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10G Launch Power around 1580 nm for Co-ex with RF Video

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Supporters

- Tetsuya Yokomoto, Fujitsu Access

Passed Motion of 10G & RF Video

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- Motion #1 (passed) by 10 Gb/s PHY for EPON Study Group, during IEEE 802 Plenary Meeting, San Diego, CA, 17-20 July, 2006

Motion #1

- Following PAR approval, 802.3av Task Force should investigate the development of physical layer specification(s) which accommodate the simultaneous operation of existing 1G-EPON and/or a 1550-1560nm video overlay, with 10G-EPON.

M: Akihiro Otaka
S: Toshiaki Mukojima

Required 75%

Y: 45 N:4 A:12
Motion passed

Purpose

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- This presentation studies 10G launch power around 1580 nm wavelength in regard to co-existence with RF video.
- ITU-T J.185 and J.186 (*1), which are generally adopted, are considered.
- Because 10G launch power may be restricted by non-linear effects with RF video wavelength, the next page shows the typical examples of the effects by the 10G.

(*1): ITU-T Recommendation J.185 and J.186

  - J.185: FM conversion
  - J.186: sub-carrier multiplexing (SCM)

Non-Linear Effect to J.185 & J.186

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ITU-T Rec.	Signal	Required CNR	RF video launch power @wavelength	10G launch power @wavelength	Non-Linear Effects		
			Distance: 20 km		SRS	SBS	XPM
J.185 (FM)	AM-VSB	44 dB	16 dBm @1558 nm	13 dBm @1571,1591,1611 nm	CNR degradation < 0.2 dB (CNR>44dB) (*1)	Solved by FM Dithering (*3)	No effect (*4)
	256-QAM	33 dB					
J.186 (SCM)	AM-VSB	44 dB	17 dBm @1550 nm	5.04 dBm Max @1570 nm 6.76 dBm Max @1600 nm 5.98 dBm Max @1640 nm	CNR degradation < 2 dB (CNR>50dB) (*2)		Negligible effect (*4)
	256-QAM	33 dB					

(*1): Results from Hitachi's experiment
(*2): 3av_0707_mao_1.pdf
(*3): 3av_0703_lingle_1.pdf
(*4): "Cross Phase Modulation (XPM).pdf" attached in the 10GEPON reflector email on Thu, 14 Jun 2007 12:35:06 –0400

Conclusion

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- J.185: Available Co-ex with 13 dBm 10G; very little non-linear effects are seen.
- J.186: Available Co-ex with 5-6 dBm (max.) 10G when maximum CNR penalty is set as 2 dB.
- 1570-1640 nm 10G maximum launch power should be restricted to around 5 dBm to avoid the SRS effect sufficiently, considering J.186 RF video.

Thank you !