

10 Mbps full duplex 10PASS-TS: Issues with Clause 62 and related copper clauses

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- » 1.0 Current status
 - Review of Objectives
 - Note to editor, 3-10-02
- » 2.0 Performance issues for 10PASS-TS
 - 2.2 Effect RFI notches on data rate
 - 2.3 Upstream Power back-off effect
- » 3.0 Remedy and suggestions for Clause 62
- » 4.0 Remedy and text for improving other Clauses and Annexes
 - 4.1 Spectral Compatibility issues
 - 4.2 Proposed new spectrum

**Issues with Short reach objective for 802.3ah
PHY for single pair non-loaded voice grade copper
distance $\geq 750\text{m}$ and speed $\geq 10\text{Mbps}$ full-duplex**

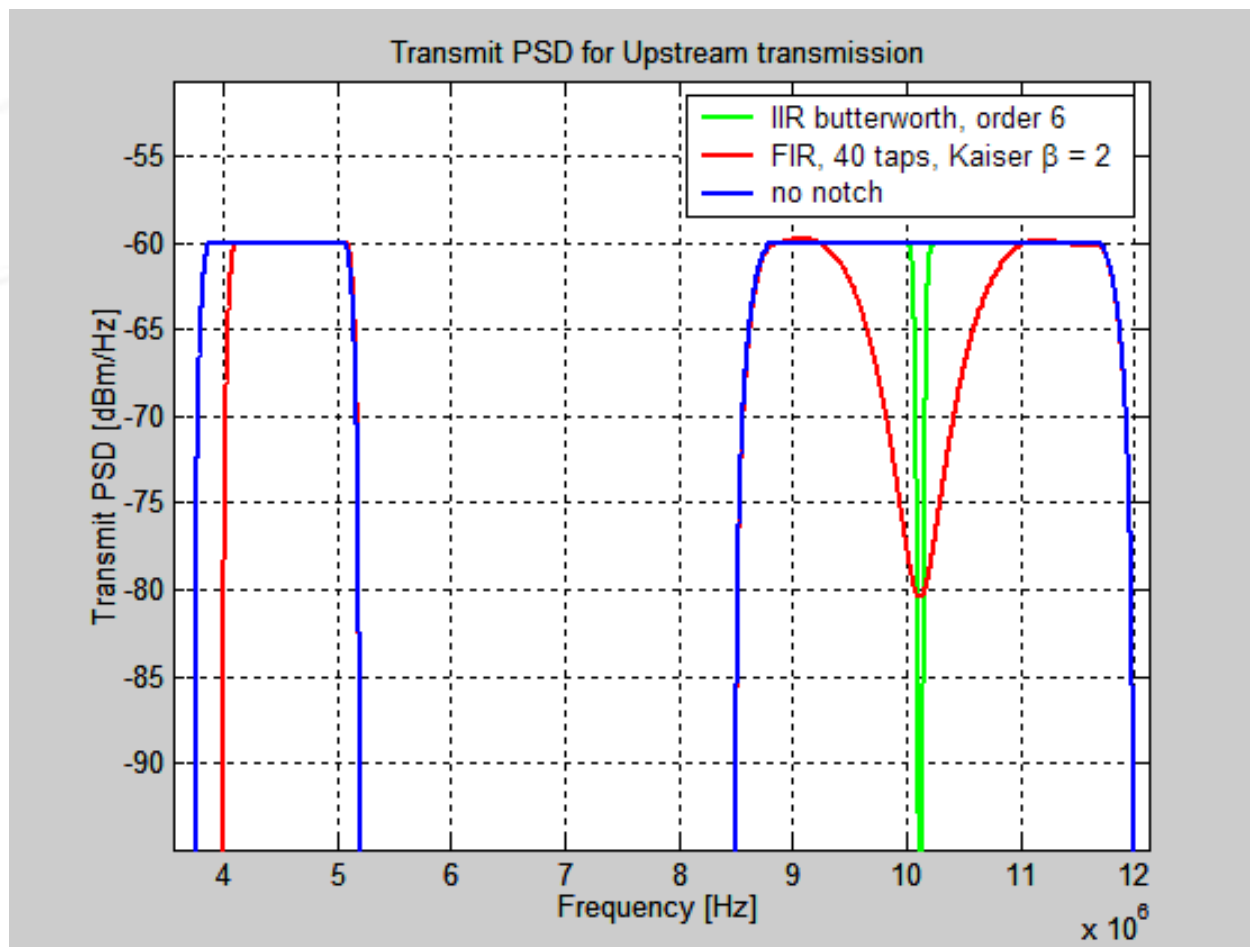
Editor's note, March 2002

Slide 13: does not preclude either group to enhance their performance with other methods such as TCM

Slide 6: Other operational modes may include dynamic frequency allocation to improve reach. This mode shall be spectrally compliant with referenced band plans.

2.1-a SCM Notch filter simulation

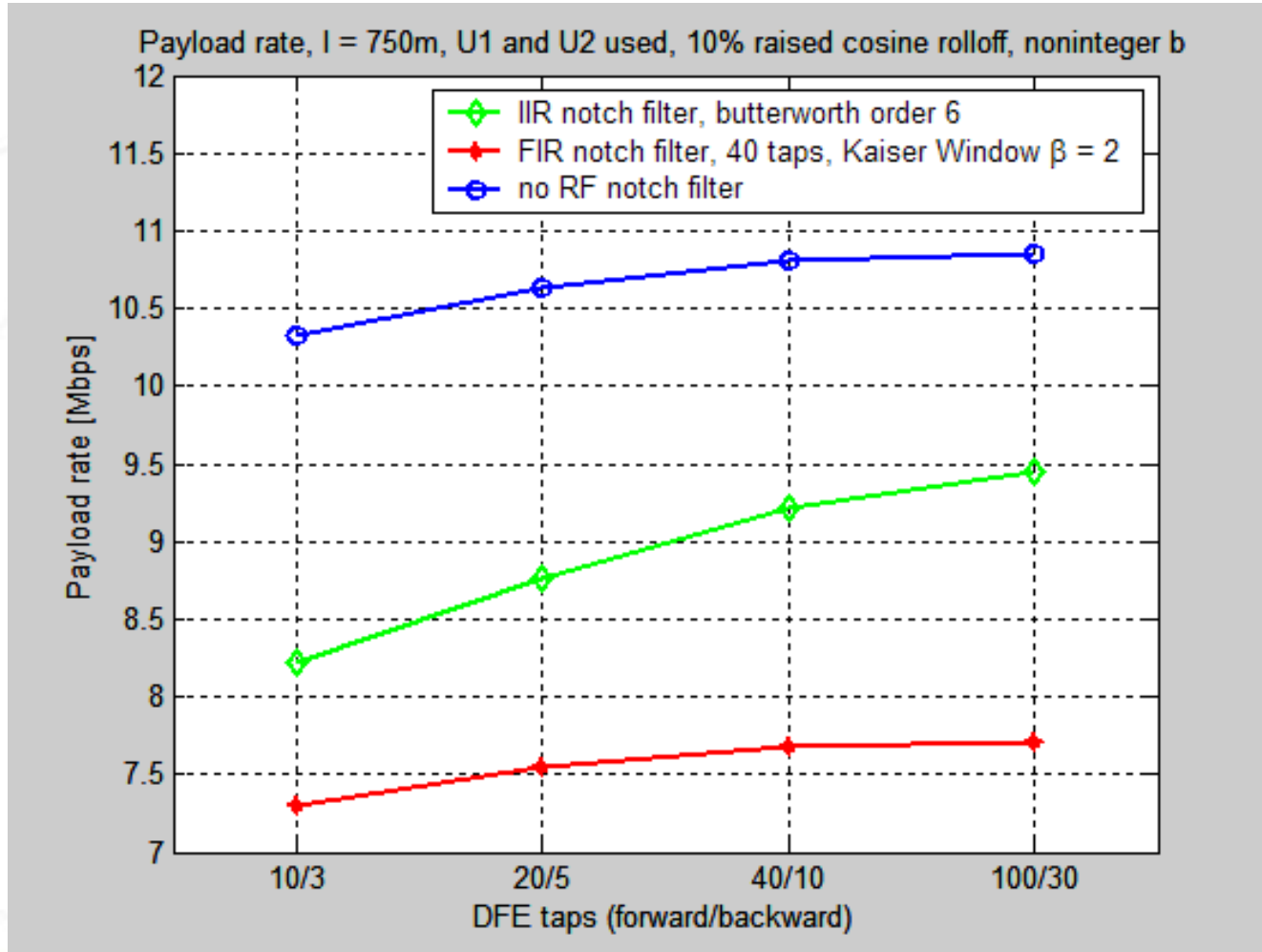
» Transmit PSD - Upstream



- » Frequency band plan: North American Plan (Plan 998)
- » Noise: Noise Model A + Background noise (-140dBm/Hz) + 20 self-disturbers
- » Coding gain: 5.2 dB
- » Margin: 6 dB
- » Symbol error probability: 10^{-7}
- » Bridged tap 1: 11m
- » Roll-off factor of raised cosine pulse: 0.1

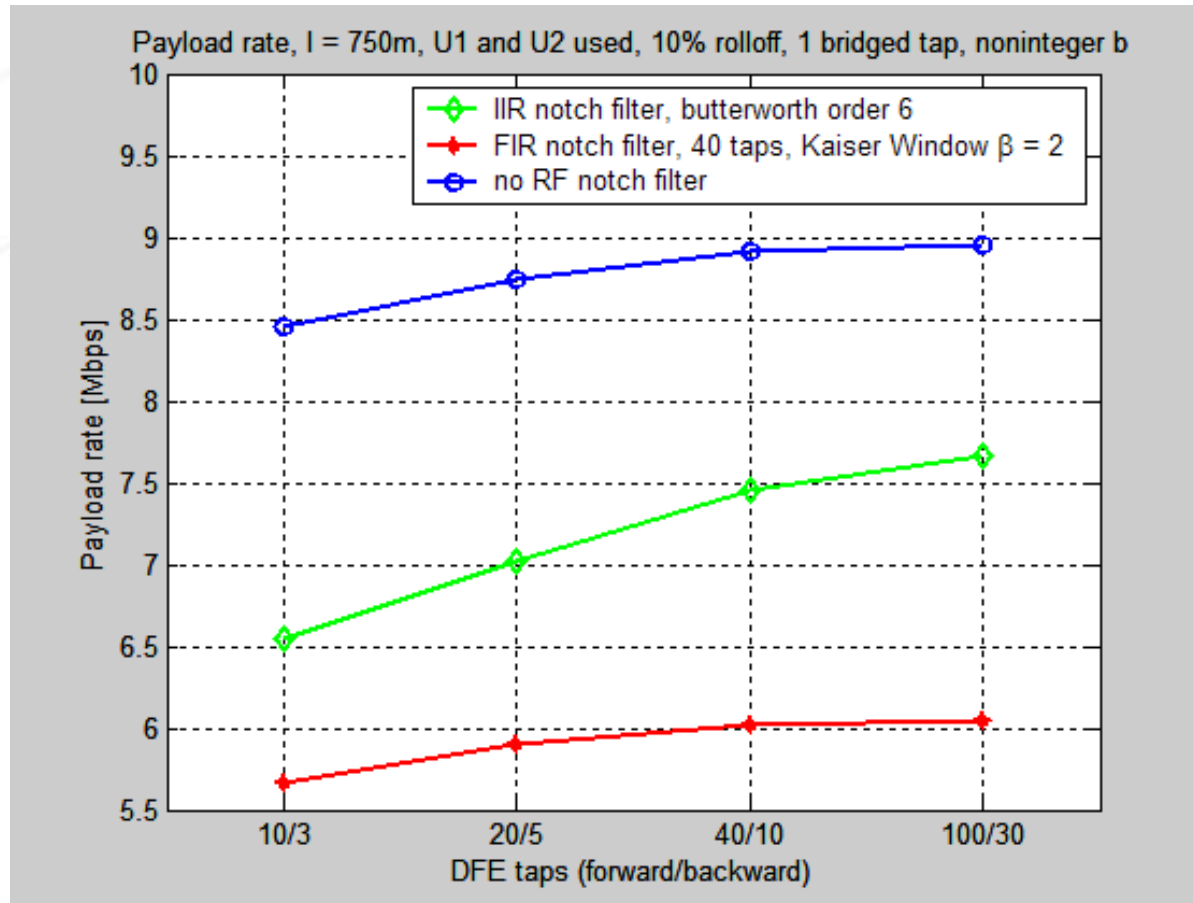
2.1-b SCM simulation

» Example payload rates – no bridged taps



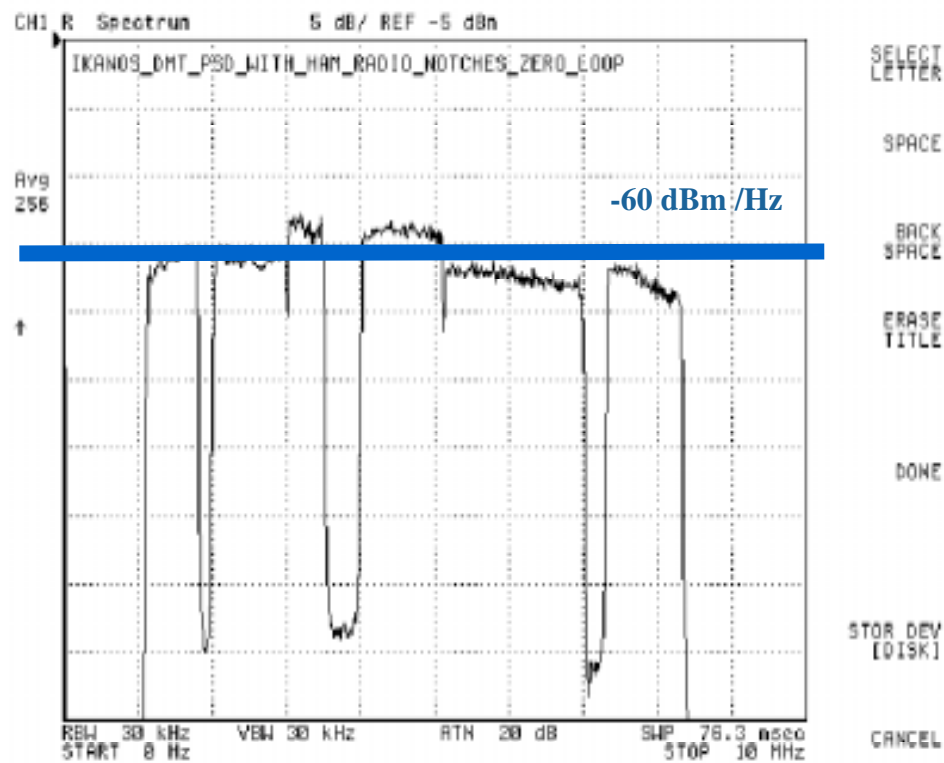
2.1-a SCM performance

» Achievable payload rates – 1 bridged tap



2.1-b MCM results

» Reducing tone energy in certain bands to get notches

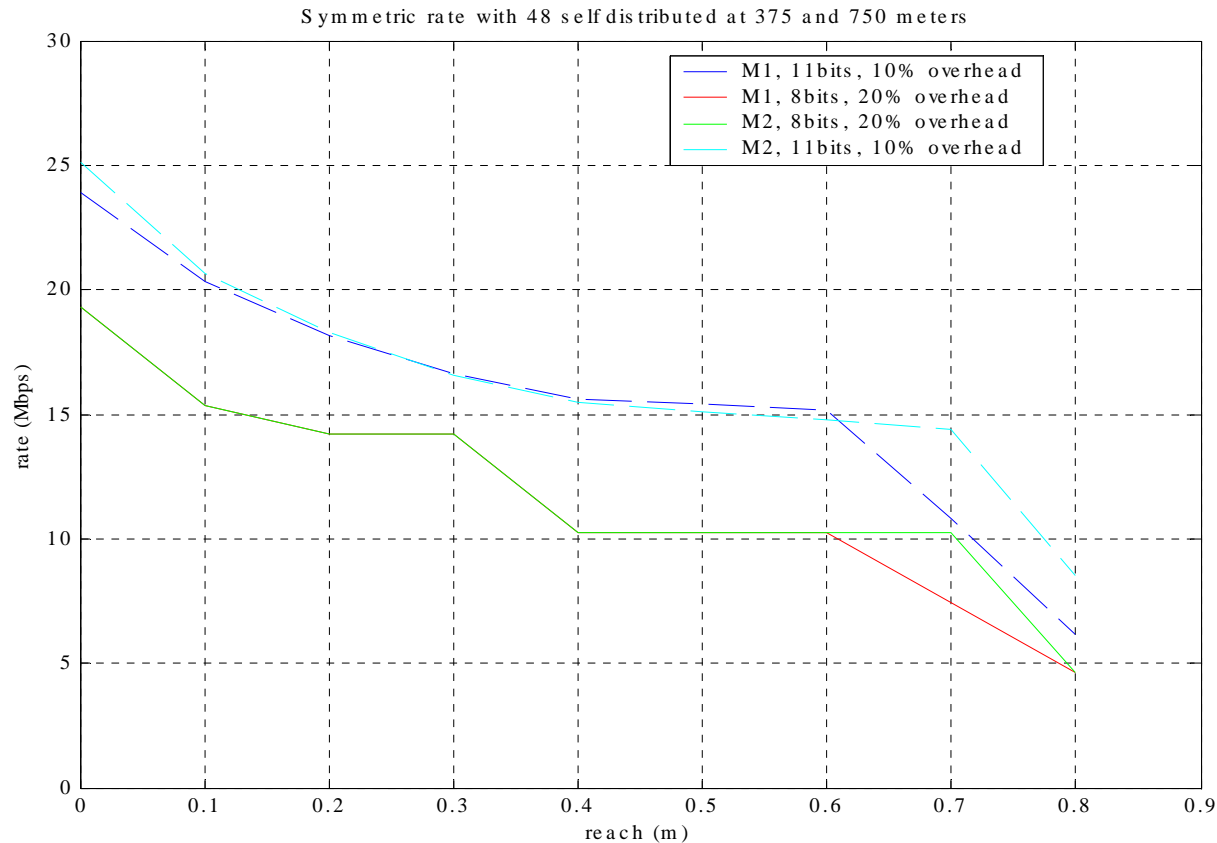


» Example upstream payload rate simulation

| | | No BT | 1 BT | |
|----------|--|-------|-------|--|
| Notch | | 14.87 | 9.85 | |
| | | | | |
| No notch | | 15.22 | 10.08 | |
| | | | | |

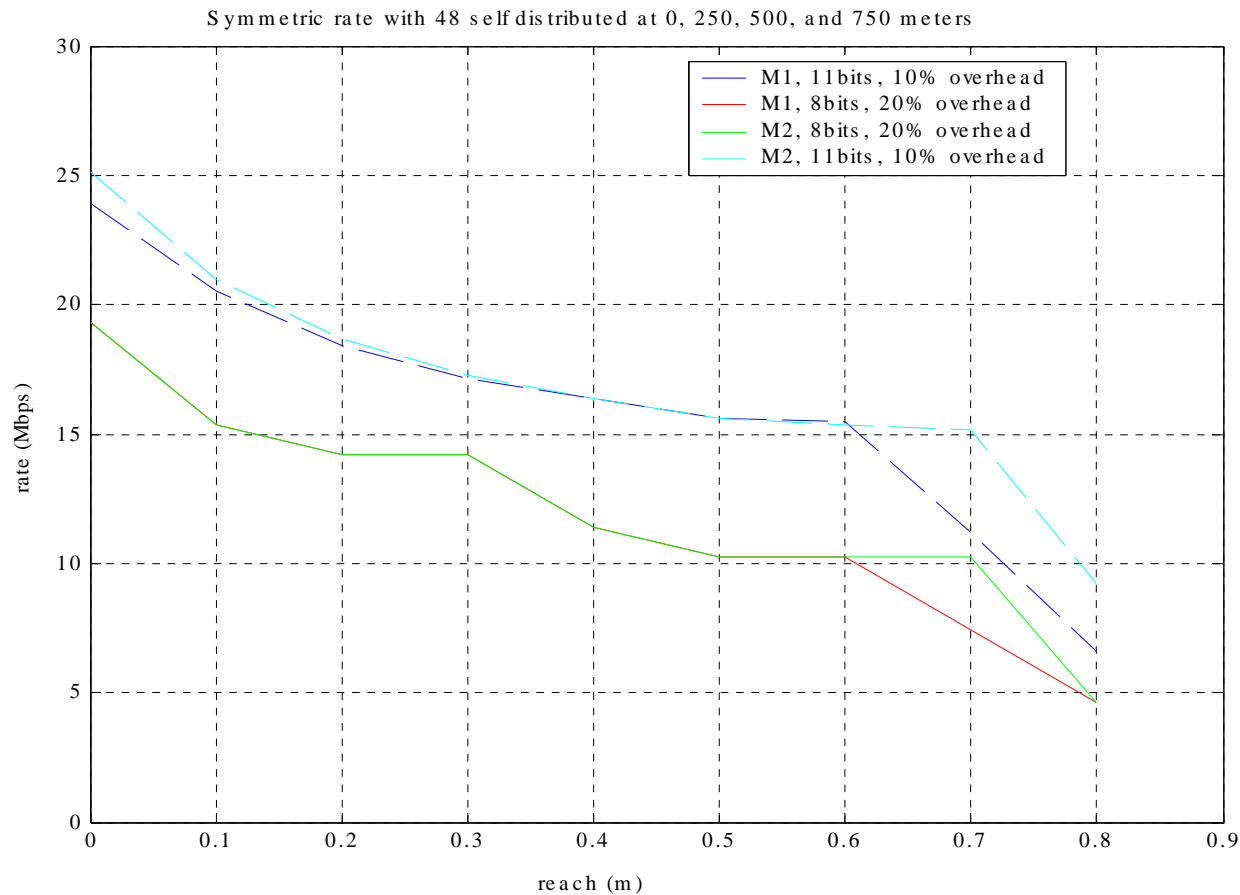
2.2 Simple UPBO and the need for Trellis coding

**998-4-band Symmetric Rate with 48 self-FEXT; 24 at each of 375 and 750 meters
(Standard M1 and M2 masks, FTTcab deployment, noise A environment UPBO)**



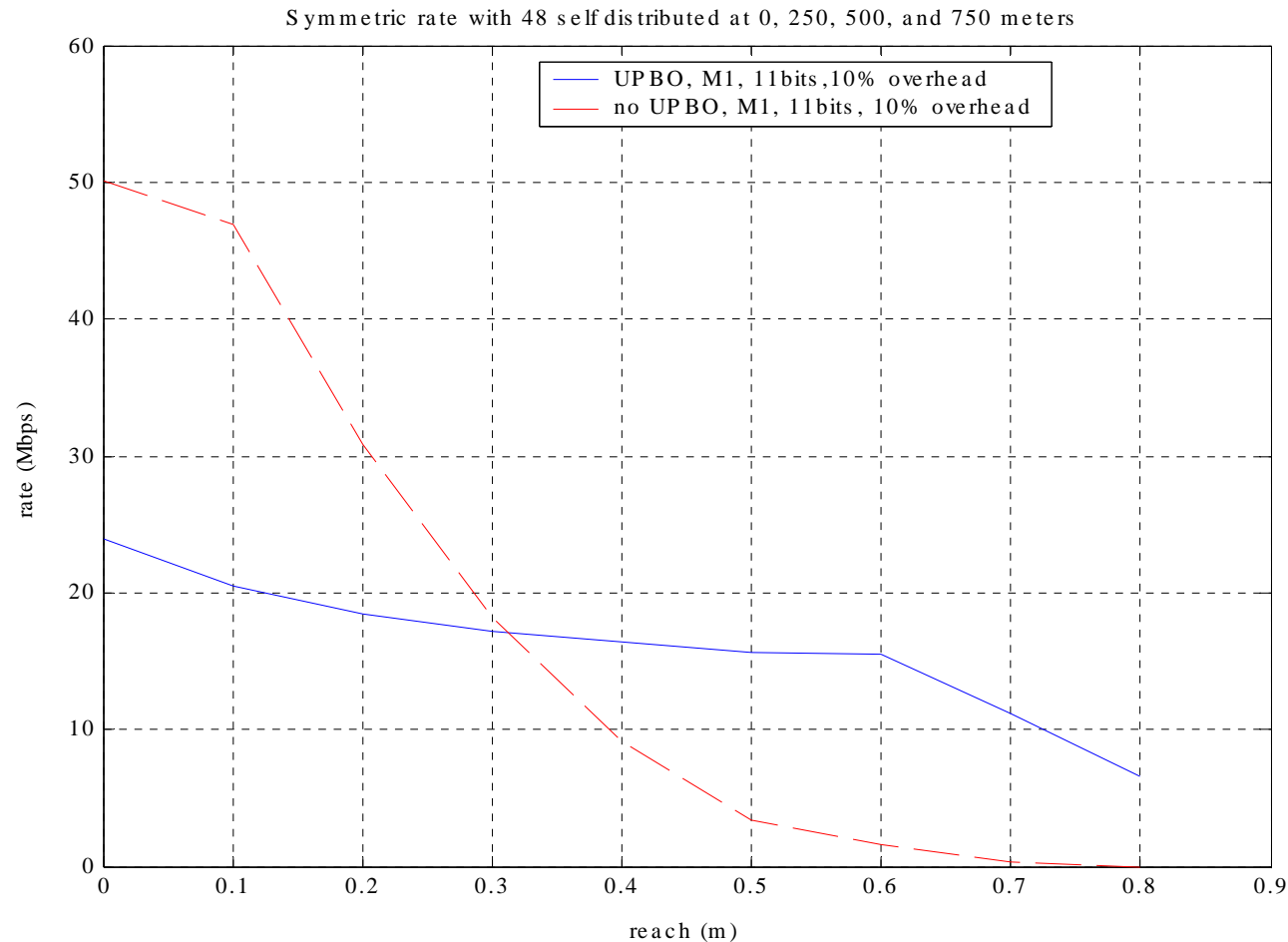
2.2 Simple UPBO

998-4-band Symmetric Rate with 48 self-FEXT; 12 at each of 0, 250, 500, and 750 meters (Standard M1 and M2 masks, FTTcab deployment, noise A environment UPBO)



2.2 Simple UPBO

998-4-band Symmetric Rate with 48 self-FEXT; 12 at each of 0, 250, 500, and 750 meters (Standard M1 mask, FTTcab deployment, UPBO vs. no UPBO)



- » Given that 10 Mbps Full Duplex over 750 meter is not realistic for all conditions then change the objective to 500 meters.
- » Also Change
 - The band plan as suggested to 3 band with 14.5 dBm transmit power, 5.2 dB coding gain which can be done in 4.4 Mhz, spectrally friendly with xDSLs and less effected by short bridge-taps in the CPE side

Example PSDs

