Backplane Ethernet

Proposal for Auto-Negotiation

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Key Messages

- Objective to “consider Auto-Negotiation”
- Proposal outlines a mechanism for speed negotiation between 1G/10G speeds in Backplane Ethernet
  - Could be used to negotiate flow control, signaling etc.
- Leverage the existing Clause 28 Auto-Neg
  - Align electricals to be defined in 802.3ap
  - Use Next Page function of Clause 28

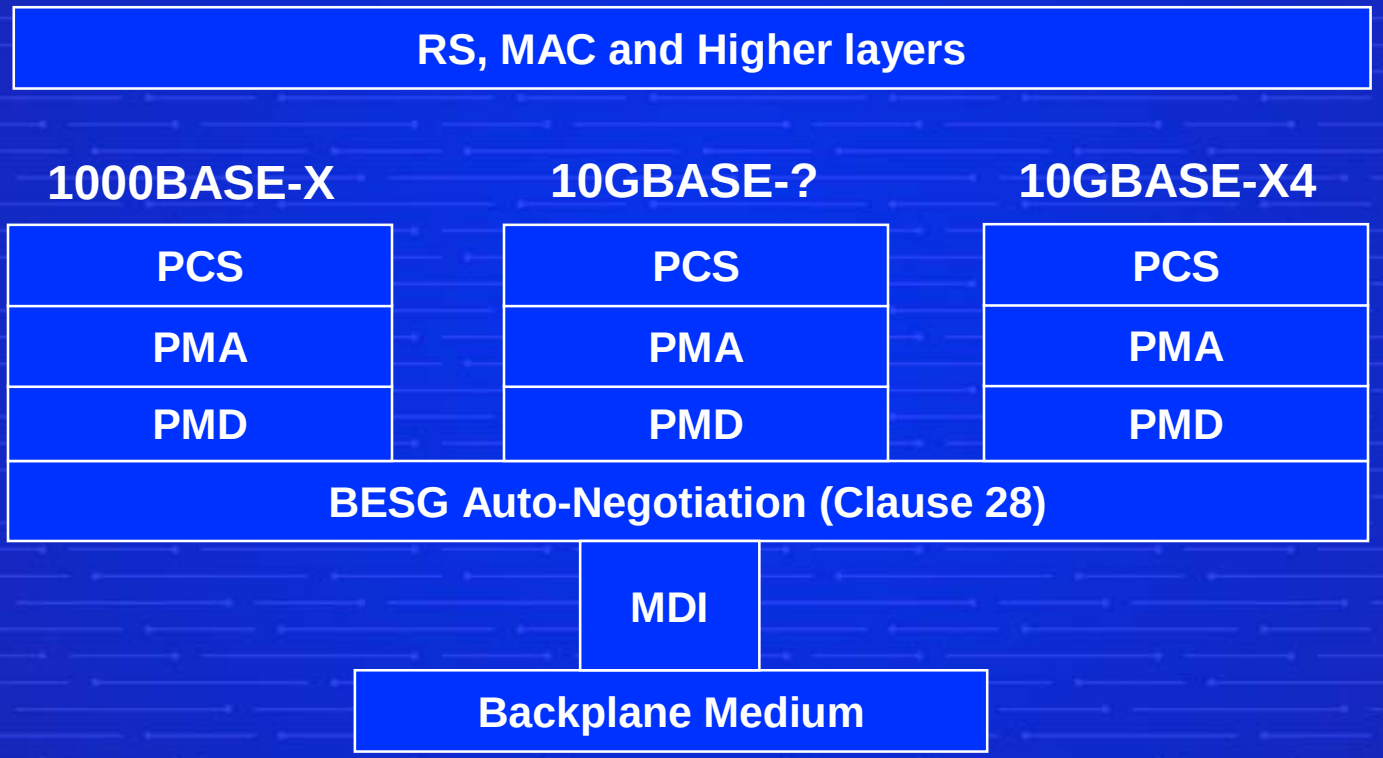
Why Auto-Negotiation

- Ability to establish link parameters
  - Know speed prior to bringing up SERDES
  - Creates a plug-n-play feel
  - Decreased management interaction
  - Ability to negotiate other protocols
- Why Clause 28 over Clause 37
  - Clause 37 requires PMA/PCS to be operational
  - Clause 28 generates its own clock
  - More Clause 28 implementations
  - Common among Ethernet copper technologies

Auto-Negotiation

- Leverage FLP mechanism from Clause 28
  - Electrical template needs to align with BESG requirements
- Speed negotiations
  - 1G single lane
  - 10G single lane
  - 10G 4-lane (aka XAUI)?
- Other negotiations?
  - Flow control, failover, signaling etc.

High Level Model



Layer Model

Auto-Negotiation with Clause 28

- Transmit Function
  - Retains FLP burst sequence and coding
- Link Code Word Encoding (Base & Next Page)
  - Use same encoding as shown in Clause 28.2
  - Set NP bit to indicate next page
  - Use NP Message Page Code 9 defined in Table 28C-1 to indicate new Backplane 10G/1G capable device
  - Lane information, technology information exchanged in next pages
  - RF, Ack Same as defined in Clause 28
  - Make it architecturally consistent with 10GBASE-T

S0	S1	S2	S3	S4	A0	A1	A2	A3	A4	A5	A6	A7	RF	Ack	NP

Base Page and Next Page Assignments

- Send Base Page Same as Clause 28
- Send one Formatted NP with Message Page for BP
  - M10:M0 = 0x9
- Send one unformatted NP as defined below

Bit	Technology	BP traces
U0	1000BASE-X	1 lane BP trace
U1	10GBASE-X4 (4 x 3.125G)	4 lane BP trace
U2	10GBASE-? (1 lane 10G)	1 lane BP trace
U3:10	Reserved *	

* Can be used for other negotiations; Flow control, failover etc.

Receive Function

- Receives FLP bursts as defined in Clause 28 with proposed burst encoding
  - Ability to detect capability of link partner
- Exchanges Ack as defined in Clause 28
- Switches the receive path to technology dependent PMA based on speed negotiated
- Priority is highest common denominator

Management Registers & State Machines

- The Management Registers will be same as defined in Clause 28
  - Appropriate selector fields will be used in the respective registers to indicate capabilities
- Can use Clause 22 or Clause 45 register set
- Use the state machines as defined in Clause 28

Electrical Definition

- The electrical template as defined in Clause 28.4 may not be suitable for operation with existing backplane SERDES devices
- Electrical template should align with backplane signaling specifications

Things to Consider

- 10GBASE-T
  - Will be making changes to Clause 28
  - Align with their efforts
- Perform an MDI/MDI-X function?
  - XAUI & CX4
- Compatibility with existing components

Summary

- Recommendation is to leverage existing Clause 28 auto-negotiation
  - Make changes where it is appropriate
- Need to operate with existing components and devices that opt not to use the proposed Auto-Negotiation
- Align with electricals to be defined in 802.3ap