

# 802.3 NGE BASE-T SG

## Layering and Gaps

Yong Kim (ybkim at broadcom com)

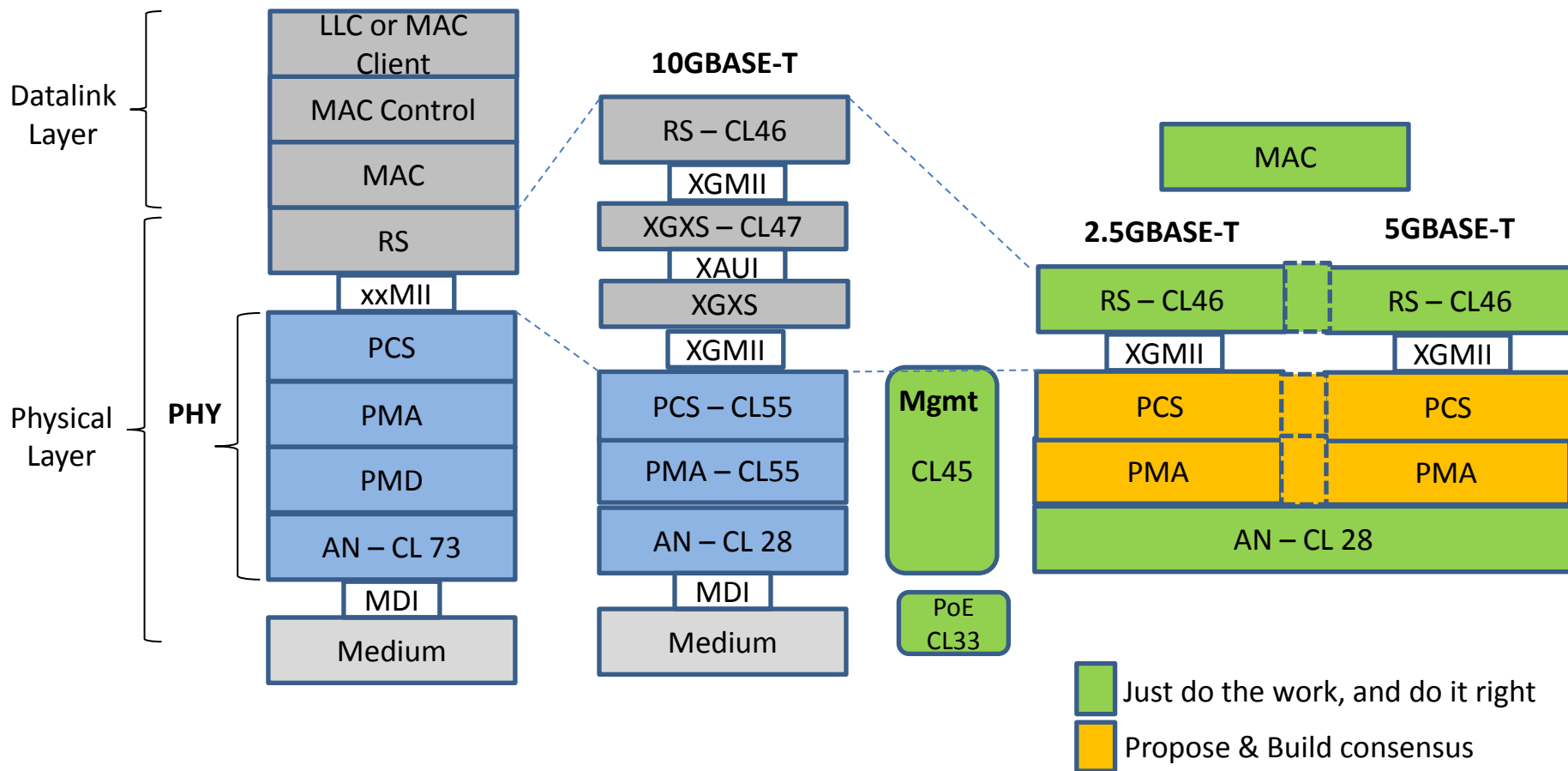
# In support of “fastest track” timeline

Looking at 2.5G and 5G, from 10GBASE-T basis

- Leverage 10GBASE-T document structure
- [Sub-]Layering
- Gaps and work to be done.

# [Sub-]Layering

NGE BASE-T Layering considerations



# Clause 1 changes

- Straight forward
- Definitions
  - Add new terms: e.g. 2.5GBASE-T and 5GBASE-T
  - Revise: Category 5, 6, 6A, 7, 7A balanced cabling
  - Revise DSQ128 or add new constellation.
  - ...
- Abbreviation
  - Revise XGMII, XSBI, XAUI or add new interface.
  - ...
- References
  - ISO/IEC TR 24750-2007 & TIA TSB-155-A-2010 references to 10GBASE-T, if appropriate.
  - ...

## MAC (CL 4)

- Straight forward
- Entry appropriate for NGE BASE-T work in 4.4.2 MAC parameters in Table 4-2 (e.g. add 2.5G and 5G next to 25 Gb/s, 40 Gb/s and 100 Gb/s column heading), and Note 4 (e.g. add 2.5G and 5G to “For 10 Gb/s and 25 Gb/s operation).
- And reflect the same changes in Annex 4A (Note 3).

### 4.4.2 MAC parameters

Change Table 4-2 to add 25 Gb/s as follows:

Table 4-2—MAC parameters

Parameters	MAC data rate			
	Up to and including 100 Mb/s	1 Gb/s	10 Gb/s	25 Gb/s, 40 Gb/s, and 100 Gb/s
slotTime	512 bit times	4006 bit times	not applicable	not applicable
interPacketGap <sup>a</sup>	96 bits	96 bits	96 bits	96 bits
attemptLimit	16	16	not applicable	not applicable
backoffLimit	10	10	not applicable	not applicable
jamSize	32 bits	32 bits	not applicable	not applicable
maxBasicFrameSize	1518 octets	1518 octets	1518 octets	1518 octets
maxEnvelopeFrameSize	2000 octets	2000 octets	2000 octets	2000 octets
minFrameSize	512 bits (64 octets)	512 bits (64 octets)	512 bits (64 octets)	512 bits (64 octets)
burstLimit	not applicable	65 536 bits	not applicable	not applicable
ipgStretchRatio	not applicable	not applicable	104 bits	not applicable

<sup>a</sup>References to interFrameGap or interFrameSpacing in other clauses (e.g., 13, 35, and 42) shall be interpreted as interPacketGap.

Change Note 4 as follows:

NOTE 4—For 10 Gb/s and 25 Gb/s operation, the spacing between two packets, from the last bit of the FCS field of the first packet to the first bit of the Preamble of the second packet, can have a minimum value of 40 BT (bit times), as measured at the XGMII receive signals at the DTE. This interpacket gap shrinkage may be caused by variable network delays and clock tolerances.

From 25G – 802.3by Draft 0.1

## Layer management (CL 30)

- Straight forward
- Add appropriate entries
  - aMAUType
  - aPHYType
  - aMediaAvailable
  - aAutoNegLocalTechnologyAbility
  - aSNROpMarginChnlA, B, C, D
  - aLDFastRetrainCount
  - aLPFastRetrainCount

## Power over MDI (CL 33)

- Add appropriate references to 33.1.1. objectives to include NGEA BASE-T PHY types, if additional channel model reference(s) needed.

## RS (CL46) XGMII Gaps

- 46.1.3 – add to support of 10 Gb/s MAC rates (including WIS rates).
- 46.1.7 – XGMII to PLS Services – explicit in 10 Gb/s operation. ← Scale the clock? Or adapt the bit rate and keep at 10G?
- 46.3 XGMII functional spec – explicit to 10 Gb/s operation.
- EEE/LPI scales with clock rates (good) as does latency (good?).



## XGXS (CL 47) XAUI Gaps

- If desired, then to support CL 47,
- 47.3 XAUI Electrical - explicit in 10 Gb/s operation. ← Scale the clock? Or adapt the bit rate and keep at 10G?

## PCS & PMA (CL55) Gaps

- **TBD** – Proposals and baseline to be established.
- Much of the PCS and PMA structures could be re-used as a framework to help the draft generation, because sub-layer interfaces remain relevant.

## Auto-Negotiation (CL28 & ref: 55.6.1)

- CL28 complete
- CL28C – Table 28-C – code field value entry (or entries) for 2.5G and 5G, and corresponding message code text.
- Mgmt (CL 45 & ref 55.6.1.1)

# Auto-Negotiation (CL28) Review

D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
S0	S1	S2	S3	S4	A0	A1	A2	A3	A4	A5	A6	XNP	RF	Ack	NP

Selector S<4:0>  
00001 == IEEE 802.3

Technology Ability <6:0>    A5 = Pause Ability  
A0=10BASE-T..A4=100BASE-T4    A6= Asym. Pause

RF = Remote Fault  
Ack = Acknowledge  
NP = Next Page, XNP = Exten. NP

D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15
M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	T	Ack2	MP	Ack	NP

Message Code<10:0>  
8: 1000BASE-T msg code  
9: 10GBASE-T msg code  
10: EEE msg, 11: OUI Tagged msg

Ack2 = NP ability  
T=Toggle from  
previous NP msg.

NP = New Page  
Ack = Acknowledge  
MP – Message Code=1 or  
unformatted=0

D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27	D28	D29	D30	D31
U0	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	U13	U14	U15

U<10:0> Master-Slave seed bits

U11: 10GBASE-T Master-Slave manual config.  
U12: 10BASE-T Master-Slave config value

D32	D33	D34	D35	D36	D37	D38	D39	D40	D41	D42	D43	D44	D45	D46	D47
U16	U17	U18	U19	U20	U21	U22	U23	U24	U25	U26	U27	U28	U29	U30	U31

U16: 10GBASE-T

U<24:22>: 10G/1G/100M EEE

## Mgmt (CL 45 & ref 55.6.1.1)

- CL45 touched every time we add a PHY.
- Add analog of 10GBASE-T mgmt/test registers.
  - 1.129 ~ 1.147 (status, pair swap, polarity, SNR margin, etc)
  - 1.110~1.128 (reserved), 1.148~149 (reserved)
- Other examples.
  - 1.0 <5:2> PMA/PMD speed selection; coordinate w/ 25G
  - 1.4 speed ability; assign a bit
  - 1.7 <5:0> PMA/PMD type; assign entries
  - 1.16 EEE Capability
- Straight forward (and methodical) changes needed.
- ...

# Summary

- Generating the draft will be straight forward task, once the baseline is selected.
  - “This ain’t our first time to the rodeo.”
- Draft generation would not the long pole in achieving the “Fastest Track” timeline.

Thank you