

Classification of 1394b PHY

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1 Purpose of contribution

The architecture of 1394b PHY is very complex. The reason is that there are some same functions in the same layer. For example, There are both BOSS arbitration and legacy arbitration as arbitration scheme. There are both DS mode and Beta mode as coding scheme. I would like to classify 1394b PHY by functions and then clarify the scope of P1394b.

2 Definitions

MAC layer :	MAC means Media Access Control layer. The function is the method that many nodes can access to shared media. There are both BOSS arbitration and legacy arbitration in the case of 1394b.
PCS layer :	PCS means Physical Coding Sub layer. Arbitration code is changed into the code for transmission. There are both DS coding and combination of modified 8B/10B and scrambler in the case of 1394b.
PMD layer :	PMD means Physical Medium Dependent layer. There are 4 kinds of transceivers for short copper, UTP, POF/HPCF and MMF in the case of 1394b.

3 Architecture of 1394b phy

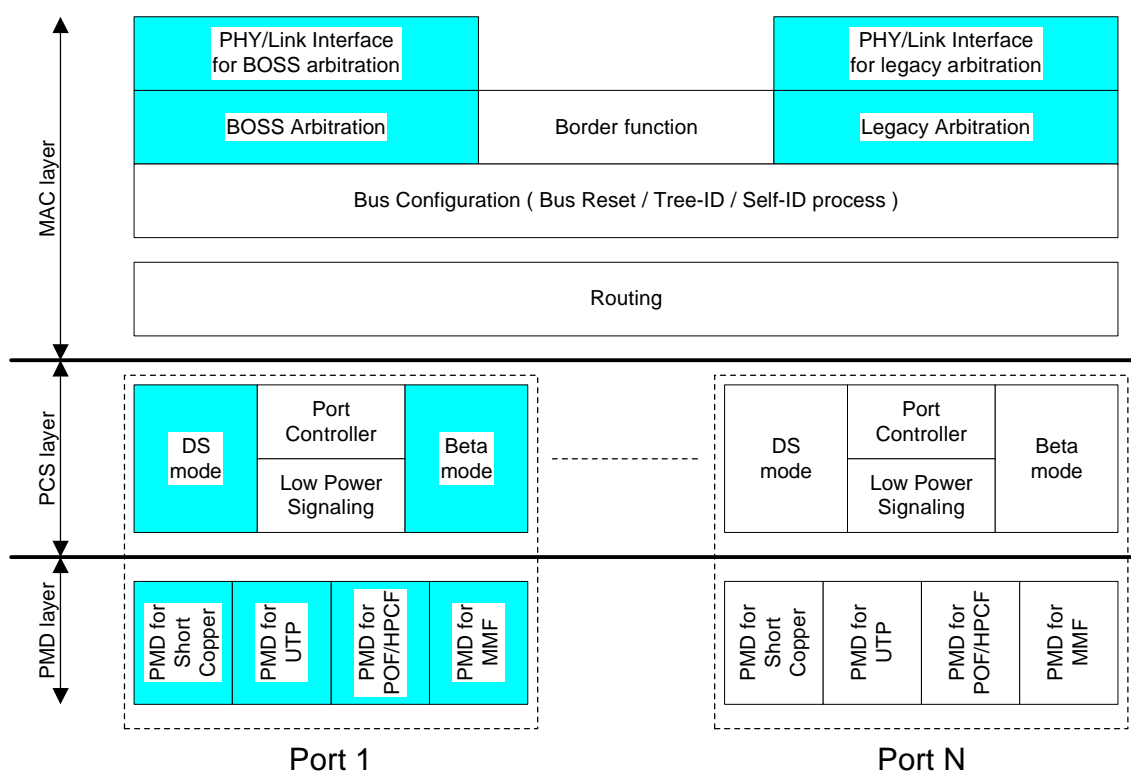


Fig. 1 : Architecture of 1394b phy (reference : mdt981206-bport-status.pdf)

The architecture of 1394b phy is shown in figure.1. It is separated into 3 layers, which are MAC layer, PCS layer and PMD layer. Meshed blocks are indicated as overlapped functions in each layer.

Table.1 shows the classification by combination of functions in each layer. A 1394b phy is classified into 16 classes. No. 1 is identical with a legacy 1995/a phy(#1). It is impossible to operate No.2, 3, 4 because both data signal and strobe signal must be transmitted simultaneously when DS coding is used(#2). It is also impossible to operate No.9, 10, 11, 12 because the BOSS arbitration needs full-duplex lines(#3).

Table. 1 : Classification of 1394b PHY

No.	Functions			Features	
	MAC layer (arbitration)	PCS layer (coding)	PMD layer for Medium (Connector)	speed range	comments
1	Legacy arbitration	DS	Copper (6ckt/4ckt)	S100–S400	(#1)
2			UTP (RJ45)	IMPOSSIBLE(#2)	
3			POF (PN)	IMPOSSIBLE(#2)	
4			MMF (LC)	IMPOSSIBLE(#2)	
5		Beta (8B/10B + Scrambler)	Copper (6ckt/4ckt)	S800–S1600	high speed
6			UTP (RJ45)	S100	low cost long-haul
7			POF/HPCF (PN)	S100–S200	low cost long-haul
8			MMF (LC)	S400– S3200	high speed long-haul
9	BOSS arbitration	DS	Copper (6ckt/4ckt)	IMPOSSIBLE(#3)	
10			UTP (RJ45)	IMPOSSIBLE(#3)	
11			POF (PN)	IMPOSSIBLE(#3)	
12			MMF (LC)	IMPOSSIBLE(#3)	
13		Beta (8B/10B + Scrambler)	Copper (6ckt/4ckt)	S800–S1600	high speed short-haul high efficiency
14			UTP (RJ45)	S100	long-haul high efficiency
15			POF (PN)	S100–S200	long-haul high efficiency
16			MMF (LC)	S400– S3200	high speed long-haul high efficiency

4 Conclusion

A P1394b phy has more functions rather than P1394a. It cause the complexity for b-phy. We should consider some layer independently and clarify combinations of the functions which are supported by P1394b.

“Backward compatible” is one of the important scopes of P1394b. Therefore both legacy arbitration and DS coding should be implemented in a 1394b-phy.

There is “definition of high speed bit protocol to handle various bus arbitration signals” as another scope. The protocol means Beta mode functions. Therefore Beta mode functions, that is 8B/10B coding with scrambler/descrambler, should be implemented in a 1394b-phy.

As a result, the phys of No.**5, 6, 7, 8, 13, 14, 15, 16** should be the scope of P1394b.