

System Coexistence

www.huawei.com

Author/ Email: Frank Effenberger

Version: V1.0(Jan 2017)

HUAWEI TECHNOLOGIES CO., LTD.



Current coexistence positions

- **In our objectives:**

- “802.3ca” must coexist with 10/10GE PON
- This has been clarified to include both WDMA and TDMA coexistence possibilities

- **In our motions:**

- The 10G upstream wavelength will be 1270nm
- 25, 50, and 100G will be sharing a set of 4 wavelengths (the 3+1 system)
- This implies these systems will be using TDM/TMDA coexistence amongst themselves

EPON and GPON coexistence

- **Notably, GE-PON is not a requirement**
 - Motivations for this include
 - GE-PON is just too wasteful of optical spectrum (the whole O-band)
 - GE-PON is past its deployment peak, and may be replaced soon
 - Some operators may go directly to 10GE-PON, skipping GE-PON
- **G-PON coexistence situation is somewhat different**
 - G-PON is somewhat more efficient of spectrum (all systems comply with the 40nm wide upstream, and some with the 20nm upstream)
 - G-PON is still growing and replacement is not expected soon
- **For these reasons, G-PON coexistence is a concern**
 - We should at least give it a look

802.3ca represents many systems

- **Saying that 802.3ca shall coexist with something isn't specific**
 - 802.3ca includes 25, 50, and 100G downstream, and 10, 25, 50, and 100G upstream
 - There are conceivably nine possible system combinations
 - In the later slides, I only consider six of these systems
 - While the standard will neatly avoid this complexity (leaving it to implementation), when we consider coexistence, we must talk about actual systems
- **We need to clarify the coexistence requirements**
 - What systems are commercially important?
 - What combinations of those systems are likely **on the same plant at the same time?**

Wavelength plan table

	Upstream				Downstream			
Plan	Ch1	Ch2	Ch3	Ch4	Ch1	Ch2	Ch3	Ch4
A	1290	1295	1300	1305	1340	1345	1350	1355
B	1270	1295	1300	1305	1340	1345	1350	1355
C	1270	C-band	C-band	C-band	1350	L-band	L-band	L-band
D	1270	1350	1295	1325	C-band	C-band	C-band	C-band

Note: Since most of these plans have several variants, this table is just my personal example

Example: "Plan A" coexistence matrix

XG(S)-PON	WDM WDMA	WDM WDMA	Fact					
25/10-PON	WDM WDMA	WDM WDMA	WDM TDMA	Objective				
25/25-PON	No	WDM WDMA	WDM WDMA	TDM WDMA				
50/25-PON	No	No	WDM WDMA	TDM WDMA	TDM TDMA			
50/50-PON	No	No	WDM WDMA	TDM WDMA	TDM TDMA	TDM TDMA	Motions	
100/50-PON	No	No	WDM WDMA	TDM WDMA	TDM TDMA	TDM TDMA	TDM TDMA	
100/100-PON	No	No	WDM WDMA	TDM WDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA
	40nm G-PON	20nm G-PON	XG(S)- PON	25/10- PON	25/25- PON	50/25- PON	50/50- PON	100/50- PON

Example: “Plan B” coexistence matrix

XG(S)-PON	WDM WDMA	WDM WDMA						
25/10-PON	WDM WDMA	WDM WDMA	WDM TDMA					
25/25-PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA				
50/25-PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA	TDM TDMA			
50/50-PON	No	No	WDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA		
100/50-PON	No	No	WDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	
100/100-PON	No	No	WDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA
	40nm G-PON	20nm G-PON	XG(S)- PON	25/10- PON	25/25- PON	50/25- PON	50/50- PON	100/50- PON

Example: “Plan C” coexistence matrix

XG(S)- PON	WDM WDMA	WDM WDMA						
25/10- PON	WDM WDMA	WDM WDMA	WDM TDMA					
25/25- PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA				
50/25- PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA	TDM TDMA			
50/50- PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA		
100/50- PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	
100/100- PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA
	40nm G-PON	20nm G-PON	XG(S)- PON	25/10- PON	25/25- PON	50/25- PON	50/50- PON	100/50- PON

Example: “Plan D” coexistence matrix

XG(S)-PON	WDM WDMA	WDM WDMA						
25/10-PON	WDM WDMA	WDM WDMA	WDM TDMA					
25/25-PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA				
50/25-PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA	TDM TDMA			
50/50-PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA		
100/50-PON	WDM WDMA	WDM WDMA	WDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	
100/100-PON	No	No	WDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA	TDM TDMA
	40nm G-PON	20nm G-PON	XG(S)- PON	25/10- PON	25/25- PON	50/25- PON	50/50- PON	100/50- PON

Proposal

- **The issue of multi-system coexistence must be raised to all stakeholders in the entire PON ecosystem**
 - The initial contact has been made, but imprecisely and with a lot of confusion and doubt
- **We need to clarify the coexistence requirements**
 - Send a liaison to SG15, BBF, and FSAN elaborating the coexistence matrices (including all the options that we have considered)
 - Ask for timely inputs so that we make informed decisions

Thank you

www.huawei.com

