Multimode PMD Proposal and Supporting Rationale

Presented By

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September 12 - 14, 2000

IEEE 802.3ae Interim Meeting, New Orleans

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Presentation Objectives

- To propose a set of PMD implementations that
  - Meet the P802.3ae MMF distance objectives and criteria
  - Provide an optimal mix of technologies
- The set consists of
  - 850 nm Serial proposed in jewell_1_0900
  - 1310 nm WWDM proposed in hanson_1_0500
- Rationale
  - Show how this proposal meets the 5 Criteria

Fewer PMDs Is Better

- Customer confusion is high when confronted by may options slowing buying decisions
- Development is slowed by many options
- Manufacturing costs are raised by options
- Ideally we would have a single PMD which is the lowest cost, operates on all the fiber, and could reach over 80Km
- Since we can’t do it all in one we end up with a compromise.

Rationale

- Clear differentiation with customers
  - 1310 WWDM ➔ Campus and building backbones
  - 850 Serial ➔ Low cost equipment interconnects
- Complementary optimization
  - MMF space too broad to be optimally satisfied by one solution
  - Most complementary 2-PMD MMF solution set is optimized for opposite ends of that space
- Risk reduction
  - Serial and WWDM technologies have different risk elements
  - Including both reduces technical and manufacturing risk for system vendors

Criteria 1
Broad Market Potential

- Short-Reach Market Size: ~80% *
  - Large Quantity of Ports in Enterprise Backbones and Equipment Rooms
  - Large Quantity of Ports in WAN/MAN POP and CO Equipment Rooms
- Market acceptance depends on how well we match solutions to customer needs
  - Customers need to support installed MM & SM backbones ➔ 1310 WWDM
  - Customers need low cost Very Short Reach interconnects ➔ 850 Serial

* Supported by Nortel Market presentations, Roy Bynum POP model reflector discussion, IEEE distance surveys, Technical Essence Webs

Criteria 2
Compatibility with Standard 802.3

- PMD / PCS interface defines compatibility with higher layers for all PMDs.
- PMD specifications confirmed with accepted link model
- Retain distance compatibility with GbE cable plant

Criteria 3
Distinct Identity

- 4 PMD set overlaps objectives, but each solves unique application

Application	Optimal Solution
Longest Distance (40^{+} km)	1550 Serial
Med. reach, lower cost, transponder compat.	1310 Serial
Max reuse of installed MM / SM (Building LAN)	1310 WWDM
Low cost on MM (Equipment Room)	850 Serial

Criteria 3
Distinct Identity

Fiber Type per 11801 (Bandwidth @ 850nm//1310nm)	850 Serial	1310 WWDM	1310 Serial	1550 Serial
Legacy 62.5 MMF (160-200//500)	1-25 m	*1-300 m	NA	NA
Legacy 50 MMF (400-500//500)	1-75 m	*1-300 m	NA	NA
SMF	NA	1-10 km	1-10km	1-40km+

* Offset Launch Patch Cord required for distances > 100m

** New 50/125 MMF (2000//500)	1-300 m	1-300 m	NA	NA

** Work at 11801 in progress, not required to achieve 75 m on MMF

Criteria 4
Technical Feasibility

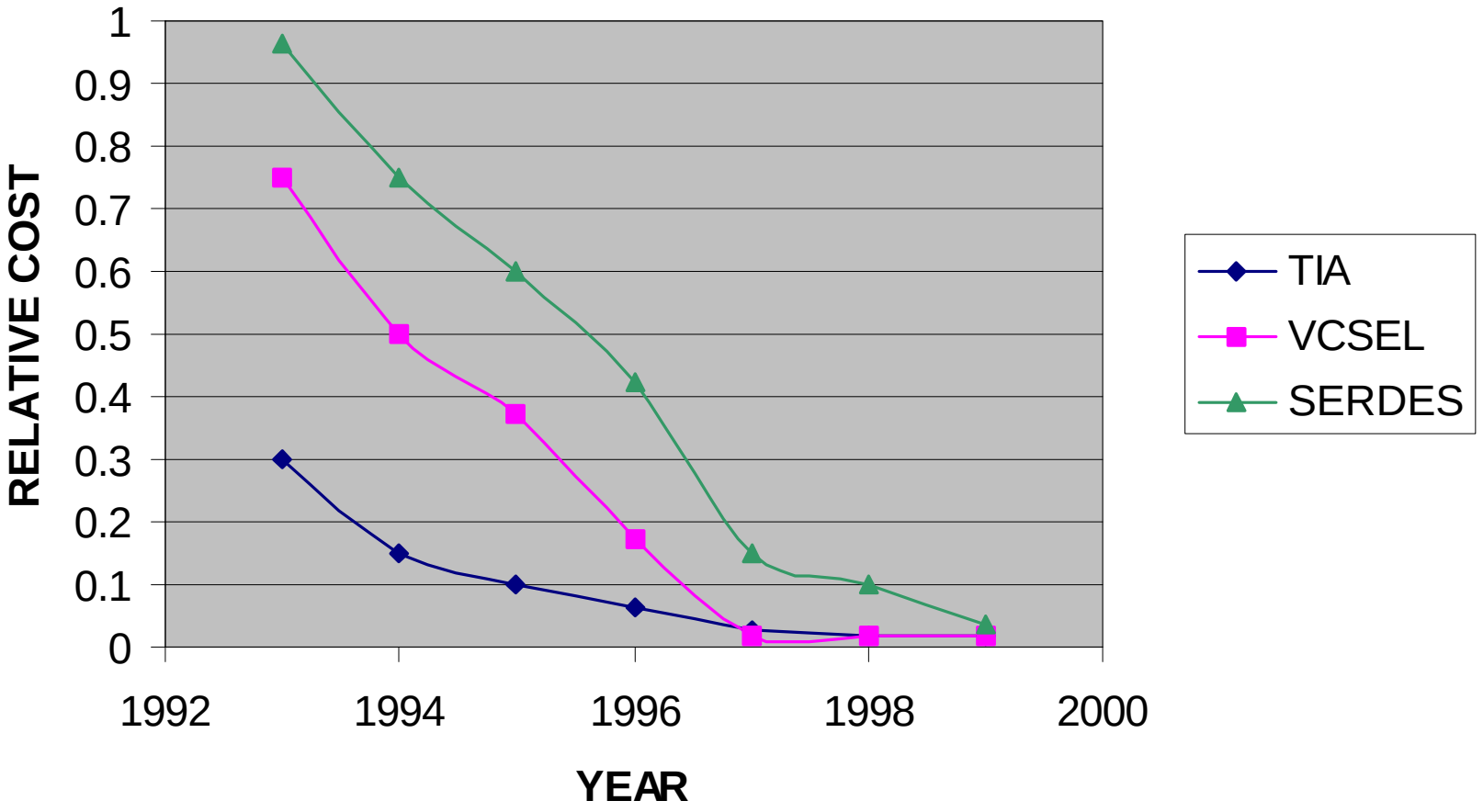
- 1310nm WWDM technology feasibility demonstrated
  - Demonstrated 300m on legacy 62.5 µm 500 MHz-km MMF and 10km on SMF
  - 300m on installed 50 µm 500 MHz-km MMF confirmed by link model
  - Prototypes available, products soon from multiple suppliers
- Serial 850nm technology feasibility demonstrated
  - 10 demonstrations by 8 companies to at least 300 m on new 50 µm 2000 MHz-km MMF
  - 75m on installed 50 µm 500 MHz-km MMF confirmed by link model
  - Prototypes available, products soon from multiple suppliers

Criteria 5
Economic Feasibility

- PMDs optimized for opposite ends of short reach space
- Customers can optimize choice based on application needs
  - Reuse legacy MMF to 300 m ➔ 1310 WWDM
  - Single solution for legacy MMF & SMF to10km ➔ 1310 WWDM
  - Low cost Very Short Reach equipment interconnect ➔ 850 Serial
  - Potential upgrade path to new HBW MMF ➔ 850 Serial or 1310 WWDM
- All Serial PMDs share same SerDes
  - Volumes and competing processes (CMOS, SiGe) will drive prices down
- WWDM PMD attaches directly to XAUI or SUPI sublayers for simple implementation

Criteria 5 - Economic Feasibility

IC Cost Trends for 1G

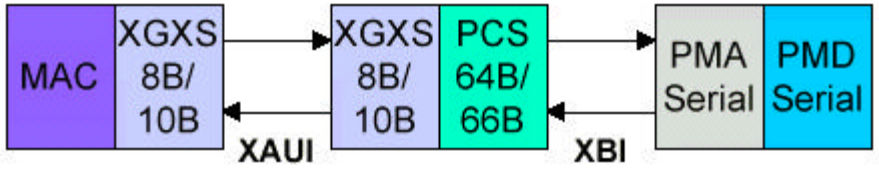


ICs decline by factors of 20 to 30

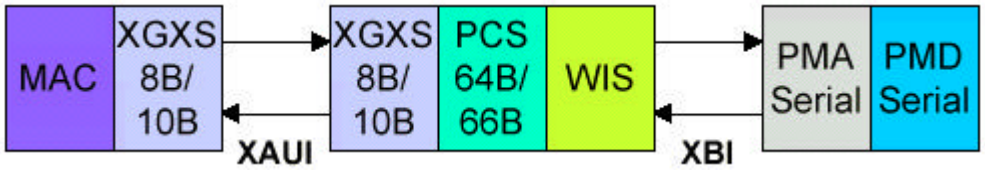
Criteria 5 - Economic Feasibility
Implementation Examples

850 Serial
1310 Serial
1550 Serial

LAN

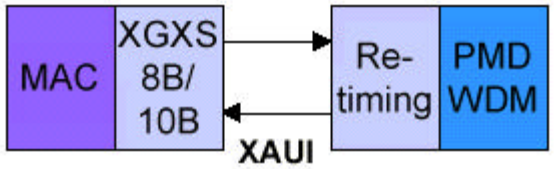


WAN

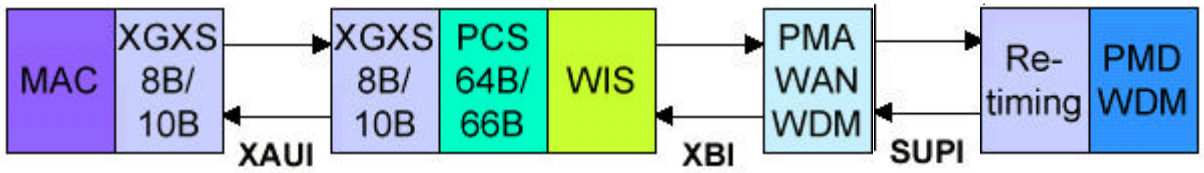


1310 WWDM

LAN



WAN



Conclusion

- The set of two MMF PMDs addressing existing campus networks and computer room jumper cables filling the objectives for a 300 m installed MMF and 75 m computer room MMF solution
  - 1310 WWDM for campus networks supporting installed MMF and also SMF
  - 850 Serial low cost solution for computer rooms allowing a single fiber and easy field termination

Possible Motion

Move that, to complete the objectives, the P802.3ae Task Force adopt the set of MMF PMDs comprised of 1310 nm WDM PMD as presented in hanson_1_0500 and 850 nm serial PMD as presented in jewell_1_0900 as the basis for two of the PMDs in draft D1.1.