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# **Market potential for 100 GbE copper**

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# Supporters

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- **Michael J. Bennett,** **LBLnet Services Group**
- **Yakov Belopolsky,** **Bel Stewart Connector**
- **Ed Cady,** **Meritec**
- **Suveer Dhamejani,** **Tyco Electronics**
- **Chris DiMinico,** **MC Communications**
- **Alan Flatman,** **Independant**
- **Henning Hansen,** **Leoni High Speed Cables**
- **Sanjay Kasturia,** **Teranetics**
- **Greg McSorley,** **Amphenol Interconnect Products**
- **Ron Nordin,** **Panduit Corporation**
- **Gourgen Oganessyan,** **Molex Incorporated**
- **Joe Pein,** **Honda Connector**
- **Petre Popescu,** **Astar**
- **Herb Van Deusen,** **W.L. Gore**
- **George Zimmerman,** **Solarflare Communications**

# Background

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- A presentation demonstrating the technical feasibility of 100 Gb/s copper interconnect and market potential for intra/inter rack applications was presented at November 2006 IEEE 802.3 Higher Speed Study Group Meeting.

[http://www.ieee802.org/3/hssg/public/nov06/diminico\\_02\\_1106.pdf](http://www.ieee802.org/3/hssg/public/nov06/diminico_02_1106.pdf)

- 5 criteria: For each project proposal the 802 standards processes includes documenting the broad market potential, compatibility, distinct identity, technical feasibility and economic feasibility; referred to as the 5 criteria.

Broad Market Potential  
Compatibility  
Distinct Identity  
Technical Feasibility  
Economic Feasibility

# Objective

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- **Further development of material on the “broad market potential” for 100 GbE copper.**
  - **Listing of interested vendors and supporters.**

# Market Potential

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**Broad set( s) of applications**

**Multiple vendors, multiple users**

**Balanced cost, LAN vs. attached stations**

Applications listed below largely based on questionnaire responses designed to solicit end-user input on the market potential for 100 GbE over copper.

Respondents: Pacific Northwest National Laboratory, ESnet Network Engineering Group, Lawrence Berkeley National Laboratory; Electronic Systems Engineering, Computing Division, Fermilab US DOE; Lawrence Livermore Nat'l Lab (LLNL)

- Right now there is a need to move and process/analyze 100+ Petabyte data sets between supercomputer and storage nodes.
- Datacenter or computer room, 100-GbE copper to a 100GbE copper+fiber router/switch.
- Low-cost interconnect between networking equipment (e.g., routers, switches, etc) in a telecom POP or at the network edge for peering or customer handoff. There is a need for 100GE customer handoff and peering within 5 years.

# Market Potential

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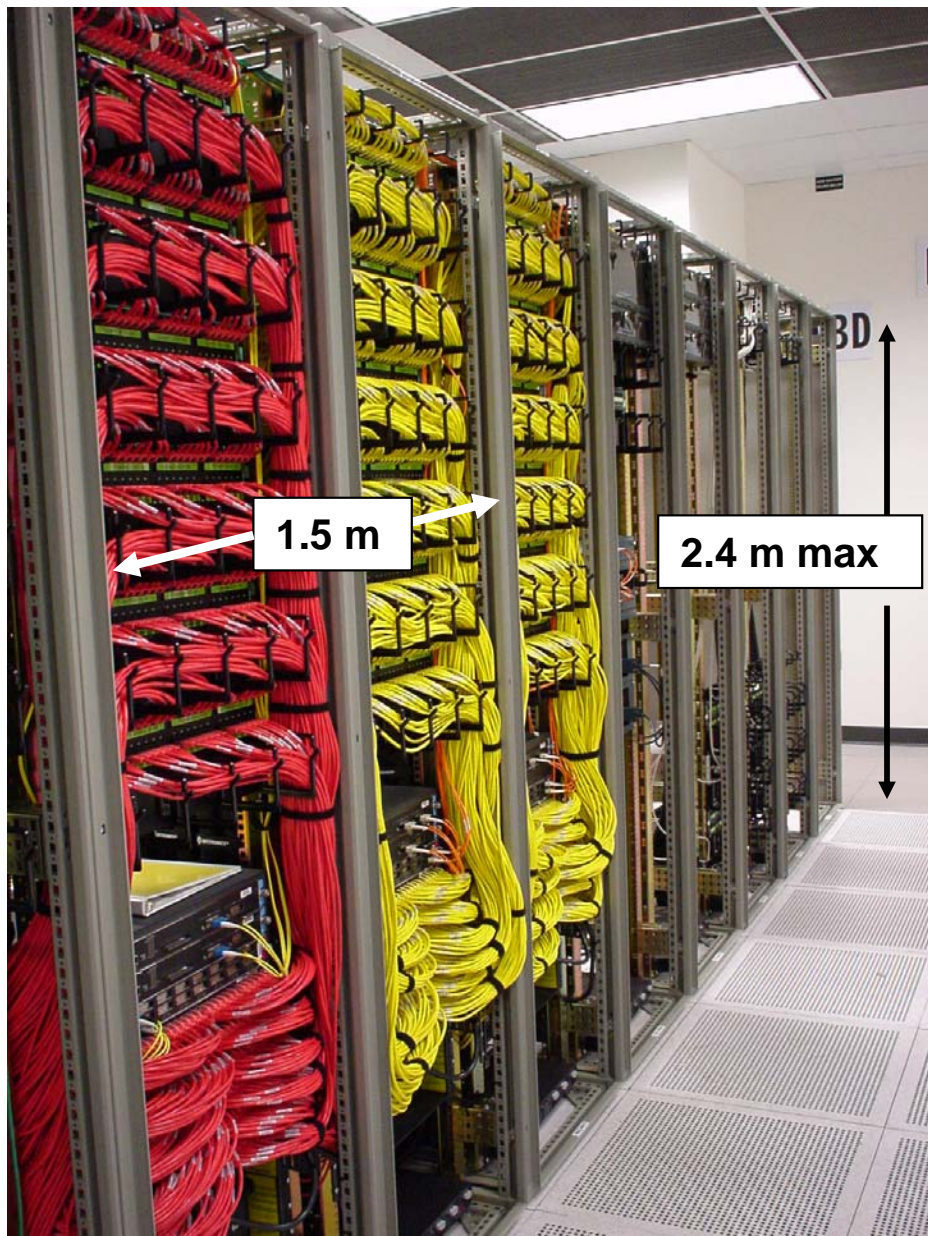
**Broad set( s) of applications**

**Multiple vendors, multiple users**

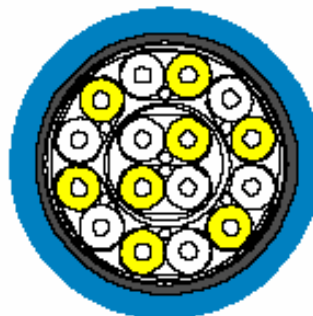
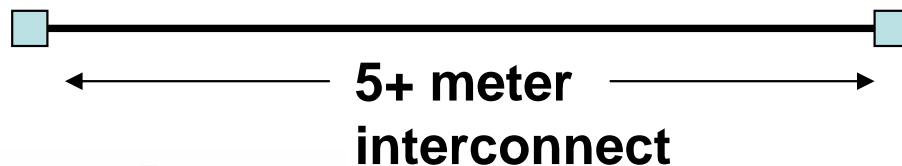
**Balanced cost, LAN Vs. attached stations**

- The sweet spot for HPC is closer to 10 m; 5 meters probably won't work well in our high performance computing (HPC) environment since the physical dimensions of the cluster and storage systems is large.
- Computer room where large switches need consolidating connections to the end-systems (large clusters, storage). These switches are close enough to the end-systems to use copper or MM fiber whenever possible.
- Low density Inter-router/switch connections within a rack or two. We're talking ten ports max.
- Interconnect for HPC clusters requiring very high reliability.

# Proposal: High Speed Copper Interconnect



## Intra/Inter rack/cabinet applications



100 ohm 8 pairs  
28 AWG - 5.6mm (0.220 in)

## TIA-942 - Cabinet and rack height

- The maximum rack and cabinet height shall be 2.4 m (8 ft).
- Preferably no taller than 2.1 m (7 ft) for easier access to the equipment or connecting hardware installed at the top.

# Conclusions

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- **Technical feasibility and market potential for a 100 Gb/s copper interconnect demonstrated.**
- **Up to 5 meter reach consistent with intra/inter rack application distances.**
- **Up to 10 meter reach consistent with HPC cluster distances.**
- **High speed study group should consider high speed copper interconnect to address intra/inter rack applications and high performance computing (HPC) interconnects.**