



# Channel Coverage in Data Centers

Paul Kolesar

IEEE 802.3ba, March 2008

**SYSTIMAX**<sup>®</sup>  
SOLUTIONS

# Recent contributions on subject

- **Kolesar\_01\_0906**
  - Channel lengths extracted from corporate fiber sales
- **Swanson\_01\_1106**
  - Channel lengths extracted from corporate fiber sales
- **Flatman\_01\_0108**
  - Channel lengths extracted from survey of nine enterprise data centers, fiber and copper
  - Delineated three connectivity subsystems:
    - Client to Access
    - Access to Distribution
    - Distribution to Core

# Observations from Flatman survey

- **Client-to-Access channel length**
  - ~100% within 100 m
- **Access-to-Distribution channel length**
  - ~100% within 250 m
- **Distribution-to-Core channel length**
  - ~100% within 250 m

# Typical media deployment scenario

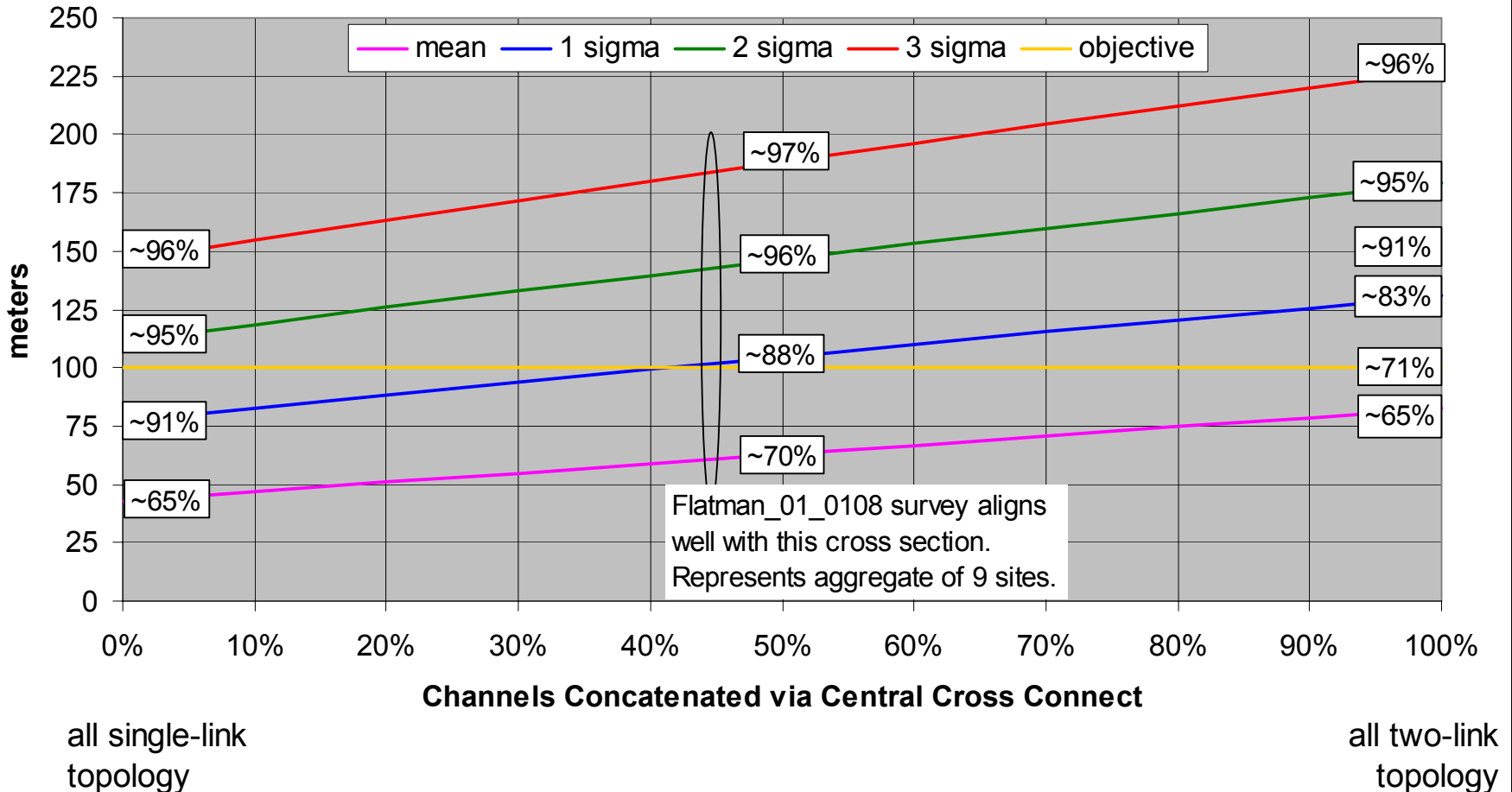
- **Client-to-Access (100 m)**
  - Served by copper media
- **Access-to-Distribution (250 m)**
  - Served by fiber
- **Distribution-to-Core (250 m)**
  - Served by fiber

**The Kolesar and Swanson contributions agree with Flatman survey on 250 m max length for last two subsystems where fiber is primary media**

**Flatman and Kolesar closely agree on distribution of permanent link distances in Access-to-Distribution**

# What portion is served by 100 m PMD?

Coverage of Access-to-Distribution Channels  
as a Function of Channel Topology



# Coverage depends on topology

- **Single-link channel coverage**
  - ~94% (good)
- **Aggregate mix (in Flatman survey) coverage**
  - ~89% (fair)
- **Two-link (central cross connect) coverage**
  - ~71% (poor)

**Aggregate mix in Flatman survey aligns with ~45% central cross connect topology presence**

**Central cross connects becoming more prevalent as structured cabling penetrates DCs driven by larger infrastructures and standards**

**Swanson study acknowledges presence of even more complex three-link topology**

# Consequences of a 100 m MMF PMD

- **Client-to-Access channels will be well served**
- **Customers deploying central cross connect topology in Access-to-Distribution and Distribution-to-Core channels will be poorly served**
  - **Forced to deploy more costly SM solution in about 30% of channels where MMF is the primary media**
  - **Hinders market acceptance of 40GbE and 100GbE in enterprise space**

# Recommendations

- **Produce specification with good coverage for all subsystems and topologies on OM3**
  - **> 90% coverage can be achieved with a reach of 150 m**
  - **Using aronson\_01\_0907 parameters, the total power penalty increases 0.9 dB for additional 50 m, still under 4 dB total**
- **Address coverage to 250 m using OM4**

