

New Ethernet Applications ad hoc Next-Gen MMF PMDs

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Agenda

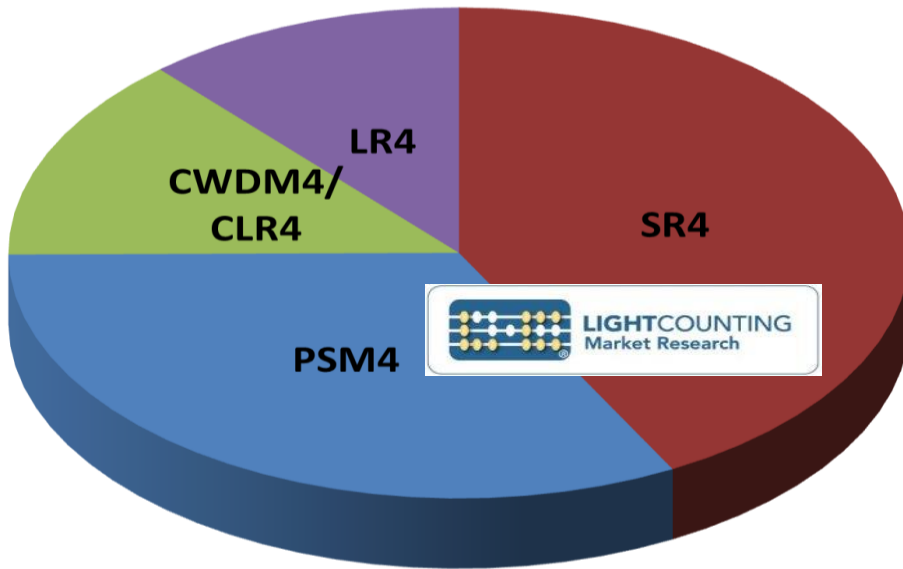
- Determine time for future calls
- Discussion of feedback from 1/8 NEA ad hoc meeting in Huntington Beach
- What is the market application to solve?
- If 400GbE short reach, what points should be clarified to build consensus on market need for 400GBASE-SR4.n?
- Any other discussion?
- Next steps

Note: SRm.n nomenclature explained in Back-Up

Key points where consensus was lacking

- Opposition to trying to standardize 100G MMF duplex fiber module, especially given that 2λ proposal failed in 802.3cd recently.
- Some surprise at LightCounting chart showing that 100GBASE-SR4 modules comprised single largest category of 100G QSPF28 modules sold in 2016
 - In what link types were they used?
 - It was suggested that SR4 modules have only found use in breakout
- Need for 400G MMF modules questioned
 - Would there ever be a need for 400G switch-to-switch links?
- Others?

100GbE QSFP28 Consumption in 2016



- Taken together, SMF modules together have majority share
- But short-reach SR4 modules had the greatest individual contribution to 2016 shipments of QSFP28 modules

Slide courtesy of Dale Murray, LightCounting

Addressing Feedback: Breakout Use

- 40G SR4
 - < 50% is breakout, as a means to creating larger 10G switch fabrics
 - > 50% is switch-to-switch links
- 40G BiDi
 - Used in switch-to-switch connections
- 100G SR4
 - Not likely to be used for breakout in cloud or large enterprise DCs (the early adopters), since 25G will not be a popular switch fabric speed there, and breakout to servers accomplished with DAC cables
 - Breakout may be popular in smaller enterprise DCs and campus networks (later adopters), where “25G may be the new 10G.”
 - The 100G SR4 in LightCounting numbers likely represent switch-to-switch and switch-to-router connections in Cloud and Largest enterprise DCs
- 100G duplex over MMF
 - Would have been sold in 2016, if available.

Market Applications to Solve

- Next-gen 100G short reach?
 - IEEE 802.3cd already selected “100G-SR2.1”
 - 100G-BiDi and SWDM4 expected in market 2017
 - Standards gap, but not necessarily a market gap
- 200G short reach?
 - .3cd defining 200G-SR4
 - Do we need a solution for duplex MMF?
- 400G short reach – see later slides

Suggested Direction for Ad Hoc

- First discuss the need for 400GBASE-SR4.n
 - Scott Kipp has suggested moving quickly on this
 - Group was told there has already been discussion of this already around Silicon Valley
- Then address 200G duplex (SR1.n)
- Lastly, may return to questions about 100G duplex (SR1.n)

Addressing feedback: Market Need

400G Short Reach

- Initial use for low-cost switch-router & In the cloud on EA Alliance roadmap timeframe
 - In largest enterprise DCs on similar time frame
- switch-to-switch links when rest of ecosystem ready
 - Needed when 100G servers arrive and perhaps sooner
 - Microsoft stated ToR to EoR need ASAP
- Breakout to 100G may be popular as for 40G-SR4, since “100G is the new 10G” in this space

Don't we already have a 400G Short Reach PMD? SR16

- SR16 not likely to be popular,
 - 32-fiber link with atypical connector will offset the low-cost nature of the transceiver.
 - Restricted to 16x25G interface (400GAUI-16)
 - No path to 400GAUI-8 without reverse gearbox
 - Restricted to CFP8 form factor;
 - If produced, may only see use for system test.
- SR4 likely available before DR4 and lower cost initially;
- FR8 could compete for same links on same timeframe, but SR4 expected to be lower cost

Missing features of current 400G Short Reach PMD

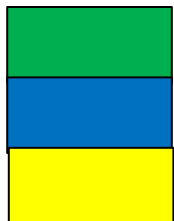
- Operate on same cabling as previous SR4 modules
 - No special connector
- Suitable for all 400G form factors
 - CFP8, QSFP-DD, OSFP
- No reverse gearbox with 400GAUI-8 interface

- Discussion
- Next Steps

Back-Up

MMF PMD Options

Technology (per fiber)	1 fiber pair	2 fiber pairs	4 fiber pairs	8 fiber pairs	16 fiber pairs
25G- λ NRZ	25G-SR		100G-SR4		400G-SR16
50G- λ PAM4	50G-SR	100G-SR2	200G-SR4	400G-SR8	
2x50G- λ PAM4	100G-SR1.2	200G-SR2.2	400G-SR4.2		
4x25G- λ NRZ	100G-SR1.4	200G-SR2.4	400G-SR4.4		
4x50G- λ PAM4	200G-SR1.4	400G-SR2.4	800G-SR4.4		



Existing IEEE standard
 In progress in 802.3bs
 In progress in 802.3cd

Proposed SWDM Nomenclature

SRm.n m = # fiber pairs
 n = # wavelengths