

802.3bz Layers – Auto-negotiation

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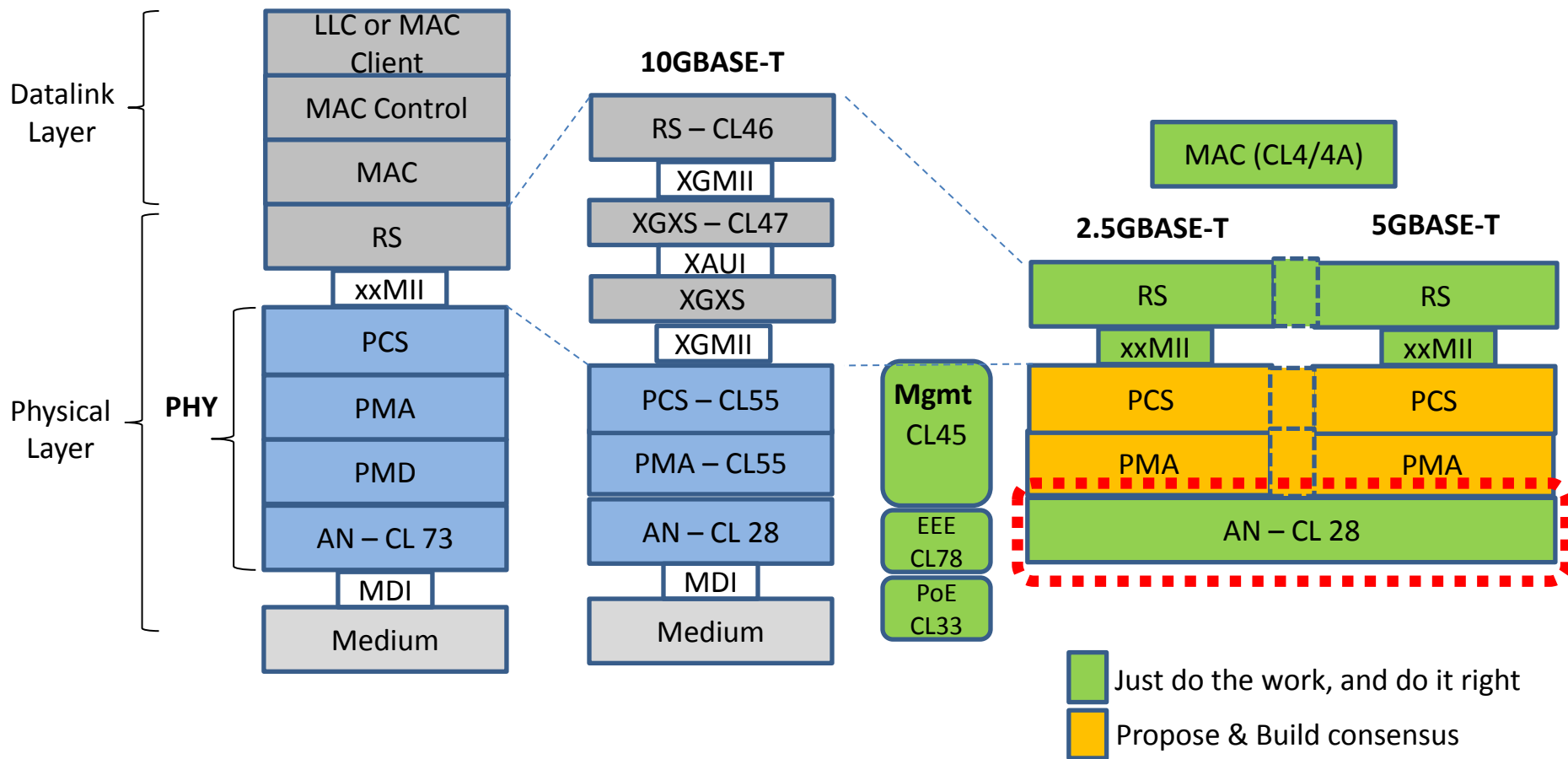
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Supporters

- Seeking supporters to help build consensus in our task force
- Please contact presenters with your comments or support

Auto-Negotiation

NGE BASE-T Layering considerations



Auto-Negotiation (CL28 + CL55.6.1 & .3bq.6.1)

- CL28 complete (no functional changes required, just revisions)
 - Table 28-9 – Timer min/max value
 - Link_Fail_inhibit_timer (**2.5G/5G**/10G/**25G/40G**) – min 2000, max 2250 msec.
- Annex 28B.3 – Priority resolution
 - Insert 2.5G and 5G above 1G and below 10G.
- Annex 28C – Next Page Msg Code field definitions
 - Table 28-C-1 (message code 9 (Ext NP, xGBASE-T) – code field value entry (or entries) for 2.5G and 5G, and corresponding message code text.
- Annex 28D – Description of extensions to CL 28 and assc. annexes.
 - 28D, insert as 28D.9(?), after 40G and 25GBASE-T
 - Auto-neg mandatory for 2.5G and 5GBASE-T, extended NP support, use of MASTER and SLAVE PHY operation, support of the priority resolution table (Annex 28B.3), and asymmetric pause (Annex 28B.2 “A6”), etc.
- And reflect the above changes to the PICS (28.5)

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, 2 x Unformatted NP

9: ~~10-BASET/1000BASE-T~~ **xGBASE-T** msg code, Ext NP

10: EEE msg, 11: OUI: Tagged msg, 12..2047: reserved

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: 10GBASE-T Master-Slave config value
U13: Port Type 1=multiport, 0 = single port

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

Auto-Negotiation (CL28) Proposal

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

40G

U24: 10G EEE 40G EEE 25G 25G EEE 5G 5G EEE 2.5G 2.5G EEE

Extended Next Page (Unformatted Message Code Field)		
U31	2.5GBASE-T EEE (1 = Advertise EEE capability for 2.5GBASE-T 0 = Do not advertise EEE capability for 2.5GBASE-T)	TBD
U30	2.5GBASE-T ability (1 = support of 2.5GBASE-T and 0 = no support)	TBD
U29	5GBASE-T EEE (1 = Advertise EEE capability for 5GBASE-T 0 = Do not advertise EEE capability for 5GBASE-T)	TBD
U28	5GBASE-T ability (1 = support of 5GBASE-T and 0 = no support)	TBD
U27	25GBASE-T EEE (1 = Advertise EEE capability for 25GBASE-T 0 = Do not advertise EEE capability for 25GBASE-T)	TBD
U26	25GBASE-T ability (1 = support of 25GBASE-T and 0 = no support)	TBD
U25	40GBASE-T EEE (1 = Advertise EEE capability for 40GBASE-T 0 = Do not advertise EEE capability for 40GBASE-T)	Defined in 45.2.7.13.10
U21	40GBASE-T (1 = support of 25GBASE-T and 0 = no support)	Defined in 45.2.7.10.4

Annex 28B

- **28B.3 Priority resolution**

Modify the priorities as:

- a) 40GBASE-T full duplex
- b) 25GBASE-T full duplex
- c) 10GBASE-T full duplex
- d) 5GBASE-T full duplex
- e) 2.5GBASE-T full duplex
- f) 1000BASE-T full duplex
- g) 1000BASE-T
- h) 100BASE-T2 full duplex
- i) 100BASE-TX full duplex
- j) 100BASE-T2
- k) 100BASE-T4
- l) 100BASE-TX
- m) 10BASE-T full
- n) 10BASE-T

Annex 28D

Add at the end of Annex 28D and replace <xx>, <yy>, <nn> as appropriate (provided as e.g.).

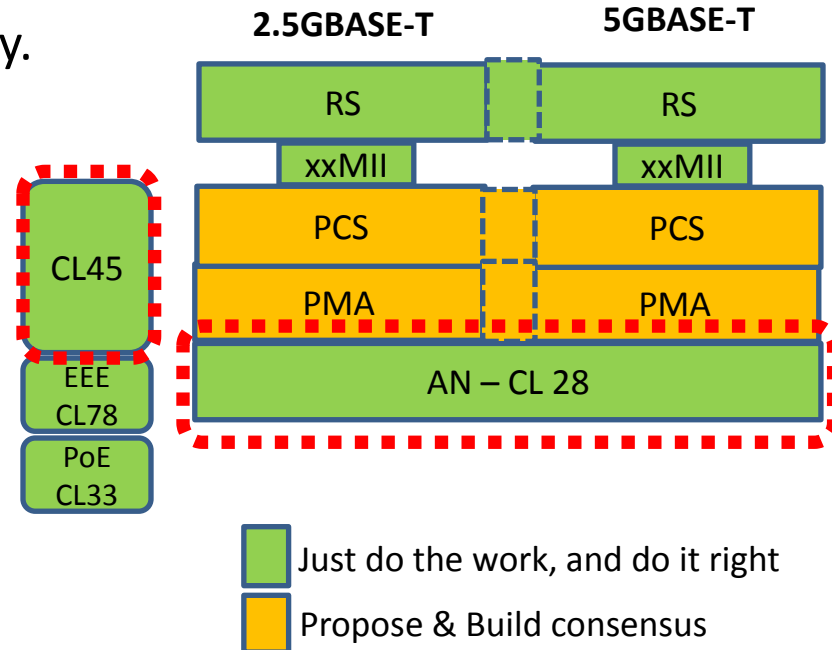
28D.xx Extensions required for Clause yy (2.5GBASE-T and 5GBASE-T)

Clause yy (2.5GBASE-T and 5GBASE-T) makes special use of Auto-Negotiation and requires additional MDIO registers. This use is summarized below. Details are provided in <yy.nn>.

- a) Auto-Negotiation is mandatory for 2.5GBASE-T and 5GBASE-T.
- b) Extended Next Page support is mandatory for 2.5GBASE-T and 5GBASE-T
- c) 2.5GBASE-T and 5GBASE-T requires an exchange of an Extended Next Page message.
- d) 2.5GBASE-T and 5GBASE-T parameters are configured based on information provided by the exchange of an Extended Next Page message.
- e) 2.5GBASE-T and 5GBASE-T uses MASTER and SLAVE to define PHY operations and to facilitate the timing of transmit and receive operations. Auto-Negotiation is used to provide information used to configure MASTER-SLAVE status.
- f) 2.5GBASE-T and 5GBASE-T transmits and receives an Extended Next Page for exchange of information related to MASTER-SLAVE operation. The information is specified in 45.2.7.
- g) 2.5GBASE-T and 5GBASE-T adds 2.5GBASE-T and 5GBASE-T full duplex capabilities to the priority resolution table (see 28B.3).
- h) 2.5GBASE-T is defined as a valid value for “x” in 28.3.1 (e.g., link_status_2.5GigT.) 2.5GigT represents that the 2.5GBASE-T PMA is the signal source.
- i) 5GBASE-T is defined as a valid value for “x” in 28.3.1 (e.g., link_status_5GigT.) 5GigT represents that the 5GBASE-T PMA is the signal source.
- j) 2.5GBASE-T and 5GBASE-T supports Asymmetric Pause as defined in Annex 28B.

Summary

- CL 28 auto-negotiation changes are straight forward.
 - Lucky! All concurrent .3 BASE-T projects fit into reserved fields.
 - Assign extended next page bits now.
 - No urgency, but no need to wait or delay discussions.
 - Upon consensus, contributions toward CL45 could be made more completely.



Thank you