
Discussion about RF and low cost solutions

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Agenda

1. About already present items
2. About new item

Supporters

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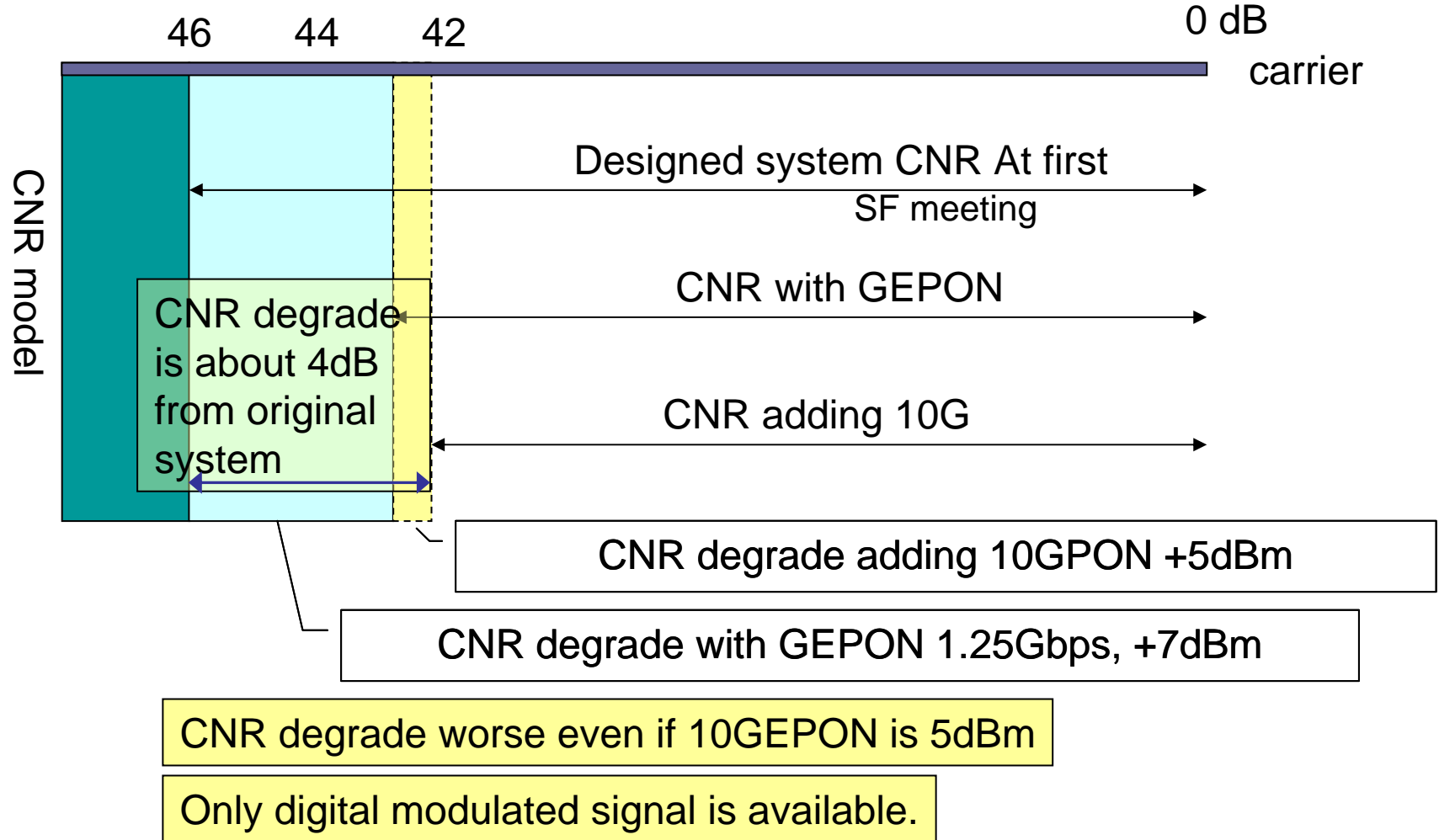
Discussion about RF and Power

- There is a presentation about this topic
 - 3av_0707_mao_1.pdf
 - Crosstalk between 1570nm(10GEPON) and 1550nm(RF) case, 10GEPON power is limited 5.04dBm.
 - Assuming CNR degradation 50dB to 48dB.
- However, 2 signal model (10GEPON and RF) is not enough
 - This is very special condition, migration from 1G or IPTV in 10GEPON is natural
 - 3 signal model should be considered
GE-PON and RF existing, then adding 10GEPON

GE-PON effect

- CNR degradation example for high load factor

Same RF assumption with 3av_0707_mao_1.pdf



Summary

- Analog RF issue should be discussed under the condition of GEAPON, analog RF and 10GEAPON.
- Using the same assumption with previous presentation, CNR is degraded to 42dB when 10GEAPON is 5dBm.
This does not satisfy the standard when referring to J.186 for AM-VSB analog modulated RF signal.
- Digital modulated RF meets the standard when 10GEAPON is +13dBm.

3av_0707_mao_1.pdf

Laser safety

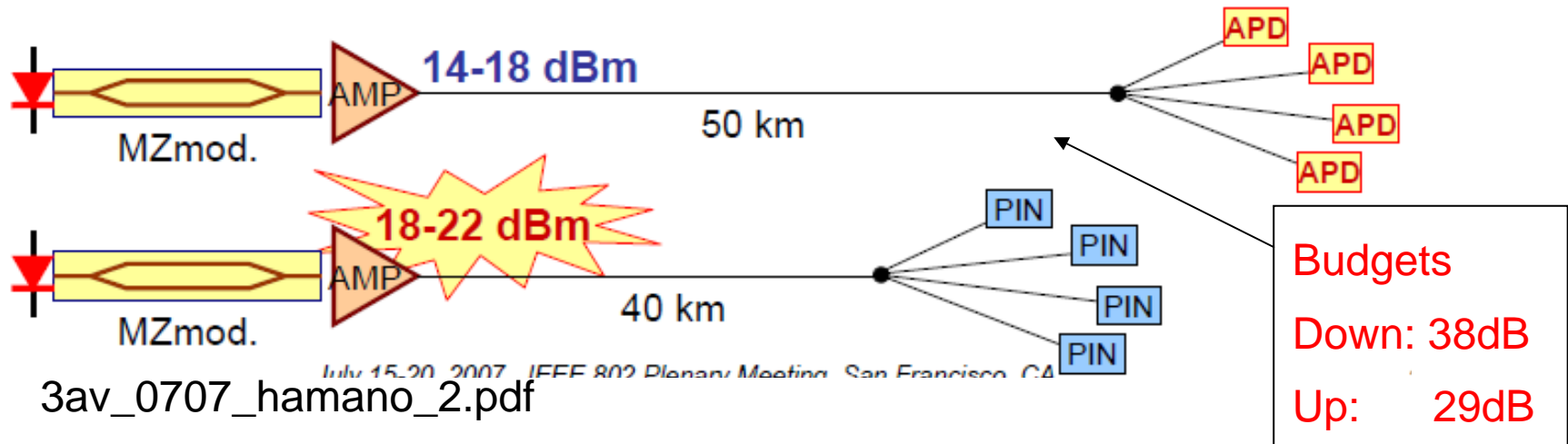
- The highest laser safety hazard level in CO is class 1M for both PIN@ONU and APD@ONU

IEC 60825-1,60825-2

	Launched power max.	Laser safety power/ class	
		OLT output port	8-core ribbon tape fiber
PIN@ONU normal	+13dBm	Low Class1	Low Class1
PIN@ONU single failure	+13dBm	Low Class1	+13dBm Class1M
APD@ONU normal	+5dBm	+5dBm Class1	+14dBm Class1M
APD@ONU single failure	+5dBm	+11dBm Class1M	+15.4dBm Class1M

Low: OLT operates with eye safety function and shutter at output port.

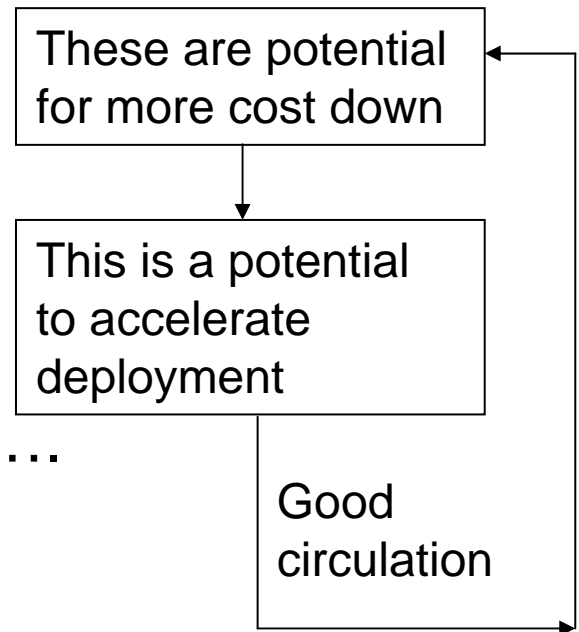
Upgrade discussion



- In this picture, only downstream is discussed.
- PON is also limited by upstream power budget.
 - This is the same condition for both PIN@ONU and APD@ONU.
 - Reach extension issue will be another workgroup grade.
 - Our focus is 10GEPON up to 29dB CHIL.

Low cost ONU solution

- Low cost technology at ONU
 - The same optics technology with successful standard B-PON and GE-PON with great field experience
- Using matured technology for
 - High reliability
 - Multi vendor supply
- welcome new technology....
 - Competition during technologies....
 - EDFA vs SOA
 - Traditional PIN vs new PIN
 - New OLT transmitter source



Low cost ONU solution Pros

- Cost PIN-PD is low cost solution. Big amount benefit at fully subscribed systems comparing to APD.
- Productivity PIN-PD system is suitable for mass-production. Great field experience at successful B-PON and GE-PON.
- Strategy PIN-PD solution invites vendor and technology competition. This generates a potential to accelerate deployment.

These items are not Pros but not Cons.

- Analog RF Both PIN¹ and APD² are severe to analog modulated RF signal. Not for Digital modulated RF both PIN¹ and APD².
- Upgrade Upstream launch power and sensitivity limit power budgets.
- Laser safety The highest laser safety class in the CO is class1M both PIN¹and APD².

PIN¹: PIN@ONU, APD²: APD@ONU