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**10GBASE-CR1 Study Group  
Call-For-Interest  
IEEE 802.3 Working Group  
San Francisco, CA  
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**Chris DiMinico**  
**MC Communications**  
[cdiminico@ieee.org](mailto:cdiminico@ieee.org)

# CFI objective

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- **To specify 10GBASE-CR1, a low-cost physical layer copper option for 10 Gigabit Ethernet.**

# Supporters

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- **Michael Bennett - Lawrence Berkeley National Laboratory**
- **Chris DiMinico - MC Communications**
- **Galen Fromm, Jay Neer - Molex**
- **Rita Horner, Brian Misek - Avago Technologies**
- **Ryan Latchman - Gennum Corporation**
- **Greg McSorley - Amphenol**
- **Shimon Muller - Sun Microsystems**
- **Gourgen Oganessyan - Quellan Inc.**
- **Robert Winter - Dell, Inc.**
- **Ilango Ganga, David Chalupsky, Rich Mellitz - Intel**
- **George Zimmerman - Solarflare**
- **Dan Dove - HP ProCurve**
- **Jim McGrath - Cinch Connectors**
- **Nathan Tracy - Tyco**
- **Ron Nordin - Panduit**
- **Atul Sharma - Volex**
- **Rick Rabinovich - Alcatel-Lucent**
- **Henning Hansen - LEONI Cables & Systems LLC**

# Potential study group items

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- **Consider industry available specifications**
  - **40GBASE-CR4/100GBASE-CR10 (Clause 85) electricals and channel to specify 10GBASE-CR1**
  - **SFF-8431**
- **Consider smaller form factor MDI (smaller than SFP)**
- **Support IEEE P802.3az, Energy Efficient Ethernet**
- **Compatibility with SFI hosts**
  - **Supportable copper reach (CR1 host ← → SFI host)**

# Contributors

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- **Market Requirements and Potential**
  - **Michael Bennett, LBNL - Energy Efficiency**
  - **Robert Winter, Dell, Inc. - Need for IEEE standard**
  - **Dan Dove - smaller form factor MDI (smaller than SFP)**
  
- **Technical Feasibility**
  - **Chris DiMinico, MC Communications**
  - **Brian Misek, Avago Technologies**
  - **Amir Mezer, Intel**

# Market need for IEEE standard

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- Twin-axial copper cabling between SFP+ connectors are often marketed as variants of 10GBASE-XX (e.g., 10GBASE-CU, 10GBASE-CR1, 10GBASE-CX1, etc...)
- These names are misleading as they give the appearance of being IEEE phy types.
- In fact, there is no one reference document that fully defines these interconnects which are currently in wide spread use.
- The opportunity exists for non-interoperable cable and interface assemblies to be developed to the possible harm of the vendor and user community.
- The market need is obvious, it is therefore appropriate and necessary for the IEEE to correctly and completely specify this interconnect as soon as possible.
- I support the basic concept of considering the use of 40GBASE-CR4 (Clause 85) to specify 10GBASE-CR1.

Source: Robert Winter, Dell Inc.

# Market Need for Smaller, Simpler 10G Copper Solution

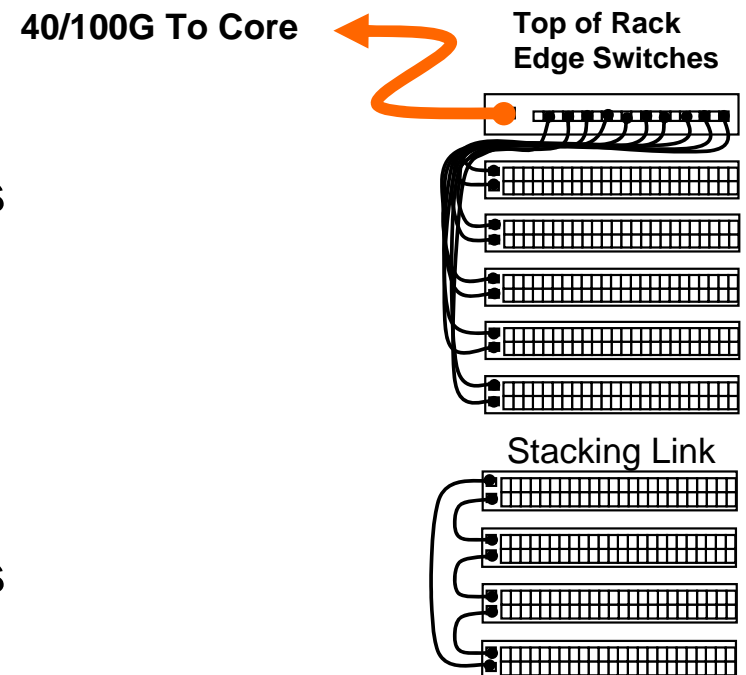
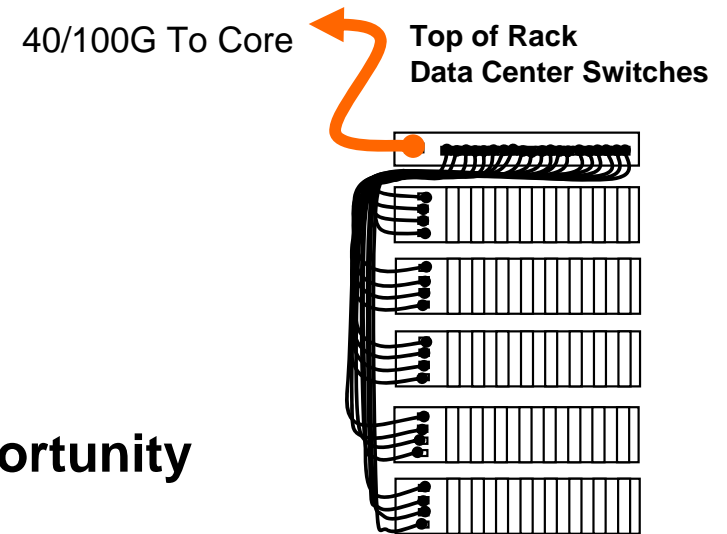
## Market Need

- Higher Density
  - Shorter (Y), thinner (X), shallower (Z) than SFF-8431 desired
  - Unique form factor to eliminate interoperability challenges with SFF-8431
  - Single MDI definition (copper only, not pluggable optics)
- Lower Power
  - Equalization for linear channel @ 10.3125Gb
  - No external PHY chips required
  - EEE capability
- Simplified Signaling
  - No need to support EDC
- Low Cost
  - Higher Density, Lower Power, Simplified Signaling will drive cost/port down
- Compatibility
  - Create a unique form factor that does not create confusion for customers in the market (SFF-8431 linear, SFF-8431 limited, SFF-8461)

# Topology Use Cases and Resulting Reach Needs

## Market Applications

- **Top of Rack Data Center Switches**
  - High Port Density & Low Cost
  - 3-5 meter reach for most connections
  - EEE would enhance the Data Center opportunity
  - Time To Market critical for success
- **Top of Rack Edge Aggregation**
  - High Port Density & Low Cost
  - 3-5 meter reach for most connections
  - Time To Market critical for success
- **Stacking/Aggregation Links**
  - Port Density not as important
  - Low Cost more important
    - 3-5 meter reach for most connections





# 10GBASE-KR cable assembly demonstration - Intel

- **10GBASE-KR based device tested over 10 m passive copper assembly under the following setup and conditions**
  - 10 meter Leoni 26 AWG passive twinaxial cable with 2 x SFP+ connectors and 1 x 2" and 1 x 4" FR-4 traces on test boards (6" total); ~5 dB worse @ 5 GHz than QSFP 10 meter cable assembly
  - Single NEXT aggressor
  - Adaptive TXFFE with the 10GBASE-KR protocol
  - 5-tap DFE at the receiver
- **Test results**
  - **BER=0 with PRBS31 was measured for 1500 seconds**
- **Summary**
  - Feasibility demonstrated at 10 Gb/s, very promising results with single NEXT aggressor
  - Margin should be sufficient for QSFP Xtalk environment

Source: Amir Mezer, Intel

Reference document: diminico\_02\_0708.pdf "802.3ba copper cable assembly baseline proposal"

# Summary

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- **This Call for Interest (CFI) proposes to specify 10GBASE-CR1, a low-cost physical layer copper option for 10 Gigabit Ethernet.**
- **Consider industry available specifications**
  - **40GBASE-CR4/100GBASE-CR10 (Clause 85) electricals and channel to specify 10GBASE-CR1**
  - **SFF-8431**
- **Consider smaller form factor MDI (smaller than SFP)**
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# Straw Polls

# Call-For-Interest

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- **Should a Study Group be formed for “10GBASE-CR1”?**

**Y: 24    N: 27    A:**

# Participation

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- **I would participate in the “10GBASE-CR1” Study Group in IEEE 802.3.**

**Tally: 23**

- **My company would support participation in the “10GBASE-CR1” Study Group in IEEE 802.3.**

**Tally: 18**

# Motion

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- **Request the formation of an 802.3 study group based on the 10GBASE-CR1 call for interest.**

**Moved: Chris DiMinico**

**Second: David Chalupsky**

**Y:**

**N:**

**A:**