

Auto-Negotiation Priority Resolution Proposal

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Basic Auto-Negotiation Function

- Find highest common ability between two PHYs
- Resolve who is leader and follower
- Stalls if no common ability exist between the two PHYs, or
- Cannot resolve who should be leader or follower
 - i.e. both PHYs insist on being leaders
- Leader/Follower applies to all capabilities
 - i.e. no provision to advertise leader for one capability and follower for another capability

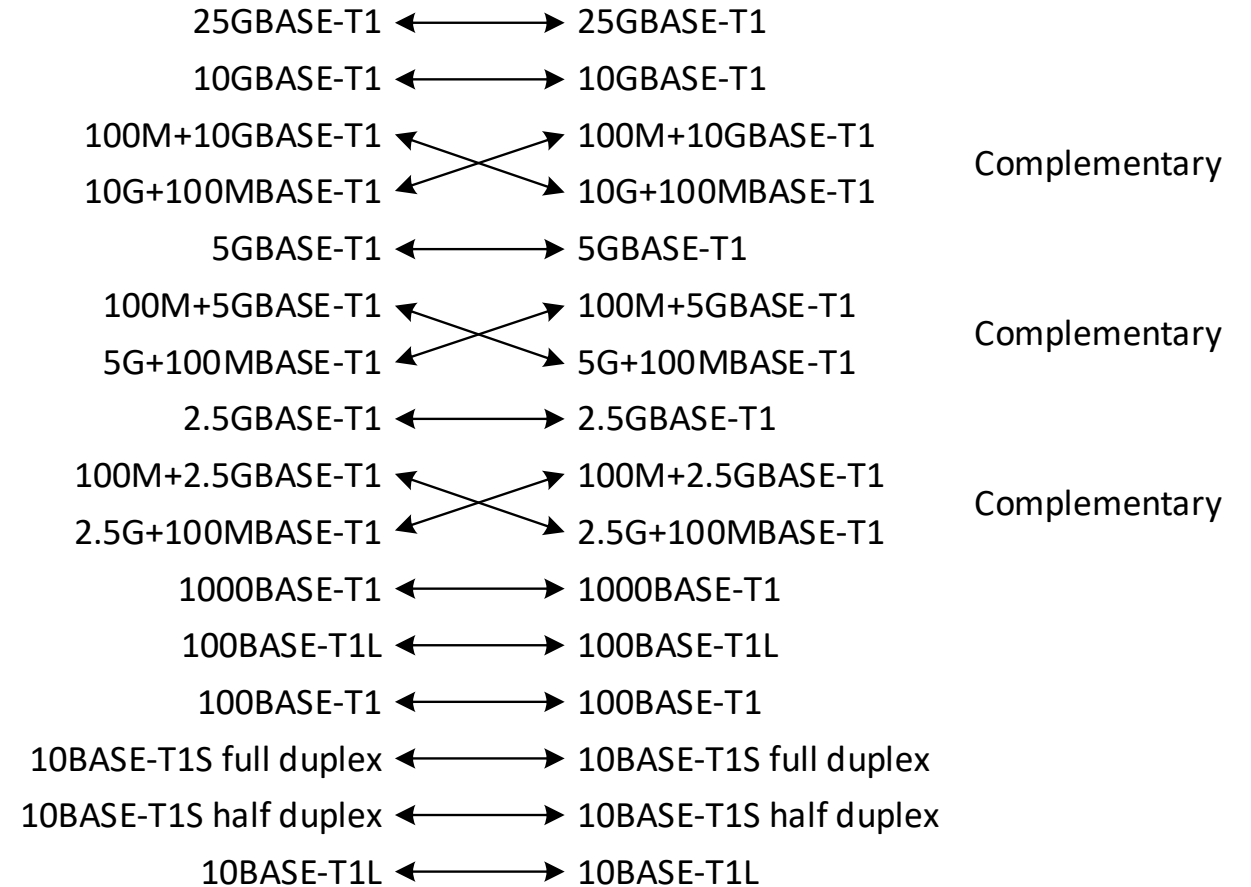
Matching Capabilities

- A simple priority list and finding matching abilities no longer works
- Asymmetrical PHYs want complementary abilities

25GBASE-T1	↔	25GBASE-T1	
10GBASE-T1	↔	10GBASE-T1	
100M+10GBASE-T1	↔ X	100M+10GBASE-T1	Not Compatible
10G+100MBASE-T1	↔ X	10G+100MBASE-T1	Not Compatible
5GBASE-T1	↔	5GBASE-T1	
100M+5GBASE-T1	↔ X	100M+5GBASE-T1	Not Compatible
5G+100MBASE-T1	↔ X	5G+100MBASE-T1	Not Compatible
2.5GBASE-T1	↔	2.5GBASE-T1	
100M+2.5GBASE-T1	↔ X	100M+2.5GBASE-T1	Not Compatible
2.5G+100MBASE-T1	↔ X	2.5G+100MBASE-T1	Not Compatible
1000BASE-T1	↔	1000BASE-T1	
100BASE-T1L	↔	100BASE-T1L	
100BASE-T1	↔	100BASE-T1	
10BASE-T1S full duplex	↔	10BASE-T1S full duplex	
10BASE-T1S half duplex	↔	10BASE-T1S half duplex	
10BASE-T1L	↔	10BASE-T1L	

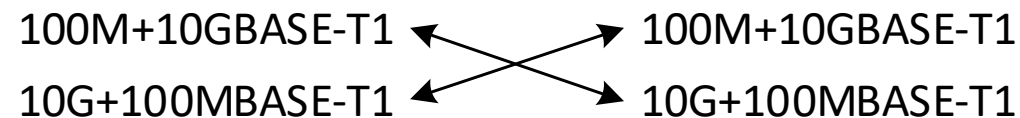
Complementary Capabilities

- Use matching ability for symmetrical PHYs
- Use complementary ability for asymmetrical PHYs



Pathological Cases

- Both PHYs advertise both capabilities of asymmetric link
- Which PHY gets to be the slow transmitter vs the fast transmitter?
- Not a likely implementation scenario, but it is possible to set



Proposed solution

- Let leader / follower be resolved first on PHYs that advertises asymmetrical capabilities
- Leader / follower resolution not needed prior to ability resolution if only symmetrical capabilities are advertised
- Have a different priority resolution order based on whether PHY is leader or follower
 - No difference in order if PHY only advertises symmetrical capabilities

Leader		Follower
25GBASE-T1	↔	25GBASE-T1
10GBASE-T1	↔	10GBASE-T1
100M+10GBASE-T1	↔	10G+100MBASE-T1
10G+100MBASE-T1	↔	100M+10GBASE-T1
5GBASE-T1	↔	5GBASE-T1
100M+5GBASE-T1	↔	5G+100MBASE-T1
5G+100MBASE-T1	↔	100M+5GBASE-T1
2.5GBASE-T1	↔	2.5GBASE-T1
100M+2.5GBASE-T1	↔	2.5G+100MBASE-T1
2.5G+100MBASE-T1	↔	100M+2.5GBASE-T1
1000BASE-T1	↔	1000BASE-T1
100BASE-T1L	↔	100BASE-T1L
100BASE-T1	↔	100BASE-T1
10BASE-T1S full duplex	↔	10BASE-T1S full duplex
10BASE-T1S half duplex	↔	10BASE-T1S half duplex
10BASE-T1L	↔	10BASE-T1L

Priority Resolution

- Another way to express
- Resolve Leader/Follower
- Find Common Capabilities
- Pick the lowest number one
- Side note for auto-downshift (outside scope of IEEE) simply downshift to next lowest numbered common capability using table.

		Link Partner															
		25GBASE-T1	10GBASE-T1	100M+10GBASE-T1/V1 (L)	100M+10GBASE-T1/V1 (F)	10G+100MBASE-T1/V1 (L)	10G+100MBASE-T1/V1 (F)	5GBASE-T1	100M+5GBASE-T1/V1 (L)	100M+5GBASE-T1/V1 (F)	5G+100MBASE-T1/V1 (L)	5G+100MBASE-T1/V1 (F)	2.5GBASE-T1	100M+2.5GBASE-T1/V1 (L)	100M+2.5GBASE-T1/V1 (F)	2.5G+100MBASE-T1/V1 (L)	2.5G+100MBASE-T1/V1 (F)
PHY	25GBASE-T1	1															
	10GBASE-T1		2														
	100M+10GBASE-T1/V1 (L)					3											
	100M+10GBASE-T1/V1 (F)				4												
	10G+100MBASE-T1/V1 (L)			4													
	10G+100MBASE-T1/V1 (F)		3														
	5GBASE-T1							5									
	100M+5GBASE-T1/V1 (L)										6						
	100M+5GBASE-T1/V1 (F)									7							
	5G+100MBASE-T1/V1 (L)								7								
	5G+100MBASE-T1/V1 (F)							6									
	2.5GBASE-T1										8						
	100M+2.5GBASE-T1/V1 (L)														9		
	100M+2.5GBASE-T1/V1 (F)														10		
	2.5G+100MBASE-T1/V1 (L)													10			
	2.5G+100MBASE-T1/V1 (F)											9					
	1000BASE-T1															11	
	100BASE-T1L															12	
	100BASE-T1																13
	10BASE-T1S Full Duplex																14
	10BASE-T1S Half Duplex																15
	10BASE-T1L																16

Technology Ability Field

- No need to have separate bits for T1 vs V1.
 - Cannot autoneg the cable type on the fly

bit	Selector description
...	
A11	100M+2.5GBASE-T1/V1 ability
A12	2.5G+100MBASE-T1/V1 ability
A13	100M+5GBASE-T1/V1 ability
A14	5G+100MBASE-T1/V1 ability
A15	100M+10GBASE-T1/V1 ability
A16	10G+100MBASE-T1/V1 ability

THANK YOU