Next-Gen 100G PMDs: Considerations when defining objectives

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Overview

Goal of this presentation is to provide the perspective of a networking and compute systems developer on what considerations should be included when developing the study group's objectives.

Significant experience in developing products and working with customers in applications relevant to this study group:

- Service Provider
- Enterprise network
- Enterprise data center
- Internet Data Center (MSDC)

Topics

- Background
- Electrical interface considerations
- MM considerations
- SM considerations

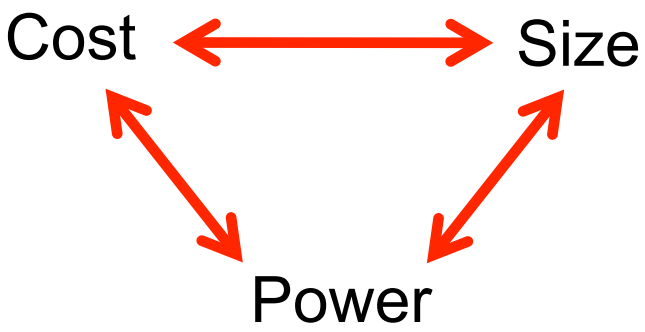
Background

Source: Yahoo and Cisco VNI 2011

Consequence: Industry priorities have adjusted between 2006 and now. Cost becomes even higher priority

System cost drivers

- system cost is driven by many factors
  - BOM cost
  - infrastructure needs (power/cooling)
  - ** system density **



Optimization of these factors is dependent on solid understanding of needs and requirements

- overdesign can result in non-optimal result
- just because we *can* do something doesn't mean we *should.*

Electrical considerations

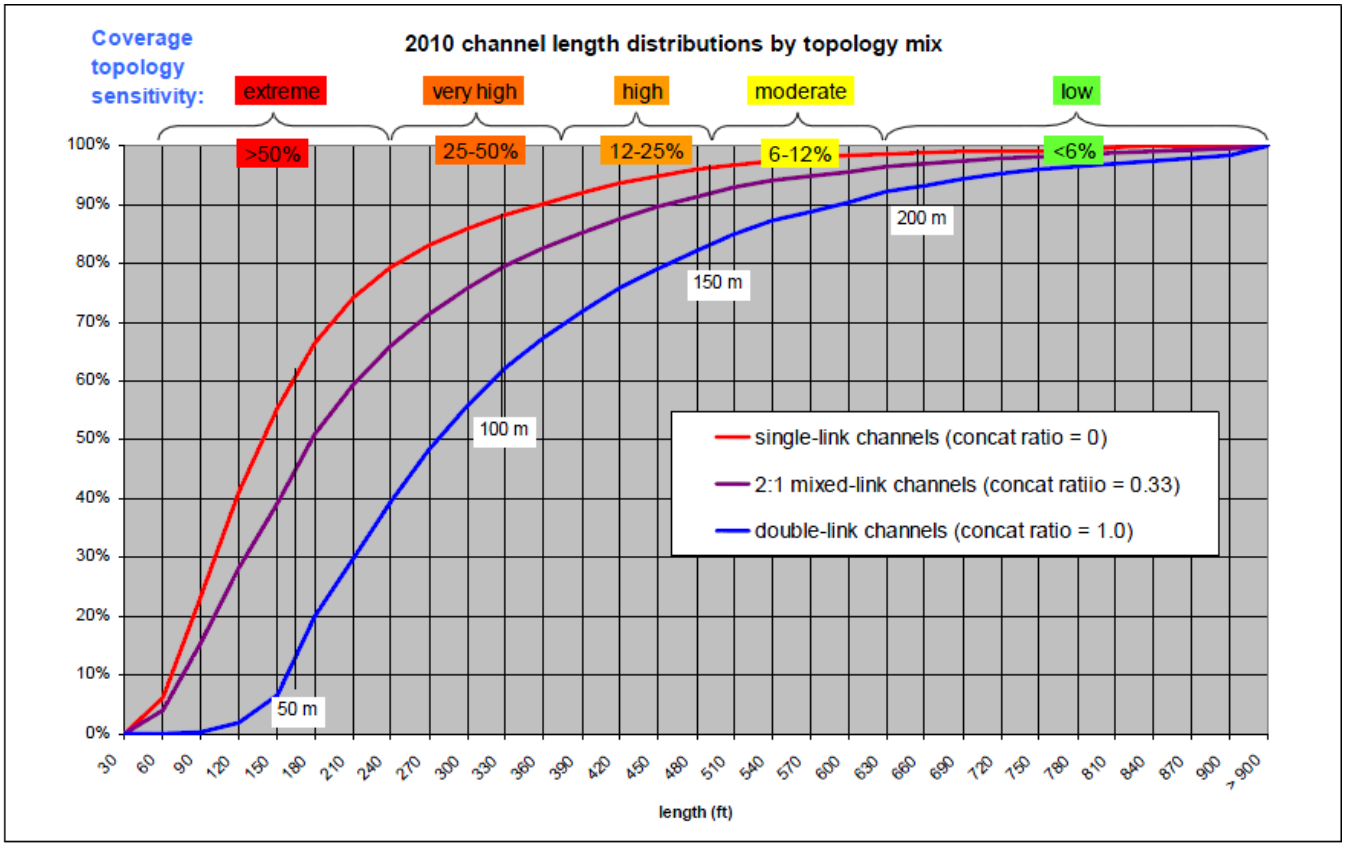
- Study group is focused on NG optical modules, therefore make sure focus is on chip to module requirements:
  - may be different from chip to chip
  - definitely different from backplane

- connector width affects density
- signal conditioning requirements affect power

Understand requirements and prioritize towards size, power, density aspects.

MM considerations

- Strongly support reduced cable density (cost)
- Expect significant discussion to determine reach objectives.
  - Reach vs. Retiming has significant system implications
  - Need to optimize cost & reach



Coverage topology sensitivity = (single-link coverage - double-link coverage) / single-link coverage

Dipping below 100m reach may limit applications

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SM considerations

- Industry concern over 100GBASE-LR4 cost factors
  - Additional concerns on density of current generation modules
- Call for Interest material showed clear benefit for reducing multimode fiber count – no such clear benefit yet articulated for single mode

Considerations:

- Incremental cost or power changes may not be sufficient to warrant definition of new PMD
- Set objective(s) at a performance level which delivers a step function improvement in cost/power/density

Industry needs: cost, cost, cost…

It's all about driving down "Total Cost of Ownership"

(capex)

Module Cost + Module Size/Power

(i.e. System Density)

(opex)

Optical Compatibility between form factors (backwards/forwards)

Question: Do we need anything beyond 802.3ba?

Don’t forget OPEX

- Total cost of ownership for network operators is a major consideration
- 10G excelled in providing a continuous form factor/cost reduction evolution without breaking optical interoperability/compatibility
- The majority of network operators have traditionally put high value on this and still do (for example IEEE 802.3bg).

Both SM and MM projects have potential to develop PMDs that break backward compatibility with previous generations of same application

- **not desirable but potentially acceptable if there is significant value proposition (i.e. cost) to it**

Wrap up

Some recommendations as the study group converges towards developing objectives:

Electrical: Focus on chip to module applications

Multimode: Ensure application coverage is maintained

Single mode: Deliver substantial improvement in cost / power / density