FEC in PONs

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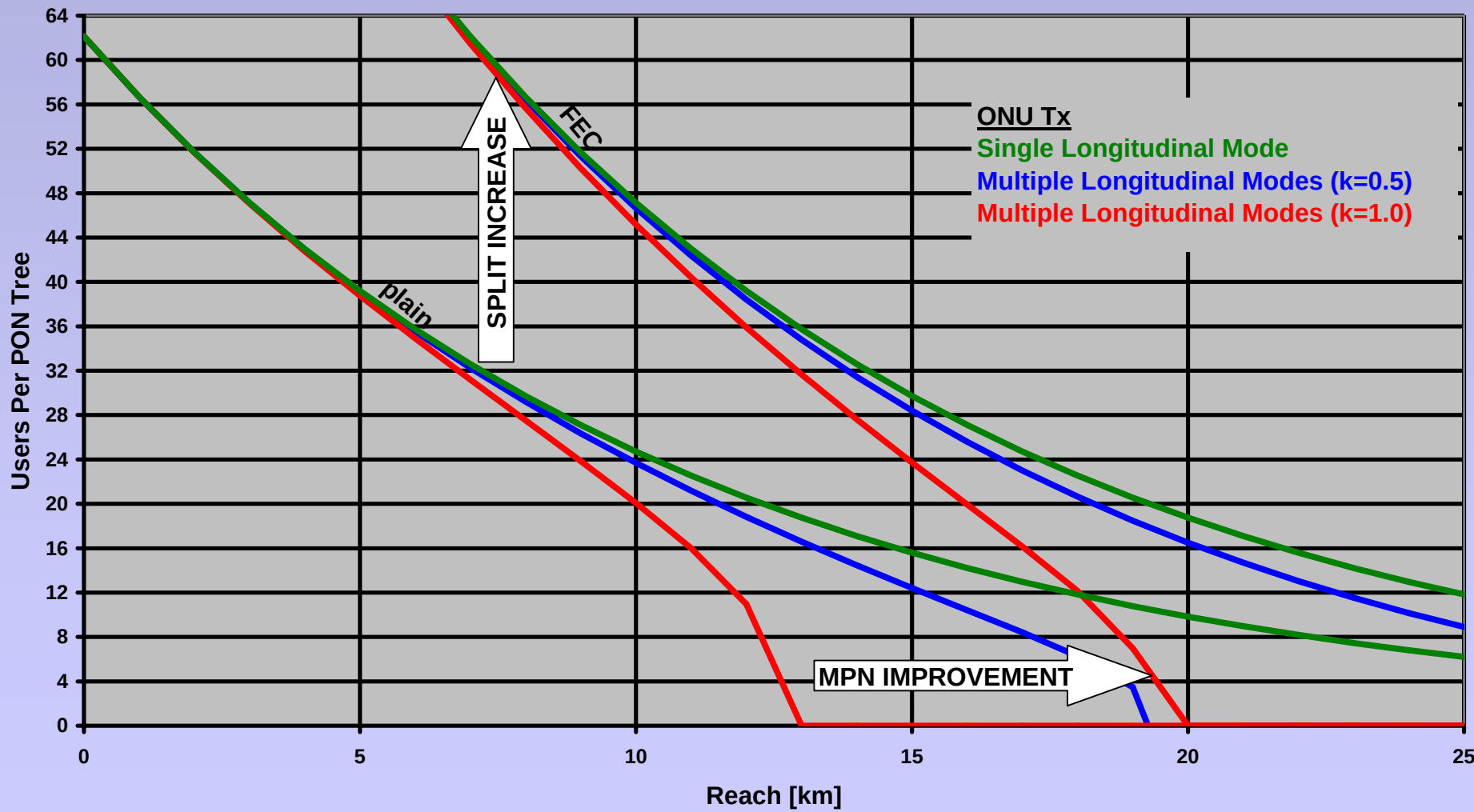
Reach-Split Curve

P2MP PMD Proposal

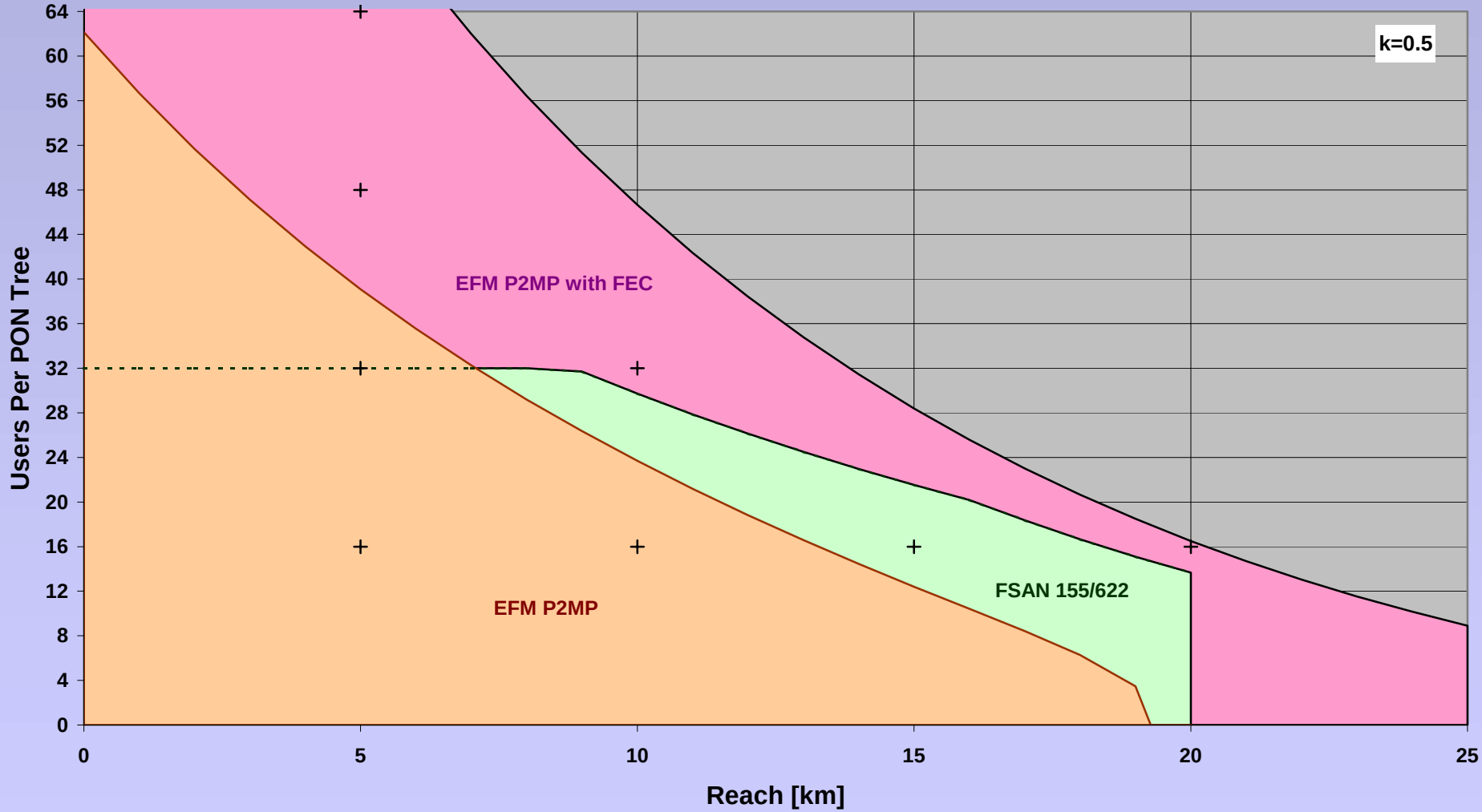


Clear Objectives

- **Improve split ratio**
  - Increase to 1:32 splits @ 10Km
  - Allow 1:16 splits @ 20Km
- **Overcome MPN distance limitation**
  - 20Km achievable with un-cooled FP lasers
  - BER improvement from 10^{-4} to 10^{-12} extends maximal reach
- **Meet operator's requirements**

Make EFM competitive!

Competitive With FSAN

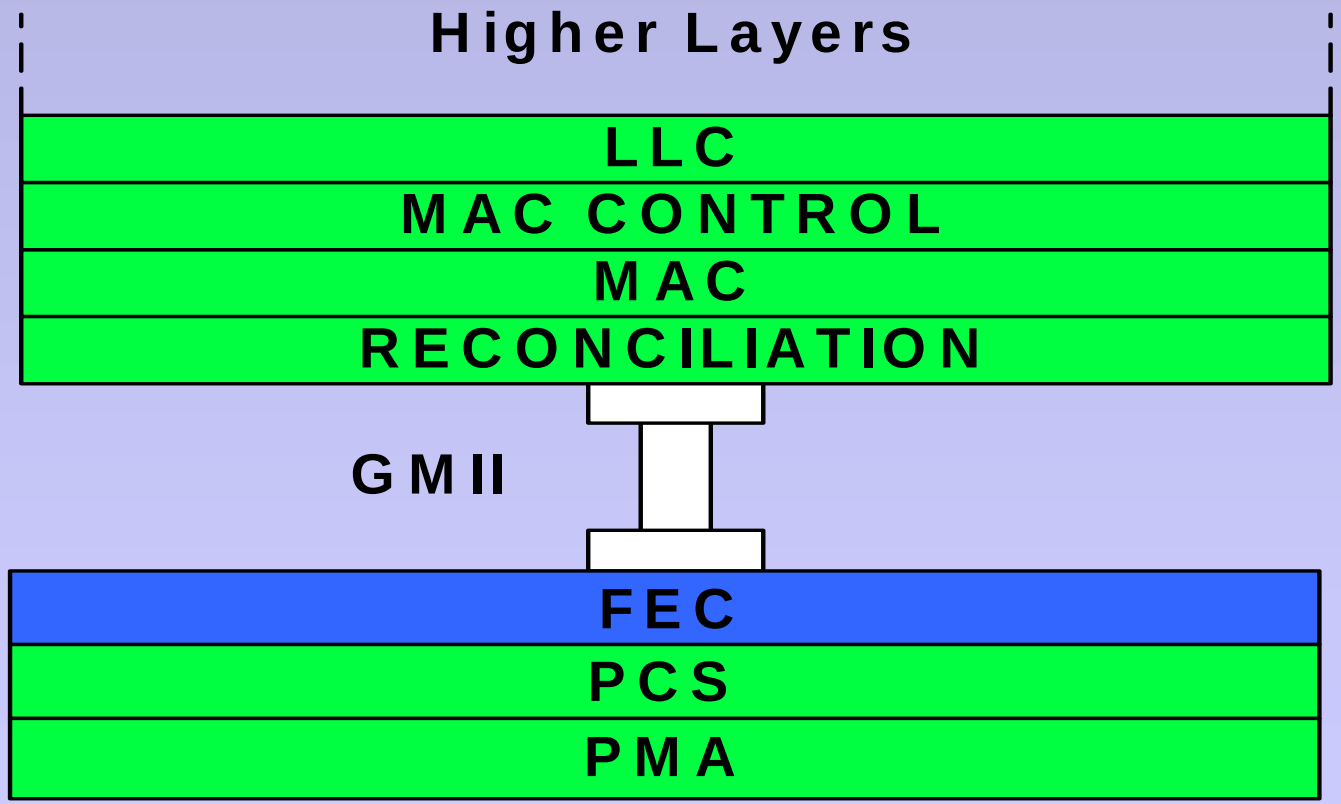


Possible Implementation

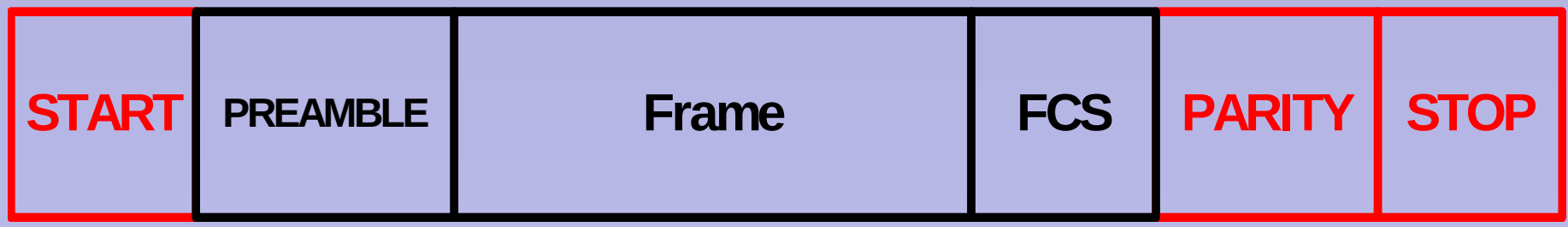
- Reed-Solomon (255,239) code
- 6% Overhead
- Widely Implemented: DOCSIS, VDSL, and ITU-T G.975 SONET

- One frame processing delay (~12uSec)
- Better gain achievable with higher overhead

FEC Layering in P2MP Ethernet

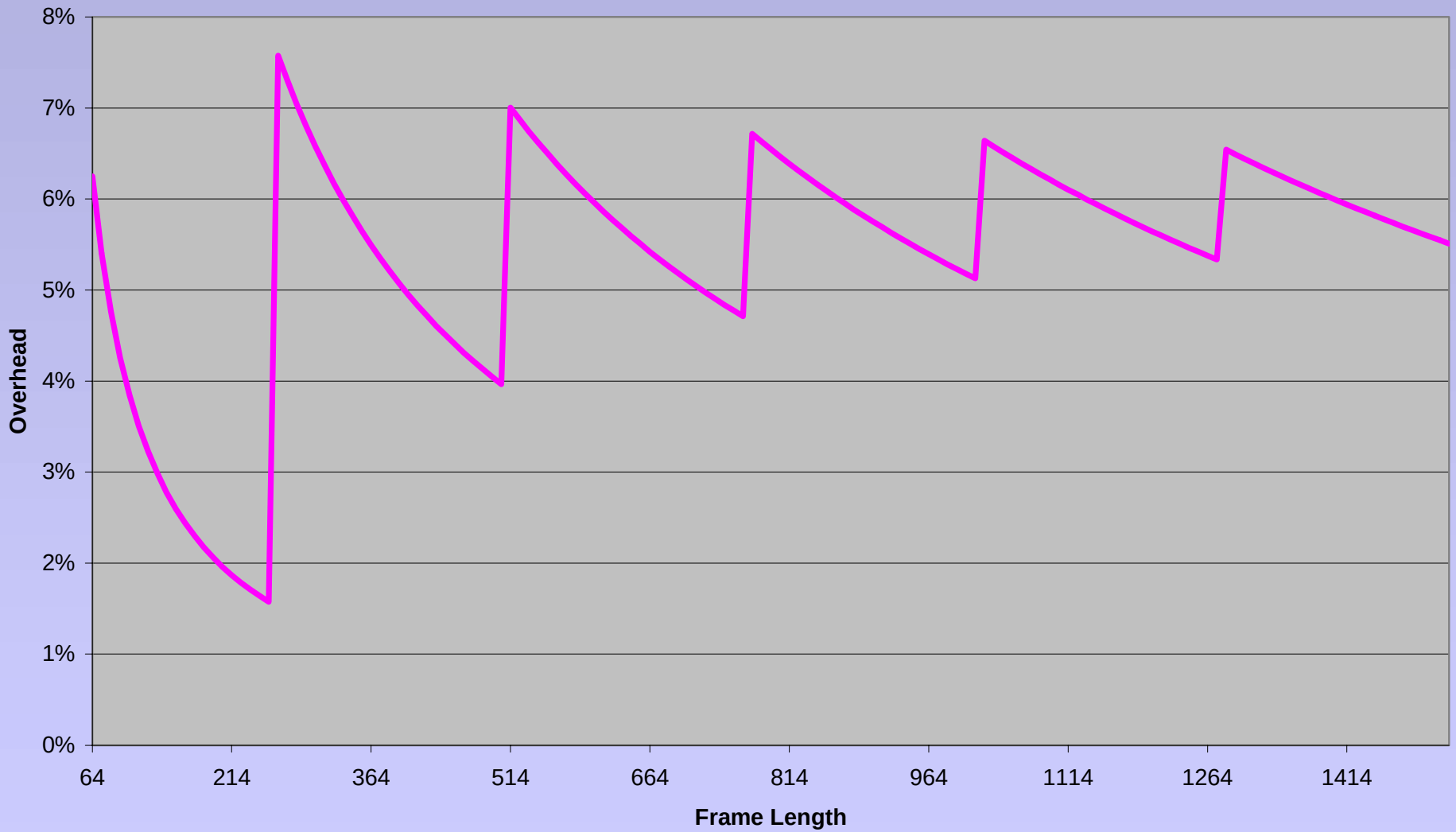


FEC Framing



- Encoding is Preamble to FCS
- Parity bits are appended to the end of the packet
- Start and Stop symbols strengthened
- Parity size depends on frame size
- Data stream is superset of existing PCS
- Use of FEC is optional

Parity Overhead



Conclusion

- **Clear benefit shown**
  - Operators' reach requirement met
  - Twofold increase in split ratio
- **One possible implementation shown**

A new objective: Define n method for use of FEC in the P2MP PHY

EFM should be competitive!