802.3ca PHY Names Revisited

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Accepted PHY naming

25 or 50	Downstream MAC rate.
[/10 or 25]	Upstream MAC rate. Only shown for asymmetric channels
G	Gigabit/s rate (in reference to the above numbers)
BASE	Baseband Signal

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P	**P**ON medium
Q	PCS type: **Q** for 256b/257b
m	Supported downstream wavelengths = {1, 2}
n	Supported upstream wavelengths = {1,2} + {G, X}

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D	**D** – Downstream-facing PMD (i.e., in the OLT) **U** – Upstream-facing PMD (i.e., in the ONU)
k	Power class = {2, 3}

- ❑ The letter(s) after "P" supposedly identify PCS line coding format
    - – **X**: 8b/10b
    - – **R**: 64b/66b
    - – **Q**: 256b/257b

- ❑ In Clause 60 and 75, we re-purposed these letters for PHY Link names because each unique line coding also used a unique line rate.
    - – **PX**: Symmetric 1Gb/s PON media
    - – **PR**: Symmetric 10Gb/s PON media
    - – **PRX**: Asymmetric 10Gb/s down + 1Gb/s up PON media

❑ We cannot continue the same trend, because with PQ, <u>a unique line code does not mean a unique line rate</u>.

– 10.3125 Gb/s rate can be used with both 64b/66b (in 802.3av) and 256b/257b (in 802.3ca)

❑ We are now forced to make a decision: **Should letters X, R, Q represent PON line coding or PON line rate?**

EPON PHY Link Type	Line Code		Line Rate (Gb/s)	
	Downstream	Upstream	Downstream	Upstream
PX	8b/10b	8b/10b	1.25	1.25
PR	64b/66b	64b/66b	10.3125	10.3125
PRX	64b/66b	8b/10b	10.3125	1.25

PQ	256b/257b	256b/257	OR	PQ	25.78125	25.78125

Option #1 (current)

- ❑ Letters X, R, and Q designate line coding. But we never used PX, PR, and PRX in PCS clauses, where the line coding is defined. We always use these terms in PMD clauses to differentiate line rates.

- ❑ Because line rate is not indicated in PMD name in any way, we had to resort to an explicit indication of the number of wavelengths to determine the line rates

- ❑ 50G-EPON per .3ca:
  - 50/10GBASE-PQ**21**-D3
  - 50/25GBASE-PQ**21**-D3
  - 50GBASE-PQ**22**-D3

- ❑ Potential future 50G single-wavelength solution
  - 50/10GBASE-PQ**11**-D3
  - 50/25GBASE-PQ**11**-D3
  - 50GBASE-PQ**11**-D3

EPON PHY Link Type	Line Code	
	Downstream	Upstream
PX	8b/10b	8b/10b
PR	64b/66b	64b/66b
PRX	64b/66b	8b/10b
PQ	256b/257b	256b/257b

- ❑ **Define "Q" to mean "25.78125 Gb/s line rate"**
- ❑ The number of wavelengths is implicit in the downstream/upstream data rates

- ❑ 50G-EPON per .3ca:
  - – 50/10GBASE-**PQR**-D3
  - – 50/25GBASE-**PQ**-D3
  - – 50GBASE-**PQ**-D3

- ❑ Potential future 50G single-wavelength solution
  - – Use a new letter, say "**S**", to represent the new line rate or new modulation
  - – 50/10GBASE-**PSR**-D3
  - – 50/25GBASE-**PSQ**-D3
  - – 50GBASE-**PS**-D3

EPON PHY Link Type	Line Rate (Gb/s)	
	Downstream	Upstream
PX	1.25	1.25
PR	10.3125	10.3125
PRX	10.3125	1.25
PQ	25.78125	25.78125
PQR	25.78125	10.3125
PS	51.5625	51.5625
PSQ	51.5625	25.78125
PSR	51.5625	10.3125

Future

Option #2

❑ Option 2 is better, but still carries redundant information

- 50/10GBASE-**PQR**-D3

- 50/25GBASE-**PQ**-D3

- 50/50GBASE-**PQ**-D3

- 50/10GBASE-**PSR**-D3

- 50/25GBASE-**PSQ**-D3

❑ PX, PR, PRX, PQ, .. identify any and all pertinent link parameters (line coding, line rate, modulation, etc.) In other words, the letters identify PMD as specified by a given project.

	Equivalent to	Specification Details
PX	as defined in .3ah	8b/10b, NRZ, 1.25GBd
PR	as defined in .3av	64b/66b, NRZ, 10.3125GBd
PRX	as defined in .3av	Downstream: 64b/66b, NRZ, 10.3125GBd Upstream: 8b/10b, NRZ, 1.25GBd
PQ	as defined in .3ca	256b/257b, NRZ, 25.78125GBd or 10.3125 GBd (upstream only)
PS (future)	as defined in .3??	256b/257b, NRZ/PAM4 (?), 25.78125GBd or 51.5625 GBd (?)

PMD names according to Option #3

PX (.3ah)	PRX (.3av)	PR (.3av)	PQ (.3ca)	PS (.3??)
1000BASE-PX	10/1GBASE-PRX	10GBASE-PR	25/10GBASE-PQ 25GBASE-PQ 50/10GBASE-PQ 50/25GBASE-PQ 50GBASE-PQ	50/10GBASE-PS 50/25GBASE-PS 50GBASE-PS

(Designators for power class, location (OLT/ONU), and coexistence option are omitted)

❑ Option #3 does not carry redundant information in PMD names

Exhaustive list of PMDs

Upstream/ Downstream MAC data rate	Option #1 (current)	Option #2	Option #3
25G/10G	25/10GBASE-PQ11G-Dn 25/10GBASE-PQ11G-Un 25/10GBASE-PQ11X-Dn 25/10GBASE-PQ11X-Un	25/10GBASE-PQRG-Dn 25/10GBASE-PQRG-Un 25/10GBASE-PQRX-Dn 25/10GBASE-PQRX-Un	25/10GBASE-PQG-Dn 25/10GBASE-PQG-Un 25/10GBASE-PQX-Dn 25/10GBASE-PQX-Un
25G/25G	25GBASE-PQ11G-Dn 25GBASE-PQ11G-Un 25GBASE-PQ11X-Dn 25GBASE-PQ11X-Un	25GBASE-PQG-Dn 25GBASE-PQG-Un 25GBASE-PQX-Dn 25GBASE-PQX-Un	25GBASE-PQG-Dn 25GBASE-PQG-Un 25GBASE-PQX-Dn 25GBASE-PQX-Un
50G/10G	50/10GBASE-PQ21G-Dn 50/10GBASE-PQ21G-Un 50/10GBASE-PQ21X-Dn 50/10GBASE-PQ21X-Un	50/10GBASE-PQRG-Dn 50/10GBASE-PQRG-Un 50/10GBASE-PQRX-Dn 50/10GBASE-PQRX-Un	50/10GBASE-PQG-Dn 50/10GBASE-PQG-Un 50/10GBASE-PQX-Dn 50/10GBASE-PQX-Un
50G/25G	50/25GBASE-PQ21G-Dn 50/25GBASE-PQ21G-Un 50/25GBASE-PQ21X-Dn 50/25GBASE-PQ21X-Un	50/25GBASE-PQG-Dn 50/25GBASE-PQG-Un 50/25GBASE-PQX-Dn 50/25GBASE-PQX-Un	50/25GBASE-PQG-Dn 50/25GBASE-PQG-Un 50/25GBASE-PQX-Dn 50/25GBASE-PQX-Un
50G/50G	50GBASE-PQ22G-Dn 50GBASE-PQ22G-Un 50GBASE-PQ22X-Dn 50GBASE-PQ22X-Un	50GBASE-PQG-Dn 50GBASE-PQG-Un 50GBASE-PQX-Dn 50GBASE-PQX-Un	50GBASE-PQG-Dn 50GBASE-PQG-Un 50GBASE-PQX-Dn 50GBASE-PQX-Un

PHY Naming Proposal

25 or 50	Downstream MAC rate.
[/10 or 25]	Upstream MAC rate. Only shown for asymmetric channels
G	Gigabit/s rate (in reference to the above numbers)
BASE	Baseband Signal

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P	**P**ON medium
Q	~~PCS type: 256b/257b~~ PMD for Nx25G-EPON as defined in 802.3ca, clause 141
~~**m**~~	~~Supported downstream wavelengths = {1, 2}~~
c	~~Supported upstream wavelengths = {1,2} + {G, X}~~ Coexistence option = {G, X}

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D	**D** – Downstream-facing PMD (i.e., in the OLT) **U** – Upstream-facing PMD (i.e., in the ONU)
n	Power class = {2, 3}

Thank You