Nomenclature: Part 2

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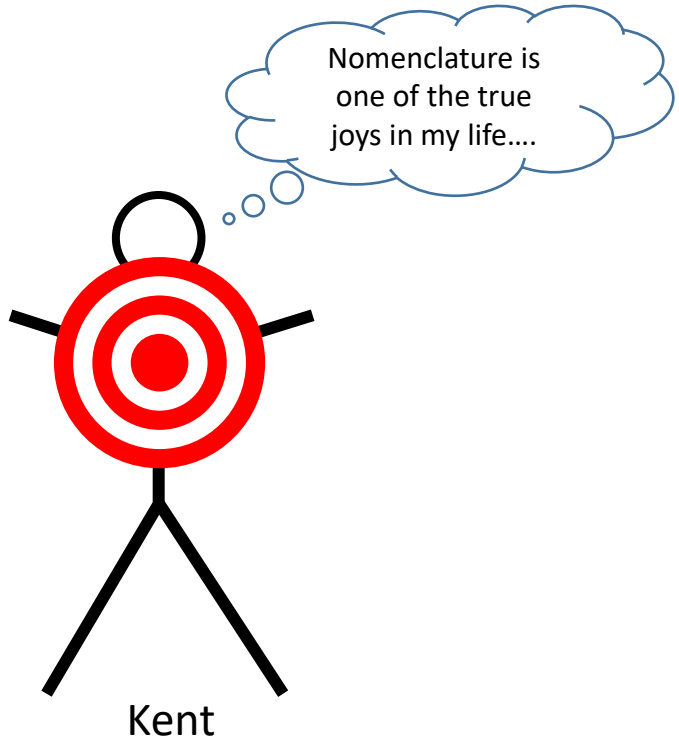
Nomenclature

- Goal: Align on the nomenclature to enable effective communication during foundational discussions in the 3df Task Force



Nomenclature References

- Participants are invited to reference the following contributions related to nomenclature
  - Past PHY naming:
    - https://www.ieee802.org/3/cb/public/jan16/PHY_names_1115.pdf
  - 3cn naming related:
    - https://www.ieee802.org/3/cn/public/18_11/anslow_3cn_01_1118.pdf
  - 3cz naming related:
    - https://www.ieee802.org/3/cz/public/nov_2020/perezaranda_3cz_02c_1120_phyname.pdf
  - 3db naming related:
    - https://www.ieee802.org/3/db/public/March-04-2021/parsons_3db_01_030421.pdf
  - 3cu naming related:
    - https://www.ieee802.org/3/cu/public/Nov19/cole_3cu_01a_1119.pdf

Key Assumptions

- #1: It is assumed that the TF wants to preserve the BASE-R PCS names and the naming conventions from the 1/2/4-lane versions of the PHYs in IEEE Std. 802.3-202x, P802.3ck, P802.3db
- #2: It is assumed baseline proposals for <= 2km reaches (optical and copper) will use effective lane data rates of 100 Gb/s or 200 Gb/s
  - Over 2km, pending TF discussion.
- #3: For the purpose of this presentation, it is assumed that the *effective* lane data rate will be 100 Gb/s or 200 Gb/s.
  - The exact lane rate per physical layer specification will be determined by the Task Force.

Adopted P802.3df Physical Layer Objectives

Focus:

Ethernet Rate	Assumed Signaling Rate	AUI	BP	Cu Cable	MMF 50m	MMF 100m	SMF 500m	SMF 2km	SMF 10km	SMF 40km
200 Gb/s	200 Gb/s	Over 1 lane 200GAUI-1		Over 1 pair 200GBASE-CR1			Over 1 Pair TBD	Over 1 Pair TBD		
400 Gb/s	100 Gb/s							Over 4 Pair TBD		
	200 Gb/s	Over 2 lanes 400GAUI-2		Over 2 pairs 400GBASE-CR2			Over 2 Pair TBD			
800 Gb/s	100 Gb/s	Over 8 lanes 800GAUI-8	Over 8 lanes 800GBASE-KR8	Over 8 pairs 800GBASE-CR8	Over 8 pairs 800GBASE-VR8	Over 8 pairs 800GBASE-SR8	Over 8 pairs TBD	Over 8 pairs TBD		
	200 Gb/s	Over 4 lanes 800GAUI-4		Over 4 pairs 800GBASE-CR4			Over 4 pairs TBD	1) Over 4 pairs TBD 2) Over 4 λ's TBD		
	TBD								Over single SMF in each direction TBD	Over single SMF in each direction TBD
1.6 Tb/s	100 Gb/s	Over 16 lanes 1.6TAUI-16								
	200 Gb/s	Over 8 lanes 1.6TAUI-8		Over 8 pairs 1.6TBASE-CR8			Over 8 pairs TBD	Over 8 pairs TBD		

https://www.ieee802.org/3/df/proj_doc/objectives_P802d3df_220317.pdf

Some Historical Ethernet Optical PMD Names

- “DR” has been used for 500m parallel fiber solutions using 100G/lane technology (e.g. 400GBASE-DR4)
  - “DR+” is used in industry to denote 2km parallel fiber solution using 100G/Lane technology (e.g. 400GBASE-DR4+)
- “FR” has been used for 2km duplex solutions using 100G/lane technology (e.g. 400GBASE-FR4)
- IEEE Std. 802.3-202x has length designation in a name for a PMD name (e.g. 400GBASE-LR4-6)
- IEEE Std. 802.3-202x has multi-wavelength per fiber pair designation in a name for a PMD name (e.g. 400GBASE-SR4.2)
- Other combinations exist and not shown for brevity

One SMF PMD Nomenclature Proposal (from 3cu)

Nomenclature Proposal

Description	DR	FR	LR	ER	ZR
unit	m	km	km	km	km
reach (max) range	100 - 2000	1 - 3	4 - 20	20 - 40	any
default reach	500	2	10	40	80
default name	DRn	FRn	LRn	ERn	ZR
optional alt. default name	DRn-500	FRn-2	LRn-10	ERn-40	ZR-80
non-default ex.1 reach	300	1	6	30	120
ex.1 name	DRn-300	FRn-1	LRn-6	ERn-30	ZR-120
non-default ex.2 reach	1500	1.5	15	25	40
ex.2 name	DRn-1500	FRn-1.5	LRn-15	ERn-25	ZR-40

https://www.ieee802.org/3/cu/public/Nov19/cole_3cu_01a_1119.pdf

(Hopefully!) The Starting Point

- Following historical precedence, these green names should be an acceptable foundation

Ethernet Rate	Assumed Signaling Rate	SMF 500m	SMF 2km
200 Gb/s	200 Gb/s	Over 1 pair: DR1	Over 1 pair: FR1
400 Gb/s	100 Gb/s		
	200 Gb/s	Over 2 pair: DR2	
800 Gb/s	100 Gb/s	Over 8 pair: DR8	
	200 Gb/s	Over 4 pair: DR4	1) Over 4 pairs = 2) Over 4 λ's = FR4
	TBD		
1.6 Tb/s	100 Gb/s		
	200 Gb/s	Over 8 pair: DR8	

Filling Out the Remaining -- A Quandary

- For some people, “DR” means 500m. For others, “DR” means parallel fiber solutions
- For some people, “FR” means 2km. For others, “FR” means duplex solutions

- What does this Task Force want to name a PMD that is a 2km, parallel fiber solution?
  - And the associated cases?

= New this slide

Comparison

Ethernet Rate	Assumed Signaling Rate	SMF 500m	SMF 2km	SMF 500m	SMF 2km
800 Gb/s					
	200 Gb/s	Over 4 Pair: DR4	1) Over 4 pairs = DR4-LEN 2) Over 4 λ's = FR4	Over 4 Pair: DR4	1) Over 4 pairs = FR4.4 2) Over 4 λ's = FR4

Example A: Use a "DR" based approach

Example B: Use an "FR" based approach

What to do here?

Note1: "LEN" is a decimal number to represent length. Number format is TBD.

Note2: Other examples exist and are not illustrated here

= New this slide

Comparison

Ethernet Rate	Assumed Signaling Rate	Example A: Use a "DR" based approach: SMF 500m	Example A: Use a "DR" based approach: SMF 2km	Example B: Use an "FR" based approach: SMF 500m	Example B: Use an "FR" based approach: SMF 2km
200 Gb/s	200 Gb/s	Over 1 Pair: DR1	Over 1 Pair: FR1	Over 1 Pair: DR1	Over 1 Pair: FR1
400 Gb/s	100 Gb/s		Over 2 Pair: DR4-LEN		Over 2 Pair: FR4.4
	200 Gb/s	Over 2 Pair: DR2		Over 2 Pair: DR2	
800 Gb/s	100 Gb/s	Over 8 Pair: DR8	Over 8 Pair: DR8-LEN	Over 8 Pair: DR8	Over 8 Pair: FR8
	200 Gb/s	Over 4 Pair: DR4	1) Over 4 pairs = DR4-LEN 2) Over 4 λ's = FR4	Over 4 Pair: DR4	1) Over 4 pairs = FR4.4 2) Over 4 λ's = FR4
	TBD				
1.6 Tb/s	100 Gb/s				
	200 Gb/s	Over 8 Pair: DR8	Over 8 Pair: DR8-LEN	Over 8 Pair: DR8	Over 8 Pair: FR8

Implications

Note1: "LEN" is a decimal number to represent length. Number format is TBD

Note2: Other examples exist and are not illustrated here

10km and 40km Names

- Two different signaling approaches are being investigated to address the 10km SMF case: IMDD and coherent
  - 40km seems to be coherent
- To facilitate comparison of the two approaches, it is desirable to have consistent naming for each
- Can we use a nomenclature of "LRn/ERn", where n is the number of optical lanes?
  - For example, IMDD with 4 optical lanes: 800GBASE-LR4 (10km), 800GBASE-ER4 (40km)
  - For example, Coherent with 1 optical lane: 800GBASE-LR1 (10km), 800GBASE-ER1 (40 km)

Ethernet Rate	Assumed Signaling Rate	SMF 10km	SMF 40km
200 Gb/s	200 Gb/s		
400 Gb/s	100 Gb/s		
	200 Gb/s		
800 Gb/s	100 Gb/s		
	200 Gb/s		
	TBD	Over single SMF in each direction TBD	Over single SMF in each direction TBD
1.6 Tb/s	100 Gb/s		
	200 Gb/s		

Straw Polls

Potential Straw Poll #1

- I would support the proposed nomenclature for parallel 500m and duplex 2km SMF listed on lusted_3df_01_yymmdd, slide 8
  - Y, N, A

Potential Straw Poll #2

- For the 2km parallel SMF nomenclature, I would support the direction of:
  - Option A: use “DR”, such as shown in Example A listed on lusted_3df_01_yymmdd, slide 11
  - Option B: use “FR”, such as shown in Example B listed on lusted_3df_01_yymmdd, slide 11
  - Option C: something else

Potential Straw Poll #3

- For the length (“LEN”) representation for the “DR” PMDs shown on lusted_3df_01_yymmdd, slide 11, I prefer the format:
  - A: units in km, e.g. 2
  - B: units in meters, e.g. 2000

Potential Straw Poll #4

- For the purpose of comparing the 10km and 40km contributions, I would support using a nomenclature of “LRn/ERn”, where n is the number of optical lanes
- Y, N, A

THANKS!