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# High Speed Study Group

## Fiber Optic Adhoc Report

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Dan Dove

ProCurve Networking by HP

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Two teleconferences in December:

<http://www.ieee802.org/3/hssg/public/foah/docs.html>

- December 6<sup>th</sup> – 2 hours
  - 22 attendees
  - 2 presentations
    - Chris Cole of Finisar – List of alternatives was discussed
      - Great effort to ensure all variables are considered and then eliminated based upon technical/economic feasibility
      - The list was presented and discussed
    - Itsuro Morita of KDDI Labs – DQPSK Proposal
- December 18<sup>th</sup> – 2 hours
  - 23 attendees
  - 1 presentation, 1 additional contribution
    - Chris Cole – Table of reduced alternatives contributed and discussed
    - David Martin: Nortel – Table of all alternatives contributed

## David Martin's Contribution:

Objective	Lambda	# Lanes	~Lane Rate (Gb/s)	Source	Mux	Grid
10km SMF	1550 nm	10	10	Cooled EML	DWDM	200 GHz G.694.1
	1550 nm	10	10	Un-cooled DML	CWDM	20 nm G.694.2
	1310 nm	5	20	Cooled EML	DWDM	200 GHz G.694.1
	1310 nm	5	20	Cooled DML	CWDM	20 nm G.694.2
	1310 nm	5	20	Un-cooled DML/EML	CWDM	20 nm G.694.2
	1310 nm	5	20	Cooled DML	DWDM	200 GHz G.694.1
	1550 nm	5	20	Cooled EML	DWDM	200 GHz G.694.1
	1310 nm	4	25	Un-cooled DML/EML	CWDM	25 nm 802.3 LX-4
	1310 nm	2	50	DQPSK	Single l	n/a
100m MMF OM3	850 nm	12 (8B/10B)	10	VCSEL	MPO ribbon (12 x 2)	12xSDM
	850 nm	10 (64/66)	10	VCSEL	MPO ribbon (12 x 2)	10xSDM
	840/860 nm	10 (64/66)	10	VCSEL	MPO ribbon (12 x 1)	2xWDM and 5xSDM
	840/860 nm	12 (8B/10B)	10	VCSEL	MPO ribbon (12 x 1)	2xWDM and 6xSDM
	835/850/865 nm	12 (8B/10B)	10	VCSEL	MPO ribbon (12 x 1)	3xWDM and 4xSDM

Chris Cole's Contribution:

## Reach (Technical) Feasibility of 100GE alternatives

	10km 1310nm	40km 1310nm	10km 1550nm	40km 1550nm
10G DML	yes (10λ span needs semi-cooling)	yes (need new DML & RX APD/SOA)	maybe (need new DML)	no
10G EML	yes	yes (need RX APD/ SOA)	yes	yes
20G/25G DML	yes (need new DML)	maybe (need new DML & RX SOA)	no	no
20G/25G EML	yes (need new EML)	yes (need new EML & RX SOA)	yes	yes (need RX DC)
50G DML	no	no	no	no
50G EML	yes (need I/Q ML)	yes (need I/Q ML, RX DC & SOA)	yes (need I/Q ML & RX DC)	yes (need I/Q ML & RX DC)

Green shading designates proposed study alternatives.

*Finisar*

Chris Cole's Contribution:

## Cost (1/Economic Feasibility) of 100GE alternatives

	10km 1310nm	40km 1310nm	10km 1550nm	40km 1550nm
10G DML	low	low	mid	not feasible
10G EML	mid	mid	mid	mid
20G/25G DML	low	low	not feasible	not feasible
20G/25G EML	mid	mid	mid	not economically feasible (RX DC)
50G DML	not feasible	not feasible	not feasible	not feasible
50G EML	high	not economically feasible (RX DC)	not economically feasible (RX DC)	not economically feasible (RX DC)

Green shading designates proposed study alternatives.

*Finisar*

Chris Cole's Contribution:

## Proposed SMF optical interface study alternatives

Alternative	$\lambda$	Channels	Rate	Source	Cooling	Grid
1	1550nm	10	10	EML	full semi	200GHz to 400Ghz
2	1310nm	5	20	EML	full semi none	200GHz to 5nm to 20nm
3	1310nm	5	20	DML	semi none	5nm to 20nm
4	1310nm	4	25	EML	full semi none	200GHz to 5nm to 25nm
5	1310nm	4	25	DML	semi none	5nm to 25nm
6	1310nm	2	50	I/Q ML	full	single $\lambda$

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Wrap Up:

Significant discussion on the single-mode alternatives

More data on technical / economic feasibility required for specific alternatives is probably required to gain consensus

Comparative data on cost difference between 10G and 100G is important to demonstrate economic feasibility

MAC/PHY interface should consider coding/lane requirements of PMD and it would be good if we can come up with a solution that takes all into consideration

I anticipate more presentations this week to drive to closure on 10Km-SM and 100m-MM

Thank you!