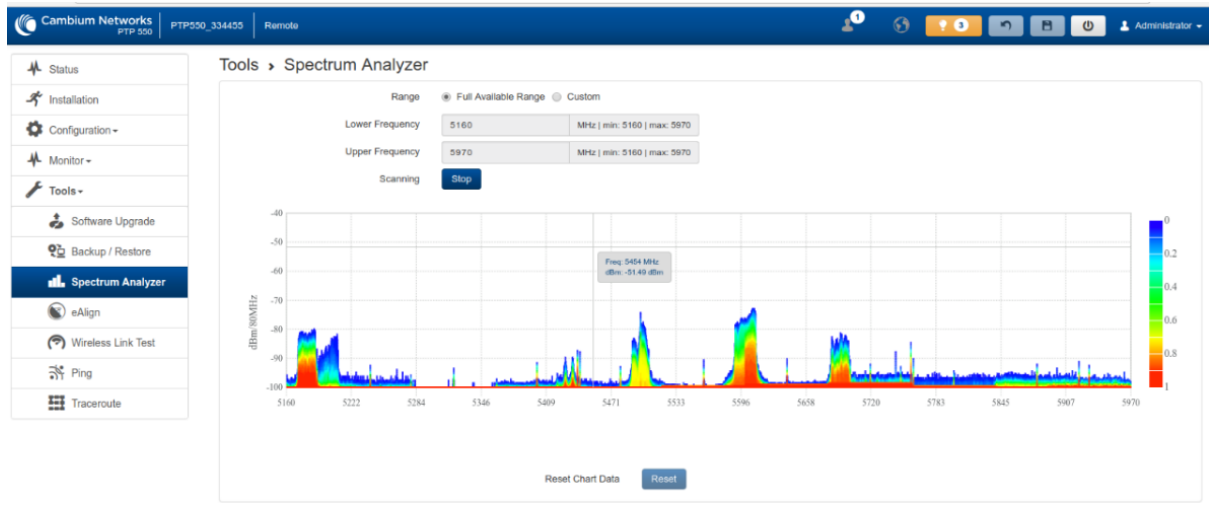
Performance:

- Up to 700Mbps of throughput (256QAM, 80MHz)
- 65K PPS supported by a quad core A7 ARM
- 20/40/80 MHz support
- 4.9 to 5.9 operation
- TDD only mode of operation with sub 5ms latency in PTP
  - Flexible mode in the future for non sync operation and lower latency

Force 300-25: Under the hood

- WiFi management using second radio on SoC
  - Second radio configurable as 2.4 or 5GHz
  - Upon boot up 2.4 radio available as management access

  (Note: 2nd radio path does not have a discrete RF lineup and leverages internal RF)
- Dedicated run time spectrum analyzer using second radio on SoC
  - During run time second radio switches to 5GHz and is a dedicated, background spectrum scanner



Built in spectrum analyzer – No more JAVA client!

Force 300-25: Under the hood

Compatibility –

High gain subscriber with ePMP3000

- Compatible as a high gain subscriber to ePMP3000 – support MUMIMO operation.
- MUMIMO supported with ePMP3000 launching in Q2 of 2018

High gain subscriber working with ePMP2000 & 1000 Access Points

Compatible to ePMP2000/1000 as a subscriber

- Requires SW upgrade on e2K/e1K to allow updated interface
- Can work in mixed mode with Force 300 and ePMP legacy SMs in same sector
- About 10% throughput impact anticipated at the sector level when running Force 300 in a legacy network. Impact reduced in updated SW releases

Force 300-25: Future capabilities

Run time heater

- Unlike ePMP1000/2000, the microcontroller is field programmable. A run time heater algorithm could be developed to support extreme cold operation

DSO(Dynamic Spectrum Optimization) functionality

- With the dedicated background spectrum analyzer, localized channel information can be shared and link optimized by cnMaestro for PTP links.
- Link can temporarily go down while PTP link switches to a cleaner channel based on background scan channel conditions. This would be a future algorithm that would incorporate the data from background scans to make smart decisions about the link.
- In a PMP system, localized channel info can be used to troubleshoot individual links

  (*Note: In PTP 550, the link will* ***not*** *go down when DSO kicks in due to an always on second channel. This is a strong differentiation for PTP550*)

WiFi management applications

- cnArcher use case as well as custom applications developed by the user community

Additional band support

- 4.9 support in ROW models a possibility via software

Force 300-25: FAQ

How does compatibility work with ePMP3K and ePMP2K?

- *With ePMP3000, the Force 300 will work as a SM and offer MUMIMO operation as a subscriber*
- *With ePMP2000, an upgrade on the AP will allow it to communicate with the Force 300*

Will I see a performance impact when the Force 300 communicates to ePMP1000/2000?

- *Yes, some overhead is added to support the compatibility to ePMP1000/2000. We anticipate this to be about a 10% impact to overall sector throughput. However, with future SW releases we anticipate this impact to be reduced significantly*

When will compatibility to ePMP1000/2000 become available?

- *We anticipate a beta release during the first week of February as the Force 300 becomes available. The SW will be available for download from our website*.

What about additional channel bandwidth support?

- *Initial launch will support 20/40/80MHz*

What is the status of regulatory approvals and product availability?

- *Q4 2017 – Limited ROW quantities available (including Brazil)*
- *Anticipate FCC test report mid December to share for other TA*
- *FCC grant and therefore FCC shipments not till Q1*
- *ETSI grant, FCC DFS & ETSI RED+DFS in Q1, 2018*