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Wireline Access Network

Practical Implementation of Profile Management Application (PMA) to Improve Data Throughput in the Presence of Impairments

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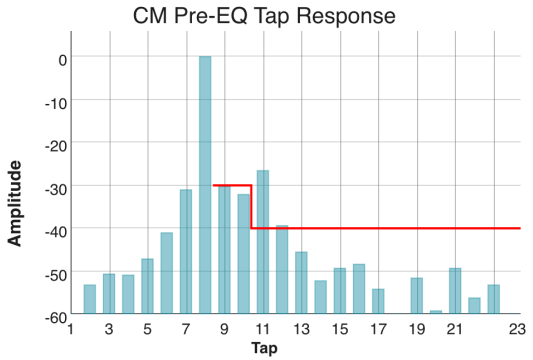
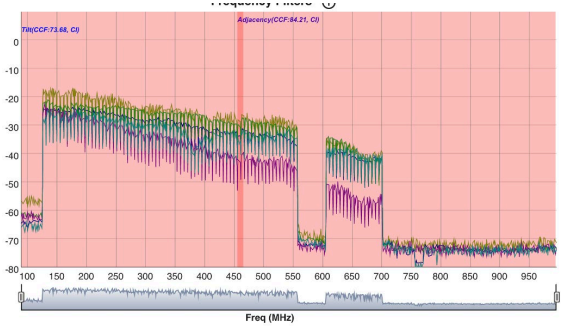
What is PNM? != PMA





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What is RxMER per Subcarrier?

Nimble RxMER Chart

Average Deviation	Average RxMER	Freq at Max RxMER	Freq at Min RxMER	Max RxMER	Min RxMER	Modem Efficiency
-5.49	29.85	744.92	882.67	40.00	22.25	0.03

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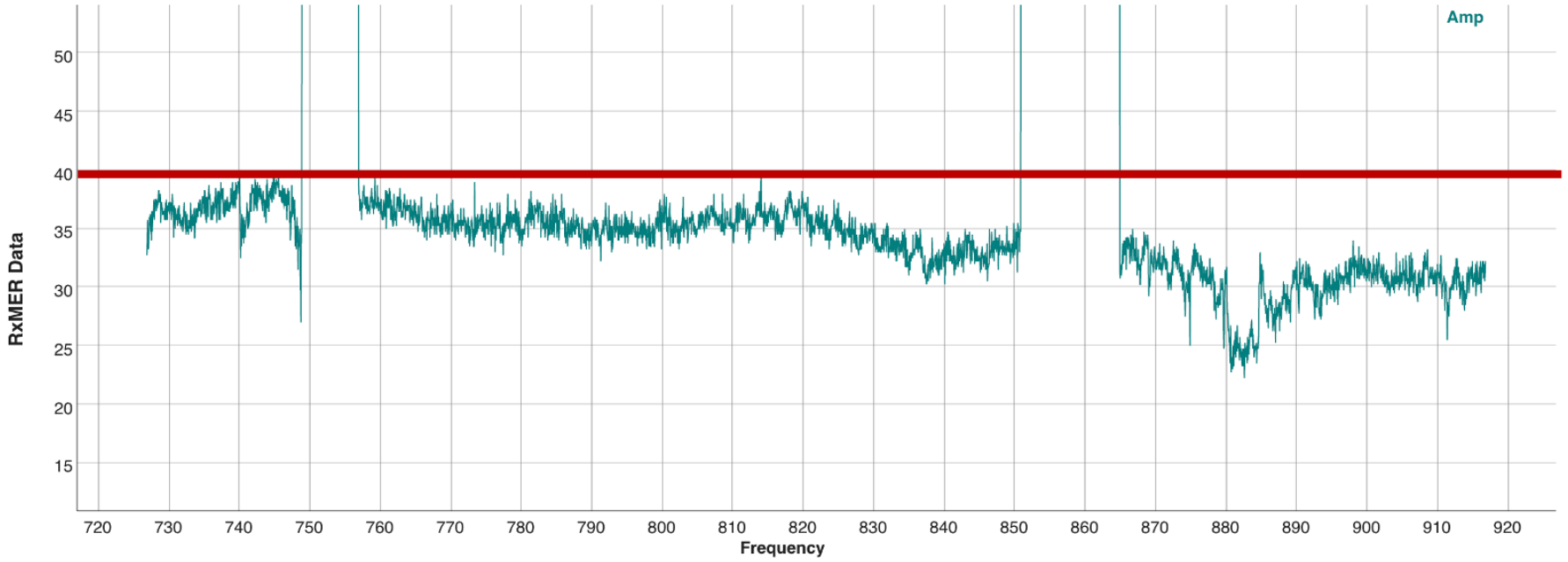
Rescan



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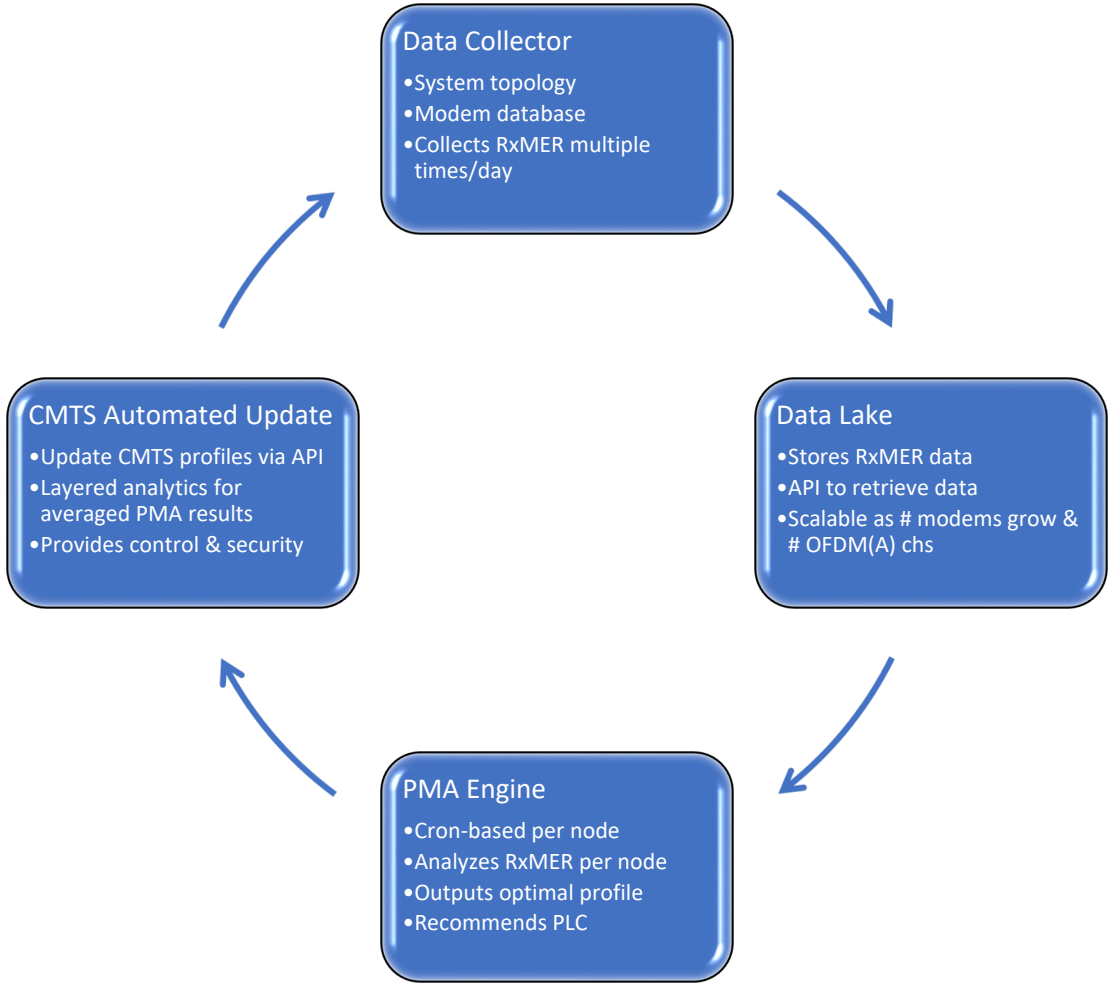
What is PMA

- Makes OFDM & OFDMA perform better
  - Optimizes data throughput
  - Improves robustness
  - Continuously adjusts based on impairments
  - Right hand image is PMA architecture



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Why PMA?

PMA optimizes downstream OFDM and upstream OFDMA efficiency

- How? Let's look at an example
- In the presence of impairments, such as a roll-off, not all subcarriers will be supported equally
- A flat profile of 4096-QAM is not ideal if roll-off, suckouts, standing waves, LTE ingress and other impairments are present
- PMA will identify which specific sub-carriers should be dropped to 2046-QAM, 1024-QAM or even 512-QAM to maximize throughput
- This occurs on a sub-carrier, but sub-carrier basis
- Every subcarrier has optimal data transmission to the subscriber's modem which can result in a 10-40% efficiency improvement in the DOCSIS network

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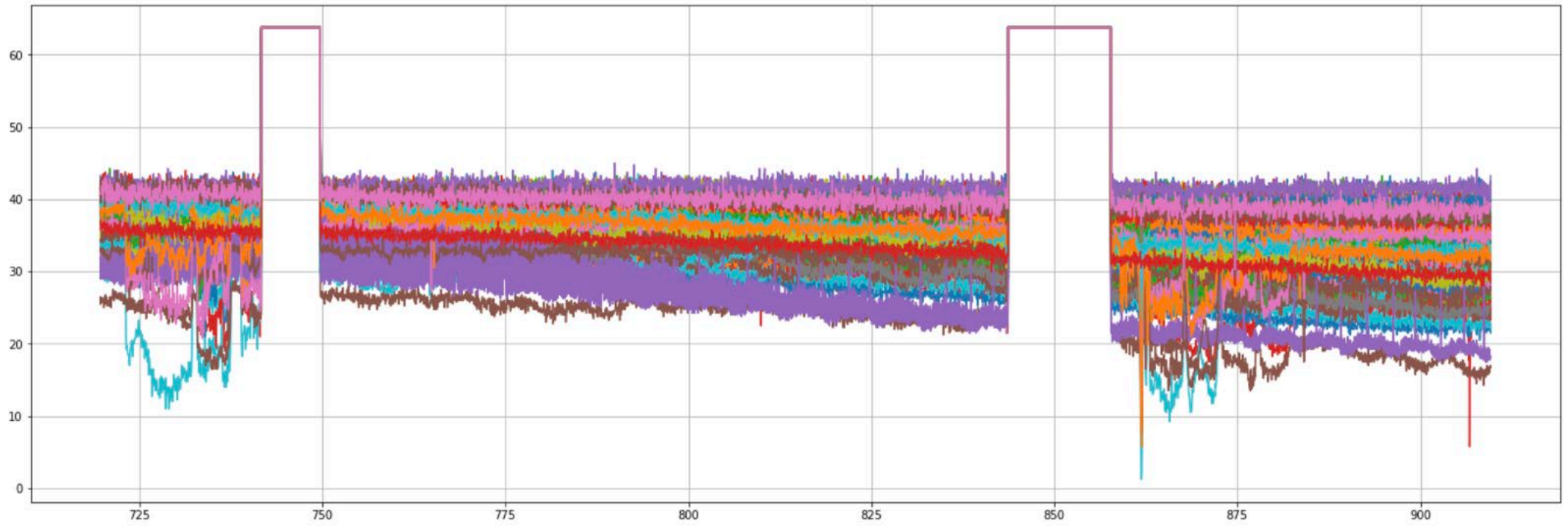
Typical RxMER of all Modems in a Given Fiber Node



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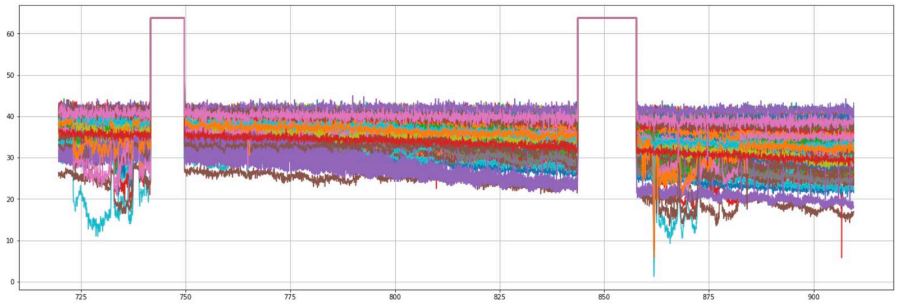
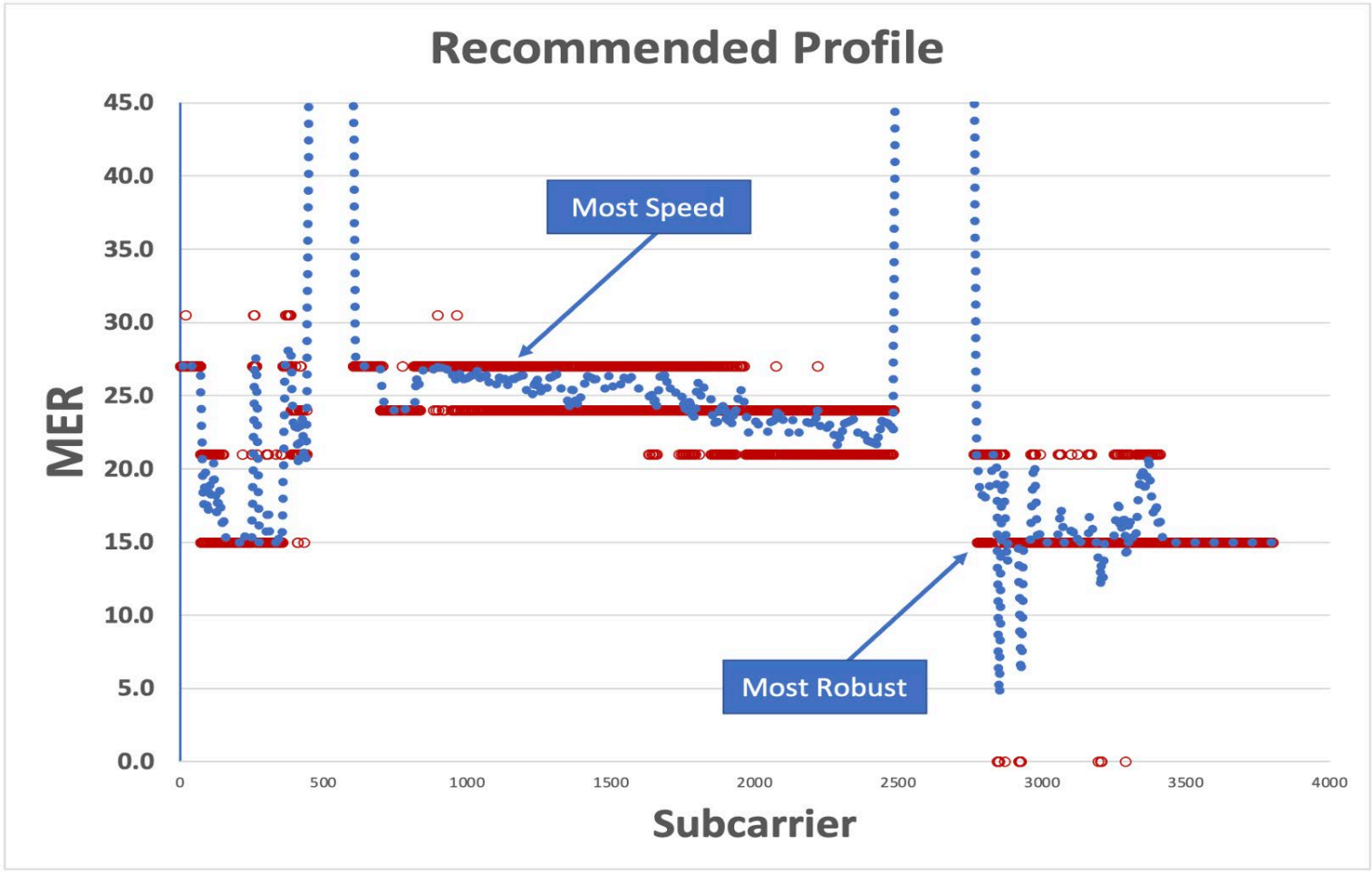
Recommended PMA Profile from Fiber Node





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Old vs New Profile

Profile without PMA:

- ofdm ds-profile 0 default-modulation 256qam
- ofdm ds-profile 1 default-modulation 1024qam
- ofdm ds-profile 2 default-modulation 2048qam
- ofdm ds-profile 3 default-modulation 4096qam

Profile with PMA:

- ofdm ds-profile 0 default-modulation 64qam
- ofdm ds-profile 1 default-modulation 256qam
- ofdm ds-profile 2 low-freq-edge 807000000 high-freq-edge 817000000 64qam
- ofdm ds-profile 2 low-freq-edge 817000000 high-freq-edge 877000000 512qam
- ofdm ds-profile 2 low-freq-edge 877000000 high-freq-edge 903000000 64qam
- ofdm ds-profile 3 default-modulation 4096qam

Segmented profile

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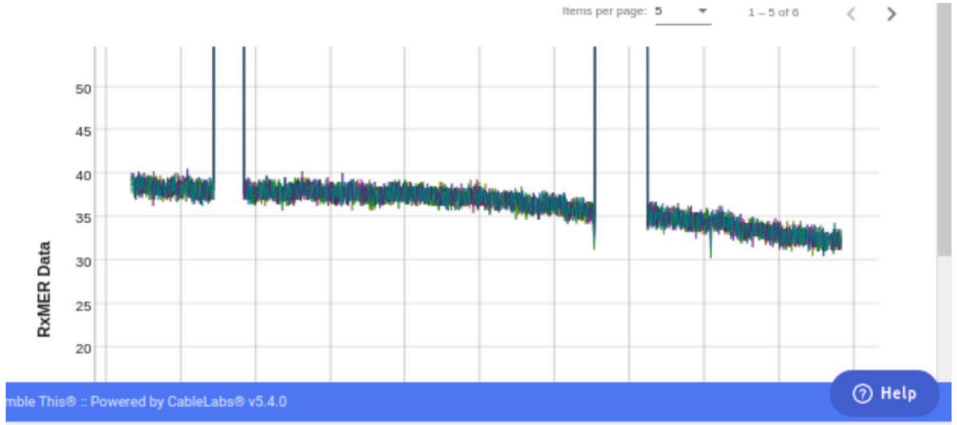
Operational Benefits

- 15% to 40% capacity increase on a channel
  - 200 to 400 Mbps extra capacity on each OFDM channel
- Like upstream dynamic modulation – profiles can compensate for impairments, keeping subscribers online
  - Reduces CSR calls and truck rolls
- Places PLC location – helps prevent outages
- Telemetry data can be used as a proactive tool
- Per cable modem profiles can be generated if CMTS supports it



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Summary

- PMA analyses the pre-collected data and produces optimized profiles ready for your CMTS
- Once you apply the optimized profiles to the CMTS, you will realize improved OFDM / OFDMA performance when impairments are present
- A 10-40% efficiency improvement in the DOCSIS network
- Improves robustness for increased subscriber QoE
- Can provide per-cable modem profiling when vendors support it

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Thank You!

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