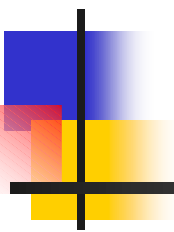


# 802.3ap

## Proposal for Auto-Negotiation



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# Contributors

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# General 802.3ap

## Autonegotiation Objectives

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- Compatible with legacy auto-negotiation systems and align with any enhancements for 802.3an(10GBASE-T)

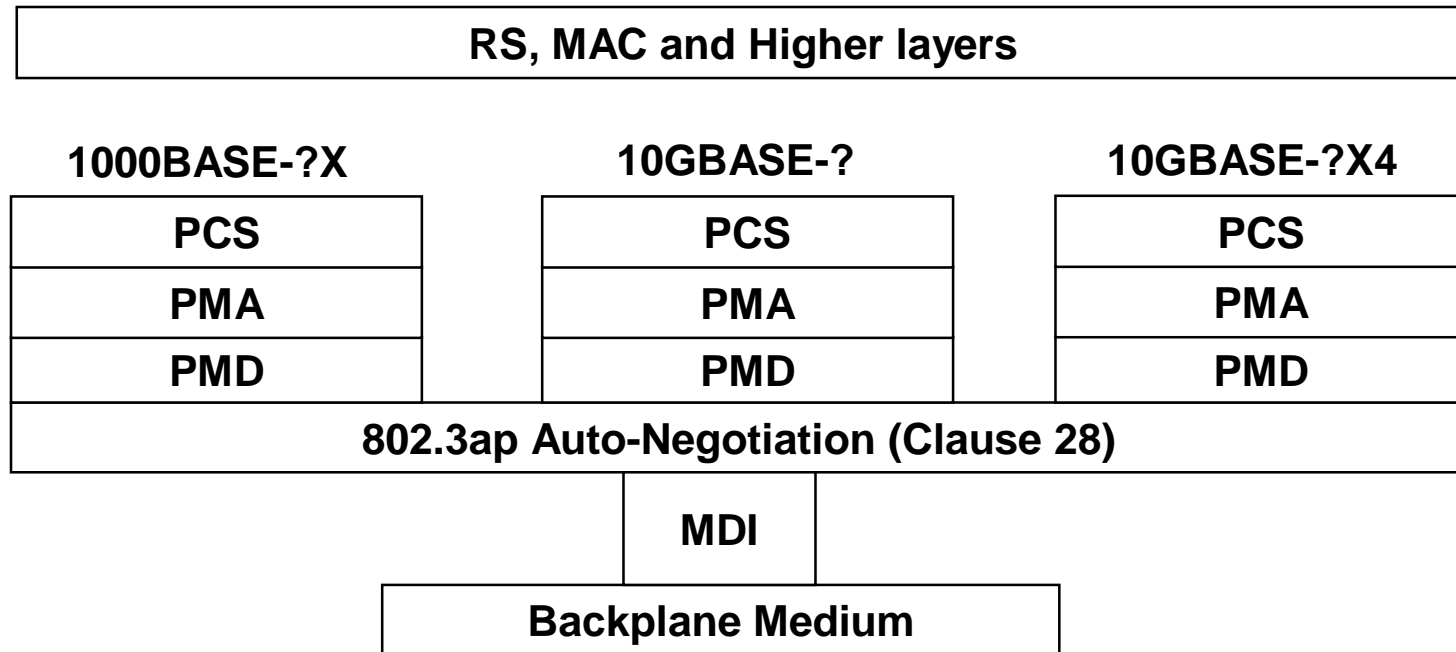
# Objectives Of This Proposal



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- Define 802.3ap Auto-Negotiation for
  - 1G/10G speeds
  - Allow negotiation of new technology capabilities for backplane Ethernet. eg. Signaling, Lanes, congestion management parameters etc.
- Define electricals compatible with 802.3ap backplane signaling (to be defined)
- Leverage existing Clause 28 Auto-Neg
  - Stay within 3 sec link time limit established by 1000BASE-T
- Adopt Clause 45 Management registers
  - Be backwards compatible to Clause 22 registers?
- Need to operate with existing components and devices that opt not to use the proposed Auto-Negotiation
  - Compatible with legacy 1G and XAUI devices

# High Level Model



Layer Model



# Auto-Negotiation

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- Speed negotiations
  - 1G single lane
  - 10G single lane
  - 10G 4-lane (compatible with XAUI, CX4, ATCA™ BX4)?
- Other negotiations relevant to Backplane Ethernet
  - Signaling, failover etc.
  - Flow control, congestion management parameters (align with CMSG)

# Clause 28 Auto-Negotiation

- Use FLP and timing as specified in Clause 28
  - Should we consider speeding up FLPs or spacing between bursts?
- Base Page same as presented in the March Plenary Meeting
- Set NP to indicate the device is next page capable

S0	S1	S2	S3	S4	A0	A1	A2	A3	A4	A5	A6	A7	RF	Ack	NP
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# 1<sup>st</sup> Next Page Assignment

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- Send one Formatted NP with Message Page for 802.3ap:  
M10:M0=0x9
- Upon receiving an ACK for this page, both sides can then speed up FLP transmission rate
- Min FLP burst time shortened to 32us
- Min period between FLP bursts shortened to 4ms
- Min FLP pulses is 17, as in Clause 28
- Max FLP pulses is 33, as in Clause 28
- Goal: Achieve consistency with potential 802.3an approach





## 2<sup>nd</sup> Next Page

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- Transmitted using the faster FLP bursts
- Unformatted NP as defined below for BP capabilities
- Additional capabilities maybe added in this page or series of NPs following this page

Bit	Technology	BP traces
U0	1000BASE-?X	1 lane BP trace
U1	10GBASE-X4 (4 x 3.125)	4 lane BP trace
U2	10GBASE-? (1 lane 10G)	1 lane BP trace
U3:U1 0	RESERVED*	

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



# Following Next Pages

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- Information to be exchanged can include:
  - # of lanes used
  - Default lane # for 10G serial or 1G operation
  - Training seeds for specific line codes
  - Power saving modes
  - Presence of Clause 22 Management registers
  - Congestion Management Parameters
- Some of the next pages can be optional
- All can be accomplished with a goal of 3 second link time out budget established by 1000BASE-T



# Receive Function

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- Receive function compatible with Clause 28
- Legacy considerations for future implementations
  - May use parallel detect function if FLP is not received
  - May determine whether link is legacy 1G SERDES or XAUI based on number of valid 10B codes received within a given time (320ns)
  - May enable Clause 37 based Auto-Negotiation for legacy 1G SERDES
  - May Autonegotiate with 1000BASE-T devices



# Electrical Definition

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- Electrical template should be defined to be compatible with 802.3ap signaling specifications
  - Need inputs?
- The electrical template as defined in Clause 28.4 may not be suitable for operation with existing backplane SERDES devices



# Management Registers

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- The Management Registers to use Clause 45 specification
- Check register 2.5.0 to see if Clause 22 based registers are present
- Backwards compatible with Clause 22 based registers (as in 802.3ah and has to be investigated by 10GBASE-T also)
- May need voltage translation devices for MDIO bus to be backwards compatible with Clause 22 specification (as specified in Annex 45A)



# Capability Resolution

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- Define capability arbitration and resolution based on extensions of current speed resolution table
- Capabilities that need arbitration are
  - PHY Type
  - Different speed capabilities
  - Any other enhancements from 802.3an
- Choose highest common denominator for capabilities



# Things to Consider

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- Specify Max FLP burst time?
- Be Clause 28 compatible but go to new simplified state machine specific to 802.3ap?
  - Logic block reuse for multiple designs
  - Compatibility with 802.3an



# Summary

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- Finalize the objectives for Auto-Negotiation
- Leverage Clause 28 Auto-Negotiation
- Adopt Clause 45 management registers
- Align with electricals to be defined in 802.3ap
- Need to operate with legacy devices and devices that opt not to implement Auto-Negotiation