CORNING

Extended Link Lengths on MMF

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Background

- Several presentations to the HSSG on Data Center link lengths
  - kolesar_01_0906.pdf
    - data gathered from corporate sales data
    - recommended setting short reach length objective = 150 m
  - swanson_01_1106.pdf
    - data gathered from corporate sales data
    - recommended setting short reach length objective = 200 m
  - flatman_01_0108.pdf
    - 9 enterprise data centers from US, UK, Germany
- Some areas of agreement, some differences
  - Likely based on assumptions

Corning survey of customers

- Asked customers to consider three options
  - **Option 1:** Requires development of one optical module
    - OM3 to 100m (low cost solution)
  - **Option 2:** Requires development of one optical module.
    - OM3 to 150m or 200m
    - OM4 to 250m
  - **Option 3:** Requires development of two optical modules.
    - OM3 to 100m from Proposal 1
    - OM3 to 150m or 200m from Proposal 2
    - OM4 to 250 m from Proposal 2

Customer profile

- 20 customers responded
  - Not as good as we hoped but reasonable response rate
- Broad cross section of users
  - Corporate accounts
  - School districts
  - Banks
  - Military
  - Consultants
  - Network integrators
  - Government users

Survey Summary

- 20 customer responses
  - **Option 1:** Requires development of one optical module
    - OM3 to 100m (low cost solution)

    Ø 0 responses
  - **Option 2:** Requires development of one optical module.
    - OM3 to 150m or 200m
    - OM4 to 250m

    Ø 16 responses
  - **Option 3:** Requires development of two optical modules.
    - OM3 to 100m from Proposal 1
    - OM3 to 150m or 200m from Proposal 2
    - OM4 to 250 m from Proposal 2

    Ø 4 responses

Capsule Summary of Responses

- When it comes to 40G and 100G, entities that need that much bandwidth won't consider cost to be much of a barrier. With that in mind, Option 3 would make the most sense.
- I believe that the growing needs of bandwidth and larger data center facilities will benefit greatly from the ability to adopt OM3 fiber optic cables out to lengths greater than 100m for this new 40/100g Ethernet standard.
- I feel that as DC managers we will be challenged in the near future to stretch out infrastructure as far as possible so I never see the need for a transceiver that would limit distance.
- I prefer an Option 2 with a 200m distance limitation. That way I could deploy one Telecommunications Room on a floor that currently requires two.
- Truth be told, I would view anything less than 200m to be extremely restrictive ... in my view 300m is not too excessive

Capsule Summary of Responses (cont.)

- I don't think that the 100m requirement is sufficient. In most cases the elimination of closets and special devices for drops over 100m will provide significant savings to end user community. I believe that 150m on Laser optimized 50µm would cover the majority of scenarios and keep the cost of fiber at a reasonable level
- With the datacenter sizes (floor space) increasing, I would support Option 3 with the development of a low cost module to handle shorter distances and a more powerful module to handle the longer distances over 50 µm OM3 and OM4 multimode fibre
- Half of my DC is outside of 100m; Option 2 (200m) would be OK but I would like it to match 10gig to 300m
- I think that Option 3 will meet the industry needs long term. It provides additional flexibility with regards to data center design and cable plant management. Fiber limitations were a major consideration during my last data center design/build out

Capsule Summary of Responses (cont.)

- We at …. (550K sq.ft) have invested heavily in OM3 fiber infrastructure over the past six years. Our thought from the beginning was to install a robust fiber network in our data centers to carry us into the realm of 40/100G topologies of the future.

  Currently, our longest runs of fiber are at 185 meters. We would like to see the standard written to include 200-meter lengths regarding OM3 50um fiber, providing the performance characteristics are there to support actual 40G & 100G throughput.

  It would be very costly for ….. to limit the new standard to 100-meters and would cause us to introduce SM fiber within our data centers which we prefer not to do at this time or in the future unless absolutely necessary.

  Please be our voice in the upcoming 40/100G standards discussions supporting a 200-meter standard for OM3 fiber.

Corning's position on link lengths

- We need to address longer lengths on MMF in the 40/100G Standard
- We support the low cost option already approved
- We are technology agnostic in how we achieve longer lengths
  - Tighter transceiver specifications
  - CDR
  - EDC
  - FEC