LD cost comparison for typical wavelength plans

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IEEE P802.3ca 100G-EPON Task Force

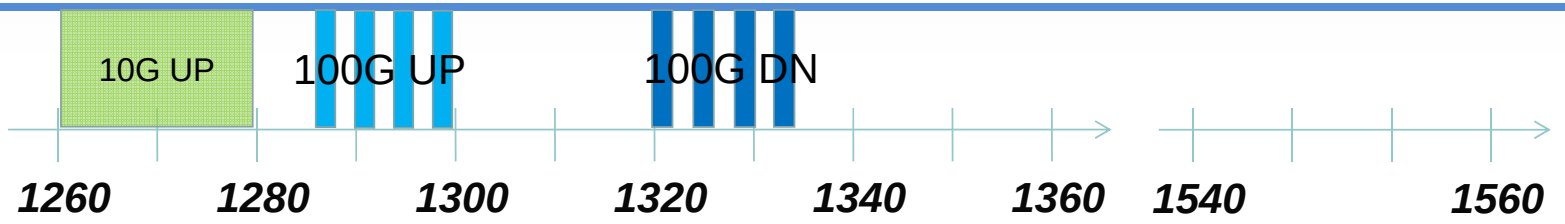
Plenary Meeting

2016, July

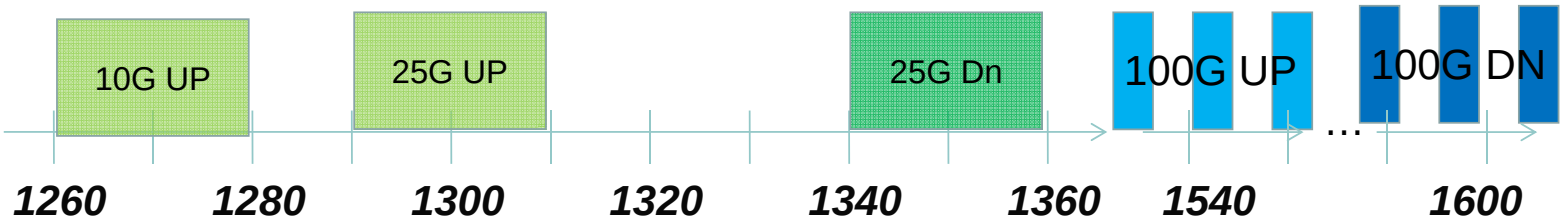
CONTENTS

Typical wavelength plans

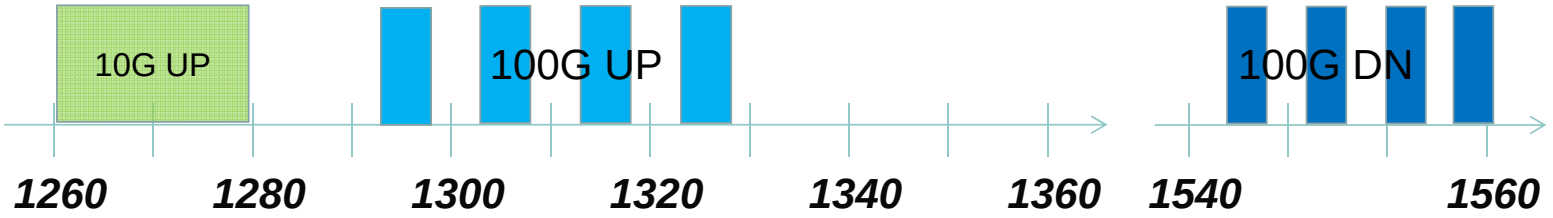
option1



option2



option3



Wavelength plans and assumptions

Typical wavelength plans

- Option 1, All US & DS wavelengths in O-Band, using cooled DML , similar to Lane WDM,shrink grid spacing to 5nm and passband ~2nm allows ±1nm laser and filter wavelength accuracy.
- Option 2, Only 25G US & DS wavelength in O-Band （ uncooled or cooled DML ）, EML for others.
- Option 3, Only US wavelength(s) in O-Band,using cooled DML , shrink grid spacing to 10nm and passband ~6nm allows > ± 2 nm laser and filter wavelength accuracy.[1]

Our estimation is based on several assumptions below

- For 10G PON, collimated light coupling may raise the cost about 1.3 times . [2]
- ONUs outnumber OLTs 10 to 1 in terms of unit shipment.
- We analogy 25Gb/s 、50Gb/s and 100Gb/s PON LD cost from the existing 10Gb/s LD supply chain. The table shows relative cost to different LD types based on our experience.

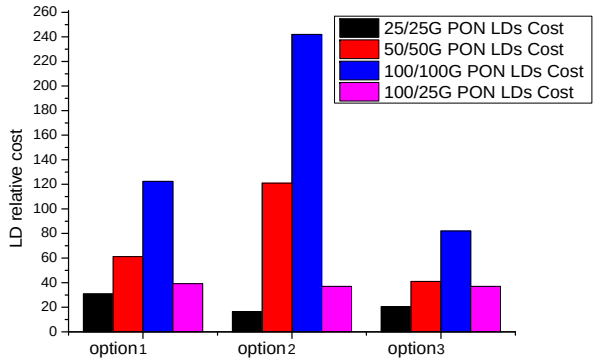
Type(10G)	DML	Cooled DML，5nm	Cooled DML，2nm	EML
Cost	1X	1.5X	2.5X	5.5X

LD cost for typical wavelength plans

- Based on the assumptions，the LD cost for 3 options are estimated in table and graph.

Type	25G/25G			50G/50G			100G/100G			100G/25G		
LD cost	OLT	ONU	Total	OLT	ONU	Total	OLT	ONU	Total	OLT	ONU	Total
option1	2.8	2.8	30.8	5.6	5.6	61.2	11.2	11.2	122.4	11.2	2.8	39.2
option2	1.5	1.5	16.5	11	11	121	22	22	242	22	1.5	37
option3	5.5	1.5	20.5	11	3	41	22	6	82	22	1.5	37

- Assuming the cost of APD die, ASIC,optical interface chip may be almost at the same level, perhaps cost to either option1 or option3 is lower for symmetrical and asymmetrical NGEPON system.
- Since whether 1270nm and 1350nm CWDM bands are suitable to DML application without EDC still need to be studied, band between 1280~1330nm should be taken into account primarily.[3]



Summary

- Since the cost of EML(25G) may be more expensive than cooled DML, and the number for ONUs is much higher, we prefer at least all US wavelength(s) should in O-Band.
- Since the preferred O-band is only about 50nm, maybe 1+3 architecture is a good choice to save lanes.
- Cooled DML(25G) with passband ~6nm, or with passband ~2nm, which is better? Personally, I prefer the former.

Bibliography

[1] John Johnson et al.,“100G-EPON wavelength plan proposal” , http://www.ieee802.org/3/bs/public /archive_3ca_0516/johnson_3ca_1b_0516

[2] Dekun Liu et al.,“Collimated beam structure cost evaluation” , http://www.ieee802.org/3/bs/public /archive_3ca_0516/liu_3ca_2_0516

[3] Tomoyuki Funada al.,"Brief consideration about loss budget and wavelength allocation" , http://www.ieee802.org/3/bs/public /archive_3ca_0516/ funada_3ca_1_0316

Thank you