

Modified Flexible Bandplan 998 for Variable Rate Symmetric VDSL Applications

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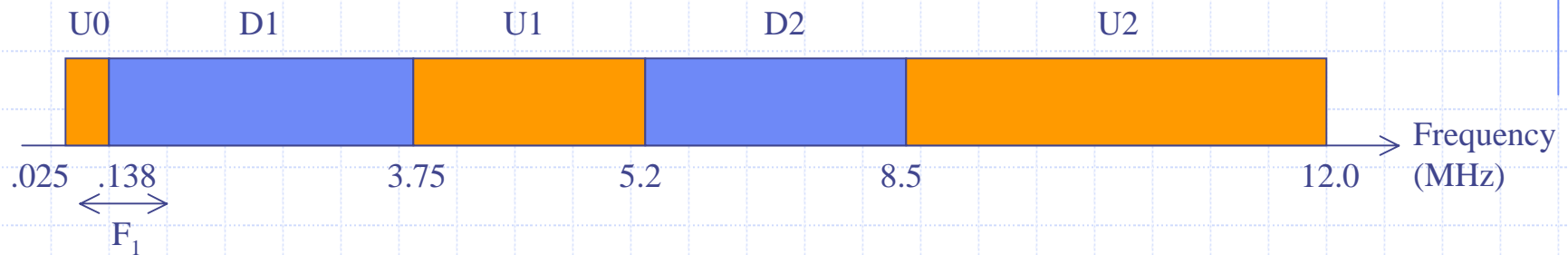
GlobespanVirata, Inc.

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Introduction

- ◆ Target Improved Performance of Symmetric Transport using VDSL
- ◆ Modified Version of Band Plan 998 with variable low frequency region
- ◆ Also may use to extend reach for asymmetric applications
- ◆ Improve Mid-reach Performance:
 - 5Mb/s up to ~2 km
 - 10 Mb/s up to ~1 km

Plan 998 w/ Variable LF Region



- ◆ Vary transition frequency F_1 between U0 and D1 to boost upstream channel bit rate
- ◆ F_1 vary between 25 kHz and 490 kHz
- ◆ Derived via variable bandwidth capability of SHDSL (G.991.2)
- ◆ Define supporting PSD
 - Improve upstream channel performance at reduced downstream channel rate
 - Spectrally Compatible per T1.417

PSD Masks for Modified Plan 998

◆ U0 band:

- -50 dBm/Hz from 25 – 490 kHz
- Based on 2.32 Mb/s SHDSL Bandwidth

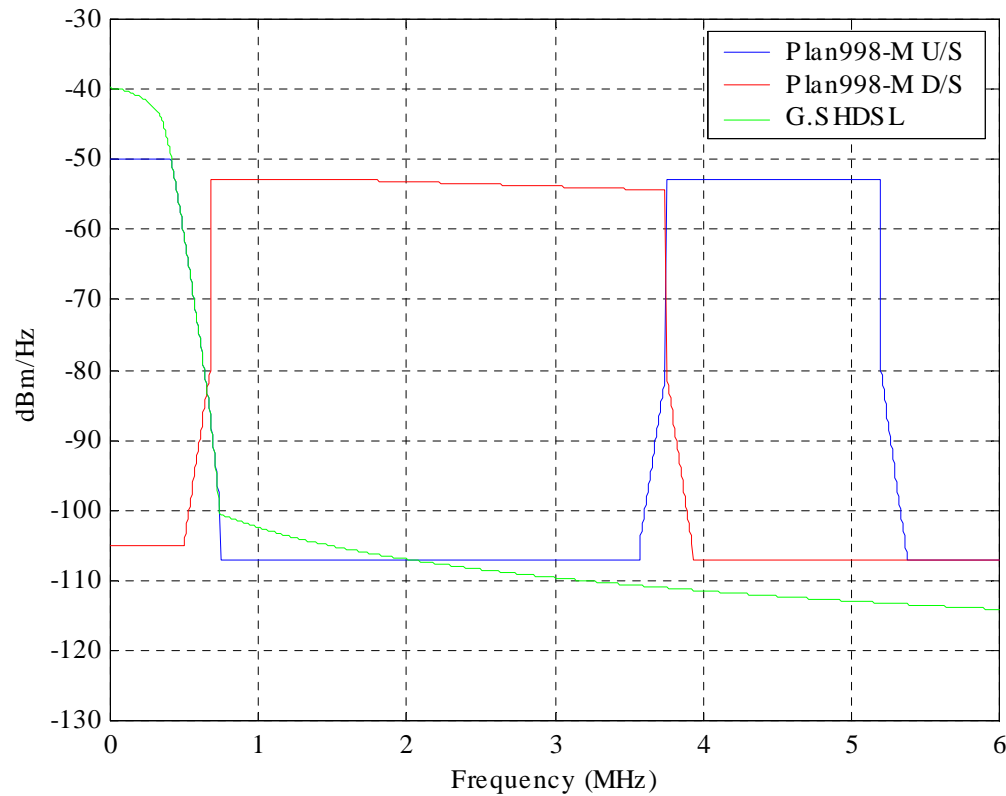
◆ PSD Masks shown in subsequent charts

- Based on Mask M2 defined in T1.424
- Similar may be defined based on M1 in T1.424

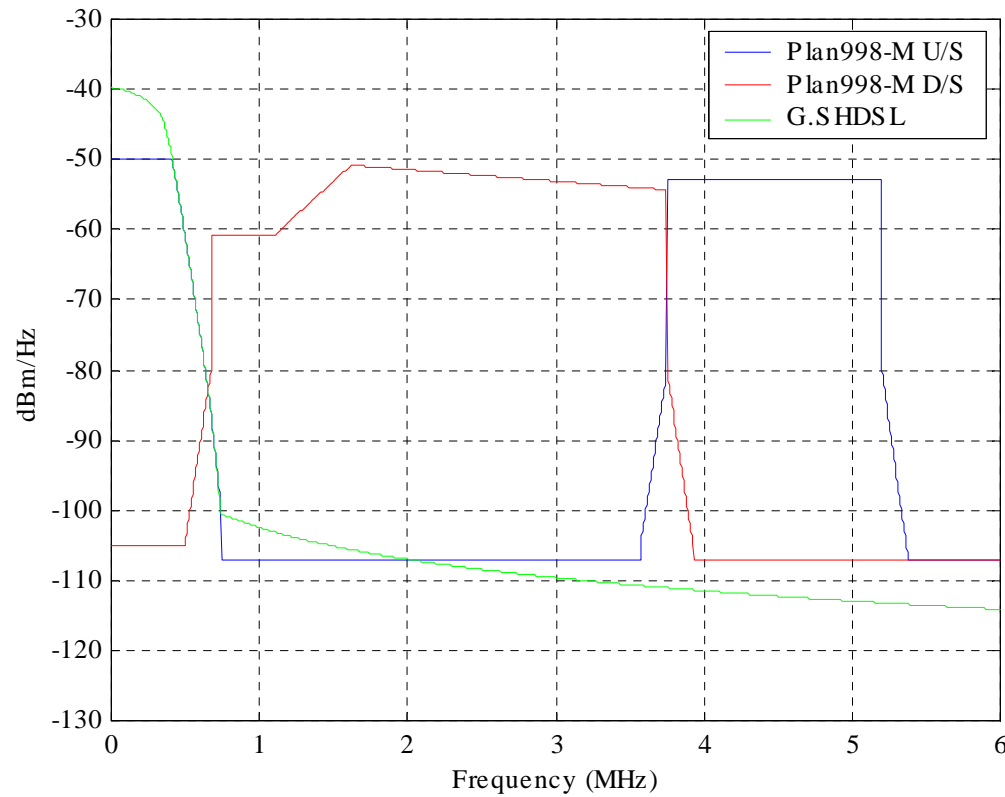
◆ PSD Nomenclature

- Plan998-M: Bands U0, D1, and U1
- Plan998-M+: Bands U0, D1, U1, D2, and U2

Plan998-M PSD Mask for Exchange



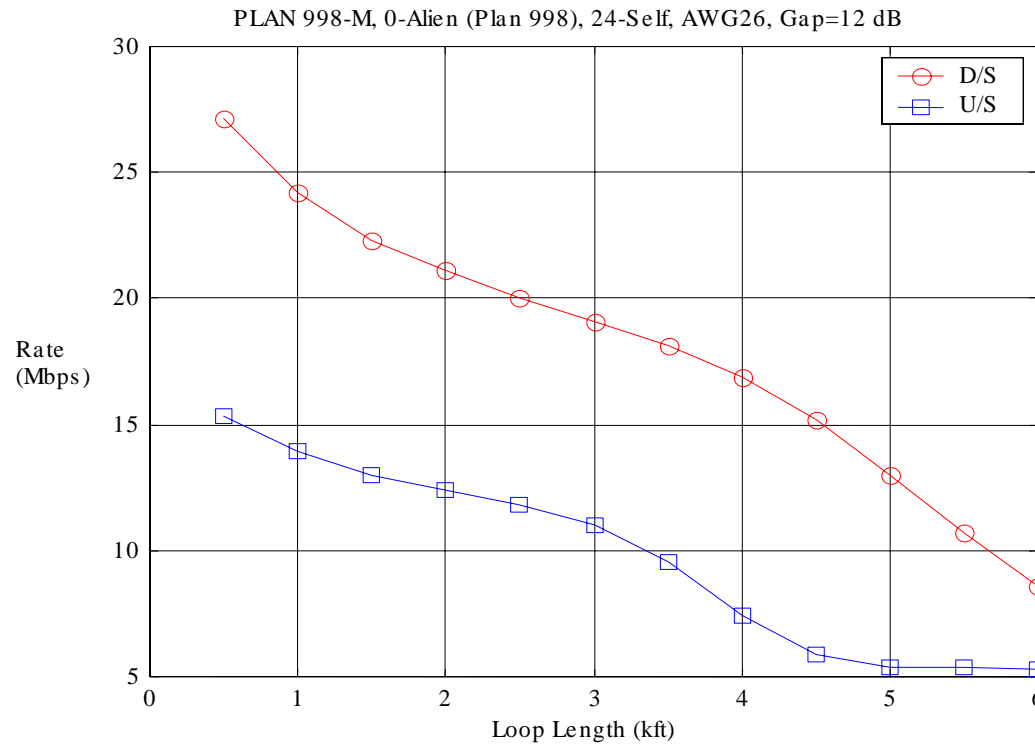
Plan998-M PSD Mask for Cabinet



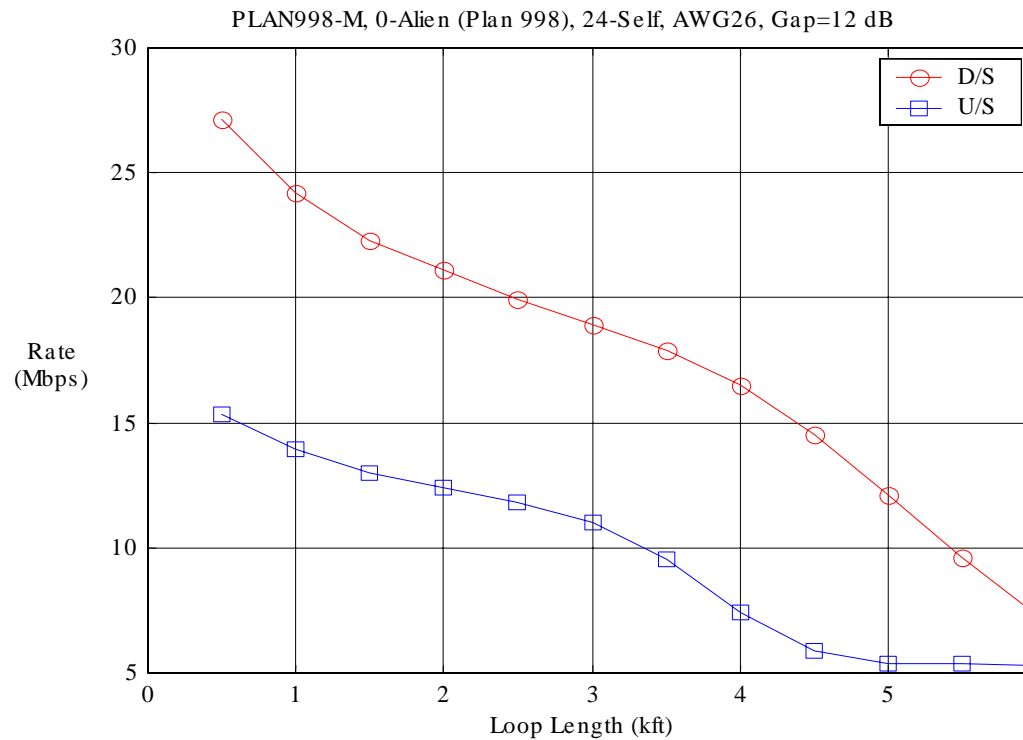
Performance

- ◆ Exchange and Cabinet Scenarios
 - 24-Self Cross-talk Disturbers
 - 12-Alien plus 12-Self Disturbers
- ◆ -140 dBm/Hz AWGN
- ◆ Alien Disturbers based on VDSL FTTex M2 Mask in T1.424 for exchange deployment
- ◆ Alien Disturber based on VDSL FTTCab M2 Mask in T1.424 for cabinet deployment
- ◆ SNR Gap = 12 dB

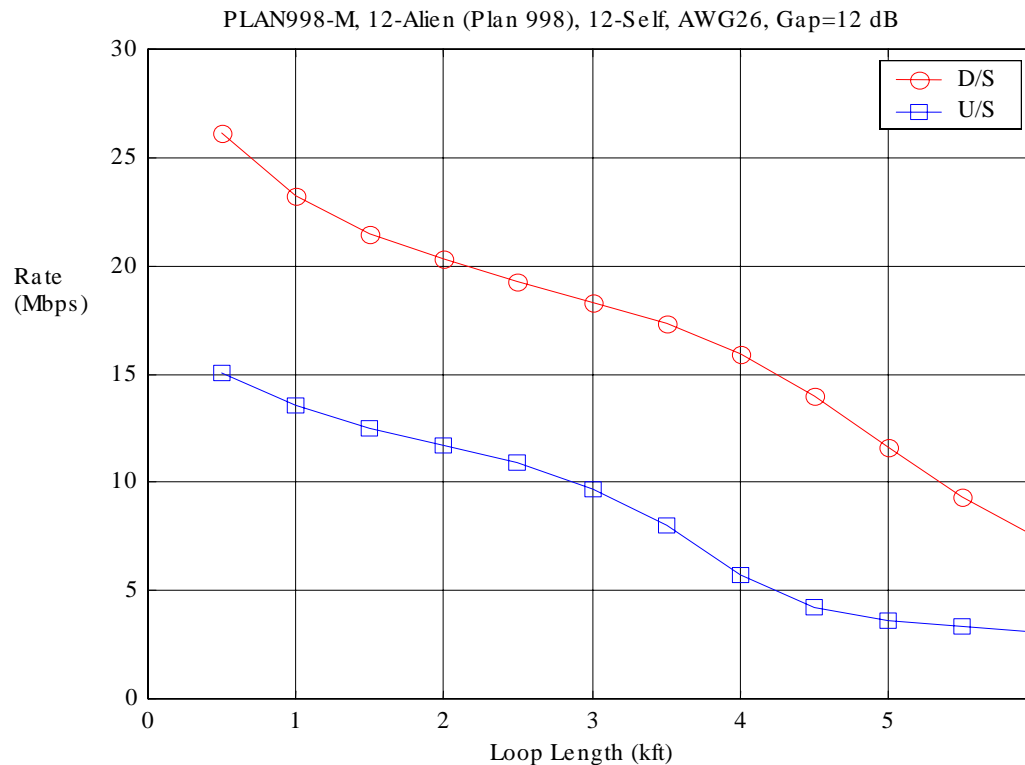
Exchange Deployment Performance: 24-Self Crosstalk



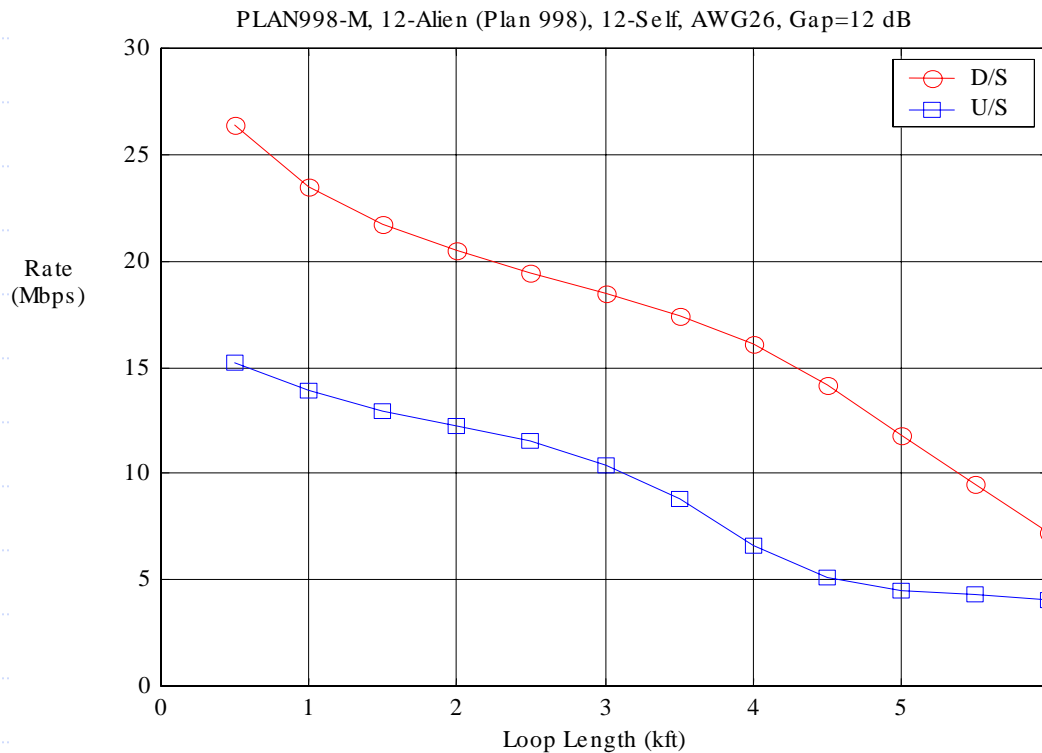
Cabinet Deployment Performance: 24-Self Crosstalk



Exchange Deployment Performance: 24-Self plus 12-Alien Crosstalk



Cabinet Deployment Performance: 24-Self plus 12-Alien Crosstalk



Some Observations on Performance

◆ Asymmetric Profile: 2.5Mb/s upstream

- Plan998 provides reach to ~ 1.1 km
- Plan998-M(+) provides reach to ~ 2 km

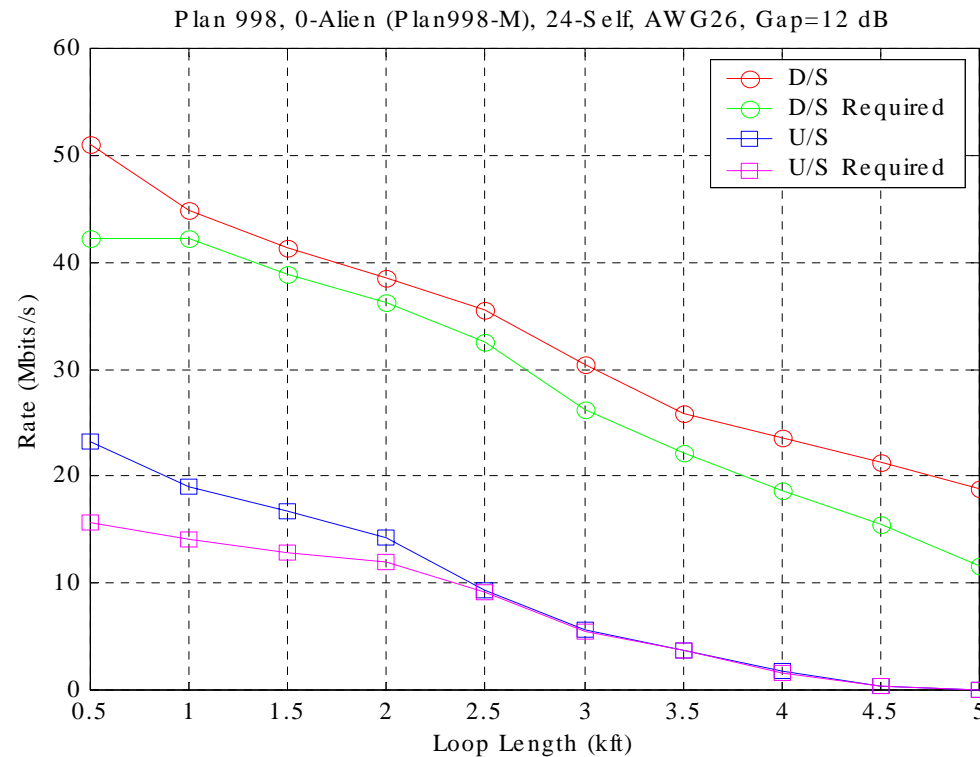
◆ UPBO

- U0 may be enabled based on UPBO status
- When UPBO is needed, band U0 may be turned off
- May apply extended upstream band ($F_1 > 25$ kHz) on loops longer than ~ 1 km

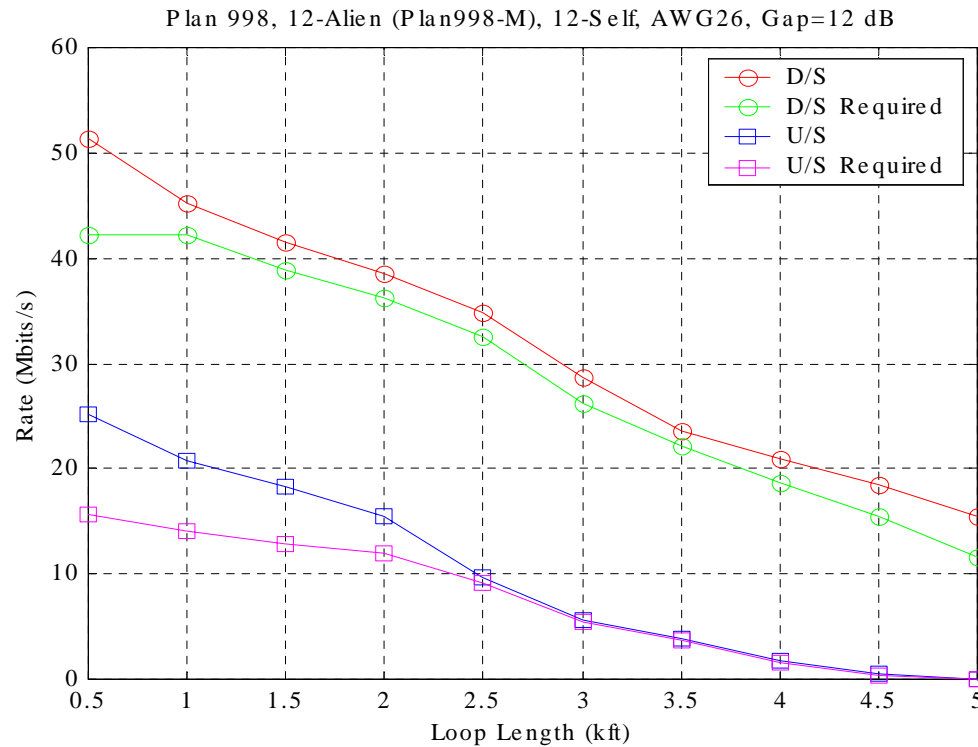
Spectral Compatibility per T1.417

- ◆ Spectral Compatibility (SC) computed using the Telcordia SC Computer
- ◆ SC tested with ADSL, ISDN, HDSL, HDSL2, 2B1Q SDSL, and SHDSL (G.991.2)
- ◆ Show SC with VDSL per criteria in the Draft T1.417 issue 2

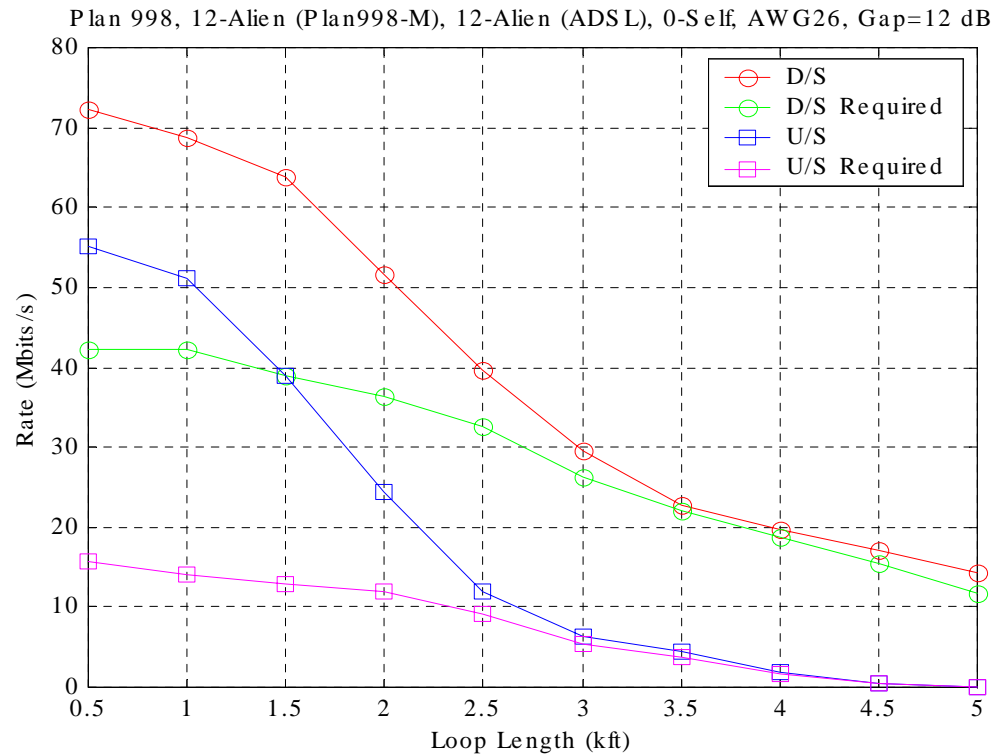
SC of Cabinet PSD: VDSL Plan 998 with 24-Plan998M Cabinet PSD disturbers



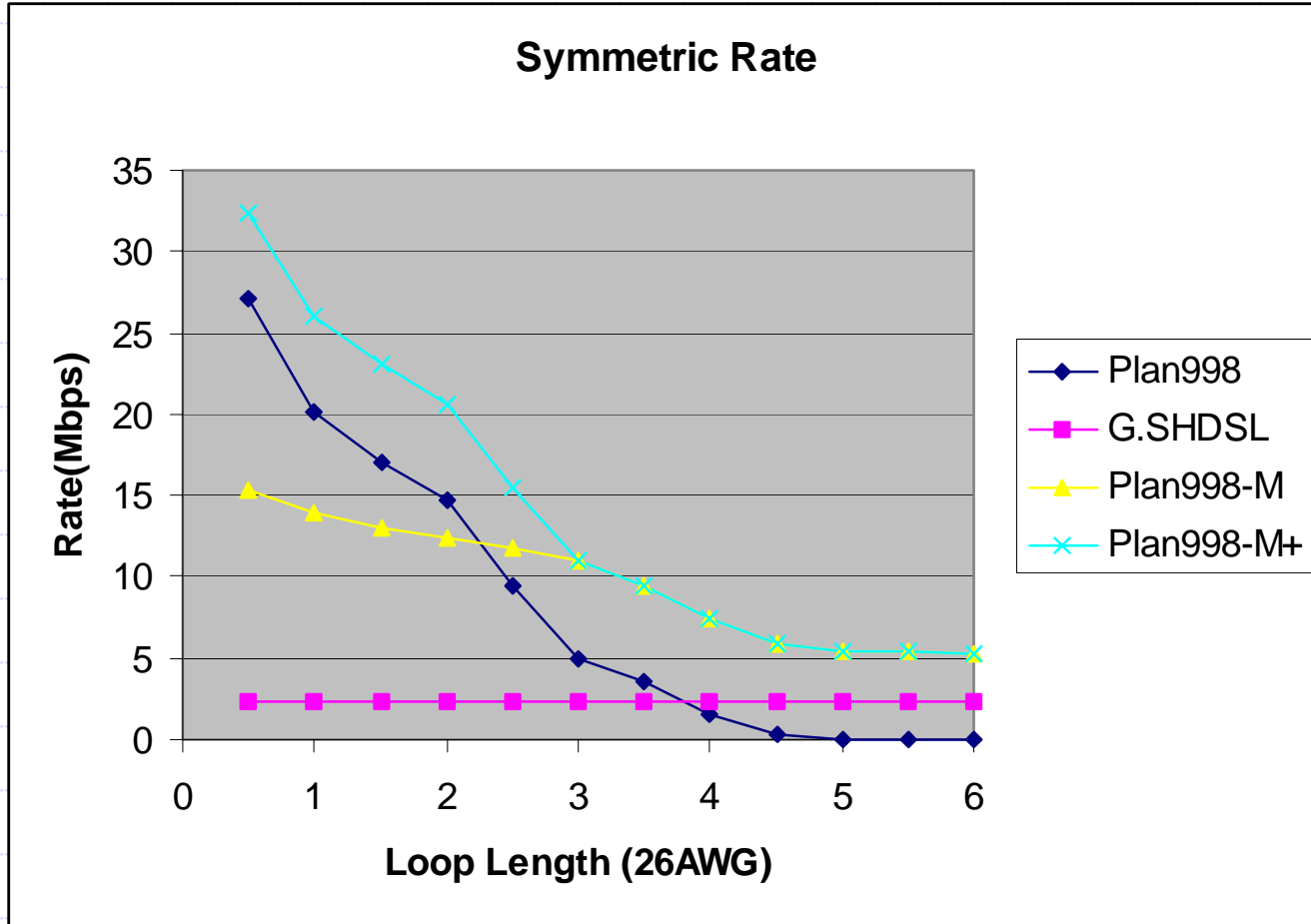
SC of Cabinet PSD: VDSL Plan 998 with 12-Self plus 12-Plan998M Cab disturbers



SC of Exchange PSD: VDSL Plan 998 with 12-Self plus 12-Plan998M Ex disturbers



Performance Summary



Summary

- ◆ Recommend Variable F_1 : 25 – 490 kHz
- ◆ Enhance performance of Upstream Channel → More Symmetric Profile
- ◆ Enhance service performance on loops beyond ~1 km
- ◆ Apply $F_1 > 25$ kHz on loops where UPBO cannot be used.

Conclusion

- ◆ We recommend inclusion of the modified bandplan 998 and the supporting PSDs in the P802.3ah Copper specification, D1.4