

Common 100G-EPON Wavelength Plan

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Yong Guo

Xin Gang Huang

Li Quan Yuan

Jun Shan Wey



Introduction

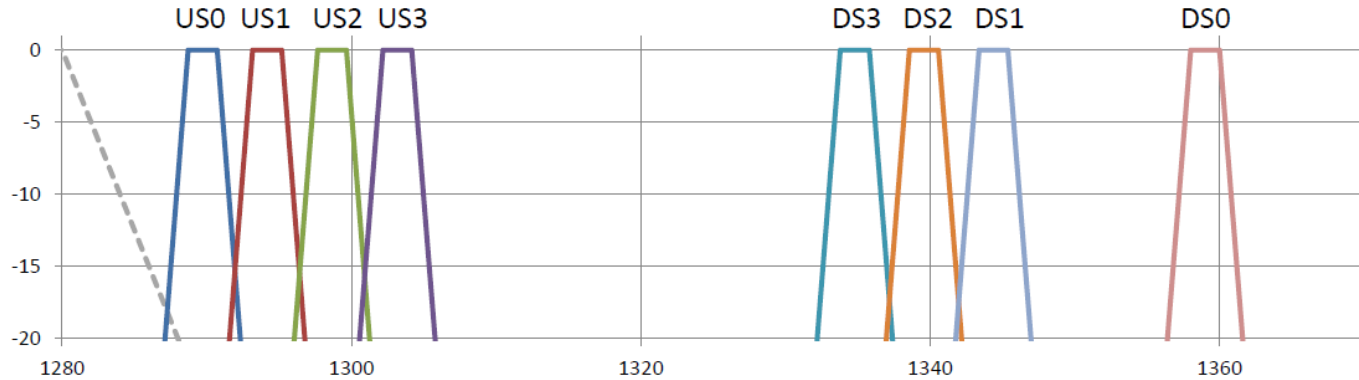
In Huntington Beach meeting, several agreements were reached

- The P802.3ca standard shall specify a wavelength plan in which all upstream and downstream wavelengths are located in O-band. (Motion #7 passed)
- Reversed order of downstream channel can help increase the US/DS gap of 25G system

However, there are still number of issues need to be fixed

- 3nm pass band can help reduce transmitter cost and achieve better yields, for US only or both US and DS?
- Coexistence between 25G-EPON and 10G-EPON US is WDM or TDM? (WDM is shown preferred in Straw poll #1)
- Coexistence with G-PON
- Is dual-rate 25/10G TIA or Triple rate 25/10/1G TIA feasible and applicable?

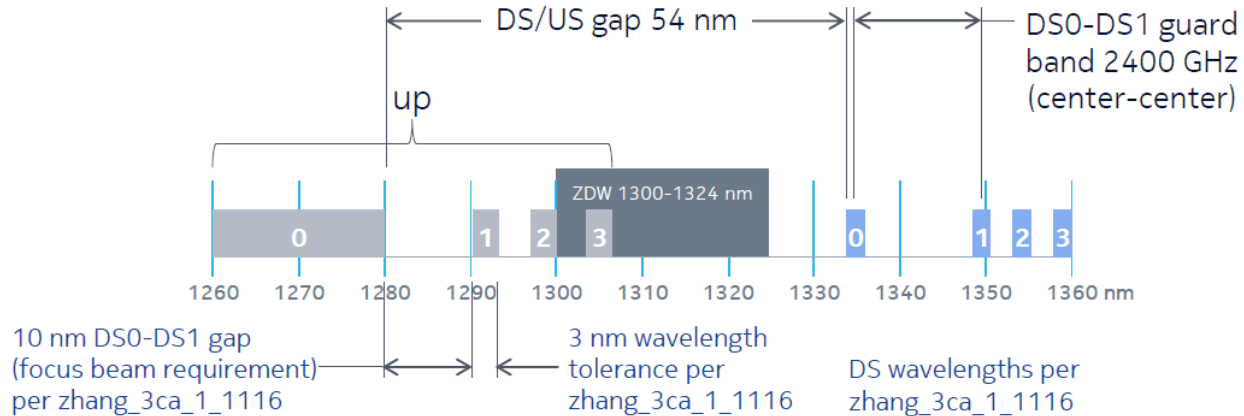
Revised Plan A (r2) from guo_3ca_1_0117



	Center freq	Center WL
US0	232.450	1289.707
US1	231.650	1294.161
US2	230.850	1298.646
US3	230.050	1303.162

	Center freq	Center WL
DS3	224.600	1334.784
DS2	223.800	1339.555
DS1	223.000	1344.361
DS0	220.600	1358.987

Modified Plan B from harstead_3ca_1_0117



CS relaxed to 1200 GHz (6.7 nm) to accommodate 3 nm wavelength tolerance

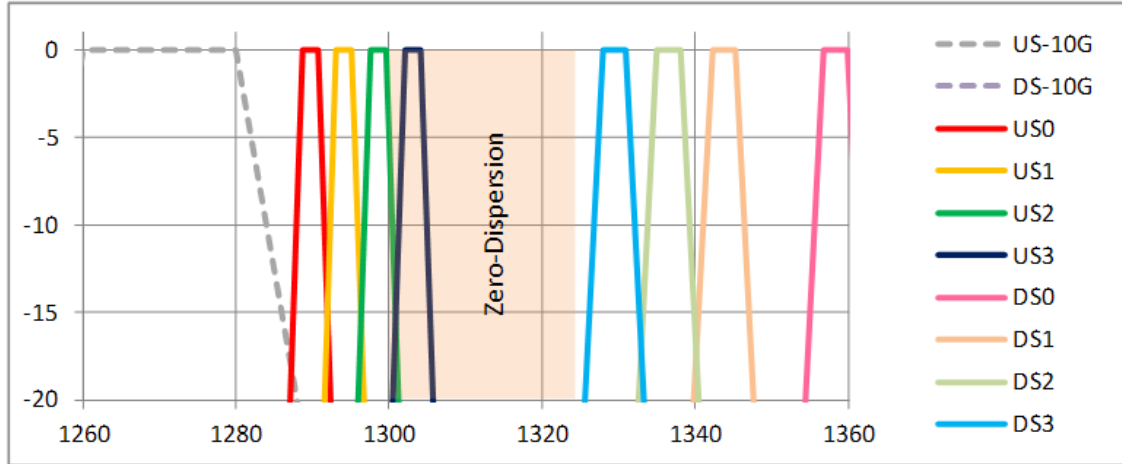
Wavelength (nm)	Frequency (THz)	
1260-1280		US 0
1291.652	232.1	US 3
1298.365	230.9	US 2
1305.148	229.7	US 1

FWM avoided, no 5 dBm limit

Wavelength (nm)	Frequency (THz)	channel
1334.784	224.6	DS 0
1349.201	222.2	DS 1
1354.076	221.4	DS 2
1358.987	220.6	DS 3

DS wavelength plan enhancements from weekly consensus call

Plan A*



	Center freq	Center WL	PB width
US0	232.45	1289.71	2
US1	231.65	1294.16	2
US2	230.85	1298.65	2
US3	230.05	1303.16	2
DS0	220.70	1358.37	3
DS1	223.10	1343.76	3
DS2	224.30	1336.57	3
DS3	225.50	1329.46	3

Common wavelength plan

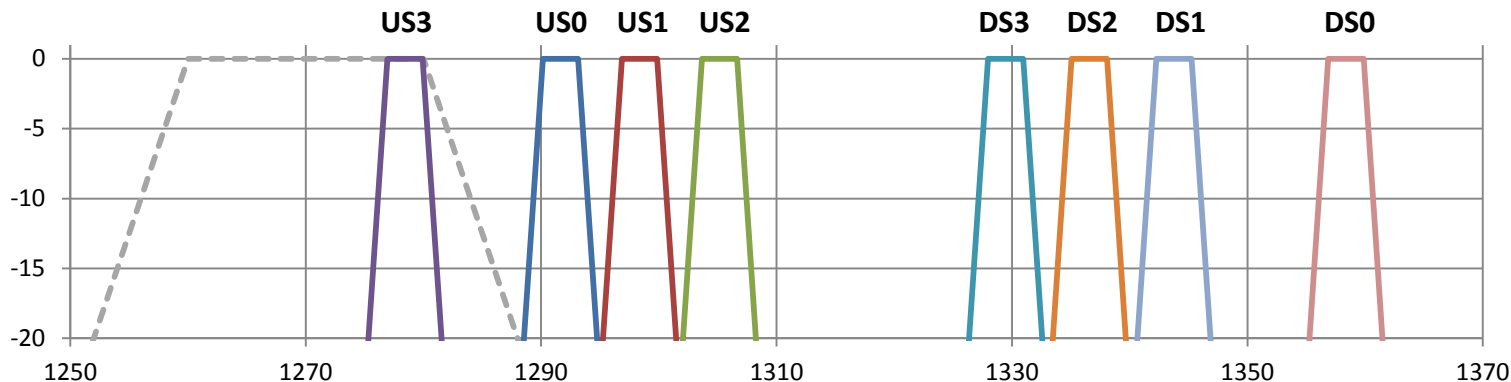
From previous discussions

- 3nm pass band and reversed order downstream channels have received wide support

Therefore, for upstream channels, we propose two options:

- Option #1 – 3rd revision of Plan A
 - Keep WDM coexistence between 25G-EPON with 10G-EPON
 - Use 3nm pass band for all 25G-EPON upstream channels
- Option #2 – revision of Plan B
 - Keep TDM coexistence between 25G-EPON with 10G-EPON
 - Use 3nm pass band for 25G-EPON and all others

Common 100G-EPON wavelength plan Option #1



	Center freq	Center WL
US0	232.100	1291.652
US1	230.900	1298.365
US2	229.700	1305.148
US3	234.500	1278.433
DS3	225.500	1329.457
DS2	224.300	1336.569
DS1	223.100	1343.758
DS0	220.700	1358.371

3nm pass band for all channels in both DS and US

- Achieves better yields, burst tolerances, good SOA performance and less spectrum usage.

65nm DS/US gap for 25G-EPON

- Reversed DS channel order where DS0 is in the longest side reduces diplexer penalty.

WDM coexistence between 25G-EPON US0 and 10G-EPON US

- No capacity loss for 25G, capacity loss only occurs in 100G.

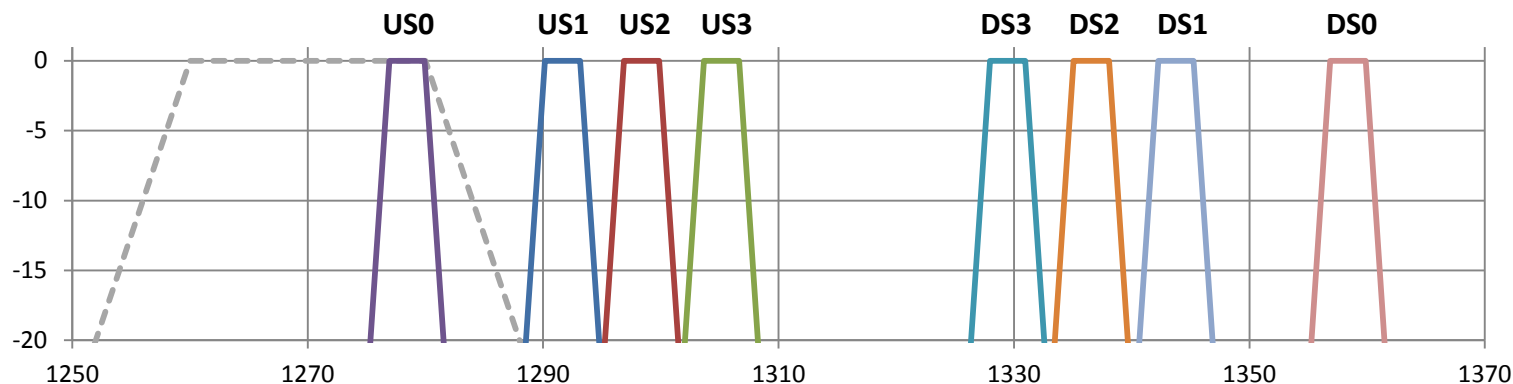
TDM coexistence between 100G-EPON US3 and 10G-EPON US

- Removes FWM impact

1200GHz channel spacing and 2400GHz for DS1/DS0 and US3/US0

- Integral number of 400G Hz does not prevent AWG implementation.

Common 100G-EPON wavelength plan Option #2



	Center freq	Center WL
US1	232.100	1291.652
US2	230.900	1298.365
US3	229.700	1305.148
US0	234.500	1278.433
DS3	225.500	1329.457
DS2	224.300	1336.569
DS1	223.100	1343.758
DS0	220.700	1358.371

Shares the exact same set of wavelengths as in Option #1
 3nm pass band for 100G-EPON US0 and all other channels

- Cooled DFB can be enabled for larger output power.

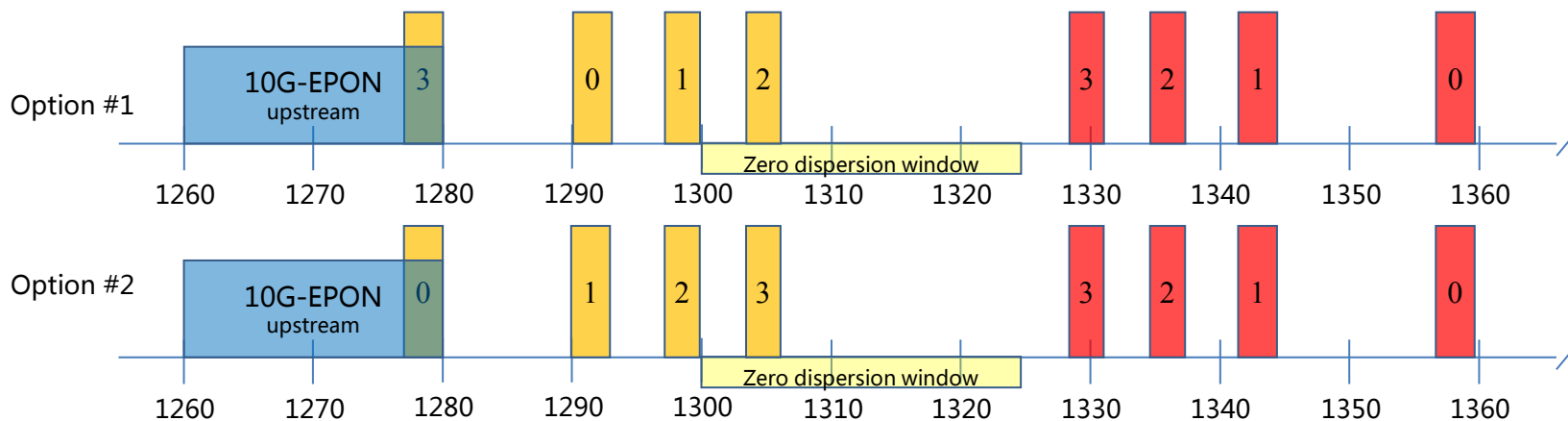
75nm DS/US gap for 25G-EPON

- Reversed DS channel order where DS0 is in the longest side

TDM coexistence between 25G-EPON US0 and 10G-EPON US

1200GHz channel spacing and 2400GHz for DS1/DS0 and US1/US0

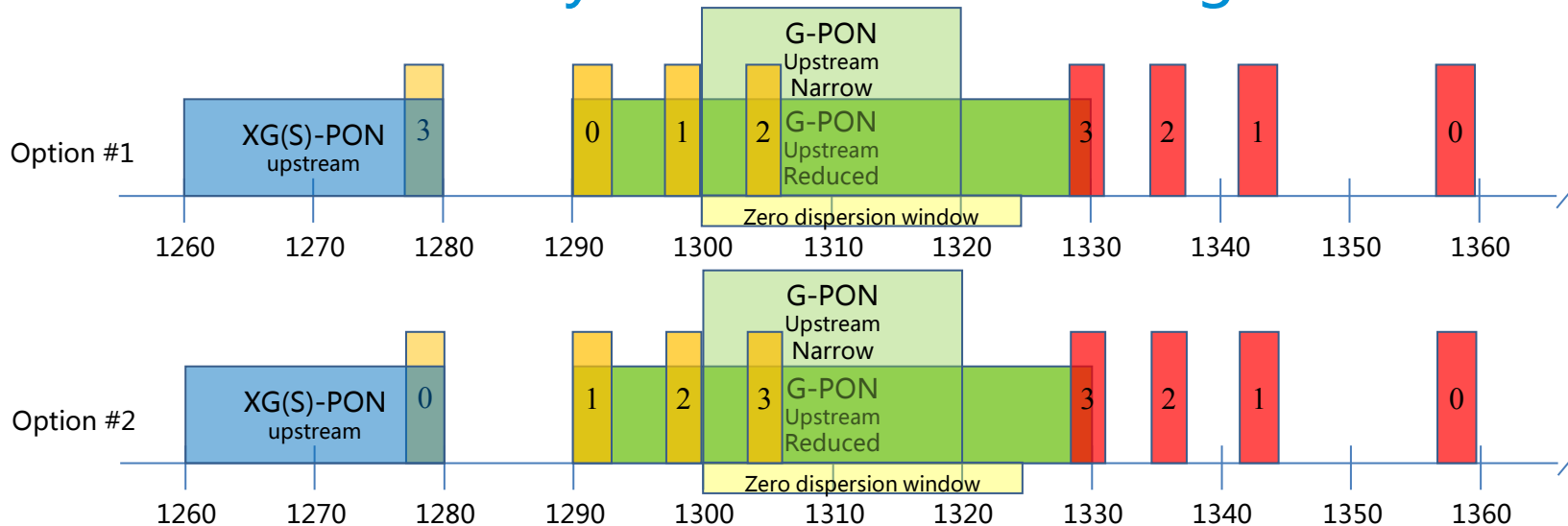
Coexistence analysis – for IEEE PON migration



Option #1	25G-EPON	100G-EPON
10G-EPON	WDM	TDM

Option #2	25G-EPON	100G-EPON
10G-EPON	TDM	TDM

Coexistence analysis- for ITU PON migration



Option #1	25G-PON	100G-PON
G-PON (narrow)	WDM	No
G-PON (reduced)	TDM	No
XG(S)-PON	WDM	TDM

Option #2	25G-PON	100G-PON
G-PON (narrow)	WDM	No
G-PON (reduced)	WDM	No
XG(S)-PON	TDM	TDM

Comparison table

		Option #1		Option #2	
Pass band		US	DS	US	DS
		3nm	3nm	3nm	3nm
10G-EPON coexistence		WDM for 25G/TDM for 100G		TDM for 25G and 100G	
SOA performance		good		good	
Capacity loss		Loss only for 100G		Loss for 25G and 100G	
DS/US gap		65nm		75nm	
G-PON/XG(S)-PON coexistence		WDM/TDM Hybrid		WDM/TDM Hybrid	
Multi-rate receiver	IEEE	3-rate 25/10/1		3-rate 25/10/1	
	ITU	2-rate 25/1 and 3-rate 25/10/2.5		2-rate 25/1 and 3-rate 25/10/2.5	
FWM impact		No		No	

Summary

One common wavelength plan

- Both options use same wavelengths, channel spacing and pass band.
- Same option can be selected for both IEEE and ITU 25G/100G PONs
 - Maximally share same industry supply chain to reduce cost.
- Or can have own preferred option, and migration path.
 - Still share whole industry supply chain.

Thank you



Tomorrow never waits

