Breakout Functionality

John D'Ambrosia, Dell

"Applications" Ad Hoc
IEEE 802.3 400 Gb/s Ethernet Study Group
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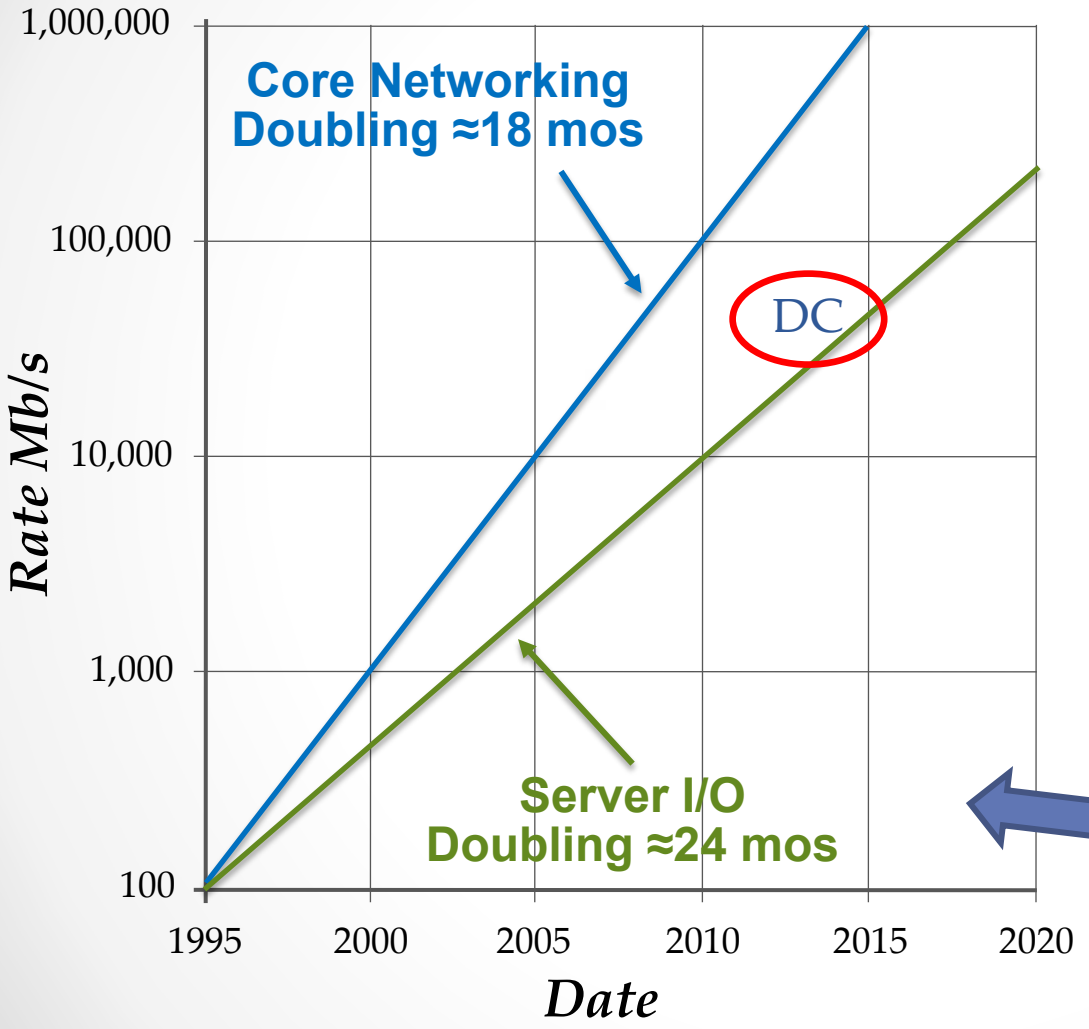
40 GbE is Taking off in the Data Center…



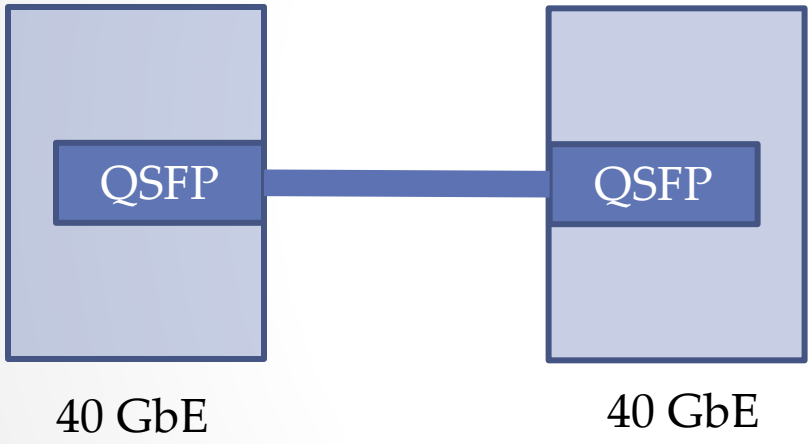
Why?

- **Cost**
- **Available solutions to meet target application**

From IEEE 802.3 HSSG Tutorial, Nov11.

40 GbE Port Usage (1 of 2)

40 GbE Port Configuration Example #1



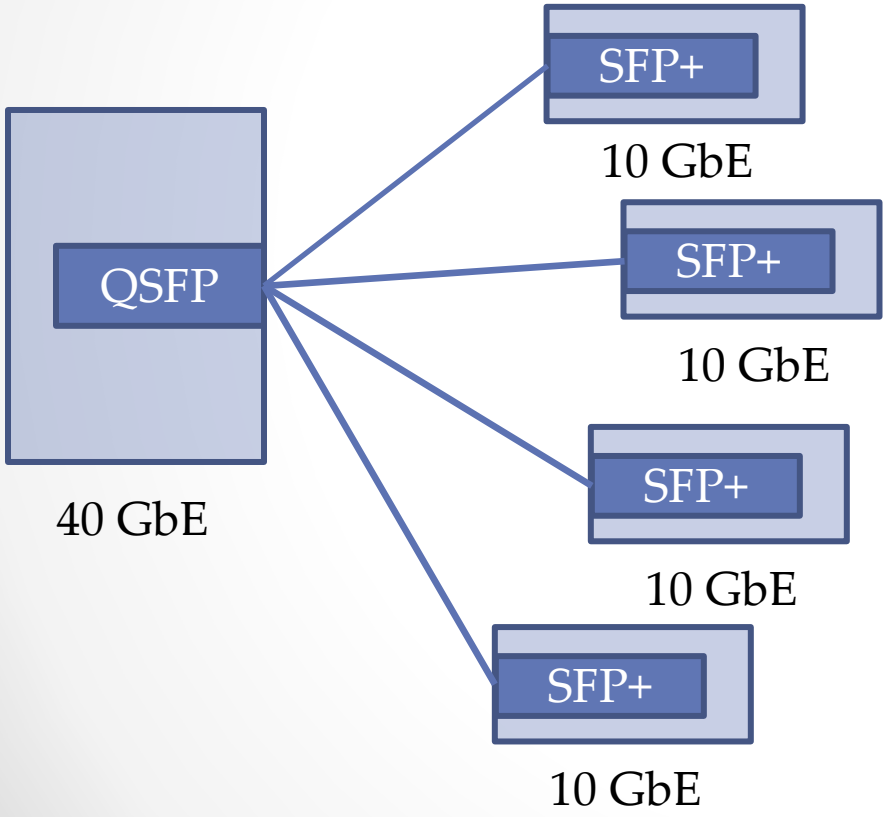
Today's Media*

- Multi-conductor twin-ax
- Multi-fibre MMF
- Full Duplex SMF
- Multi-fibre SMF

* Includes standard & non-standard technologies

40 GbE Port Usage (2 of 2)

40 GbE Port Configuration Example #2



Today's Media*

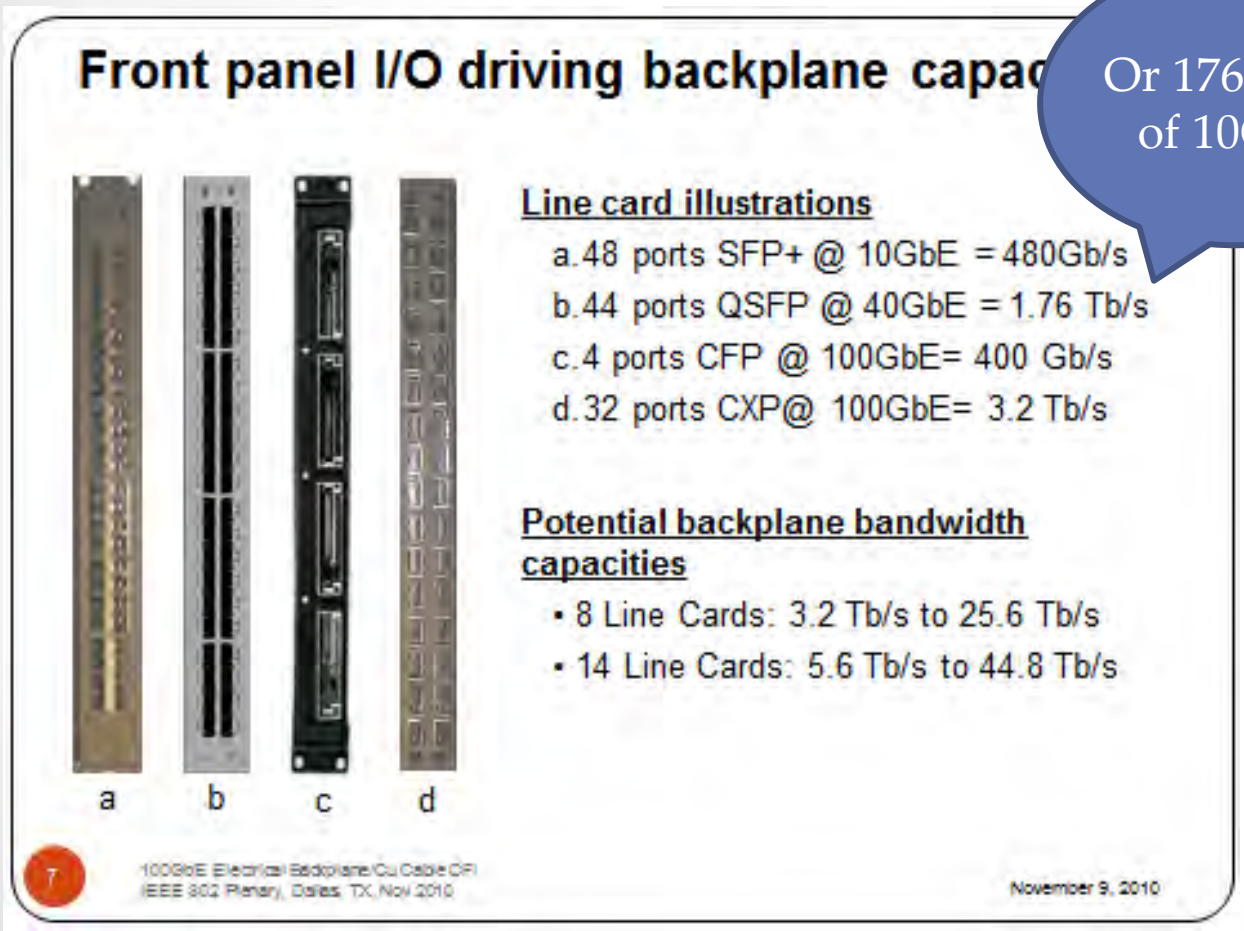
- Multi-conductor twin-ax**
- Multi-fibre MMF**
- ~~Full Duplex SMF~~
- Multi-fibre SMF

** Being used in data center applications for all above.

* Includes standard & non-standard technologies

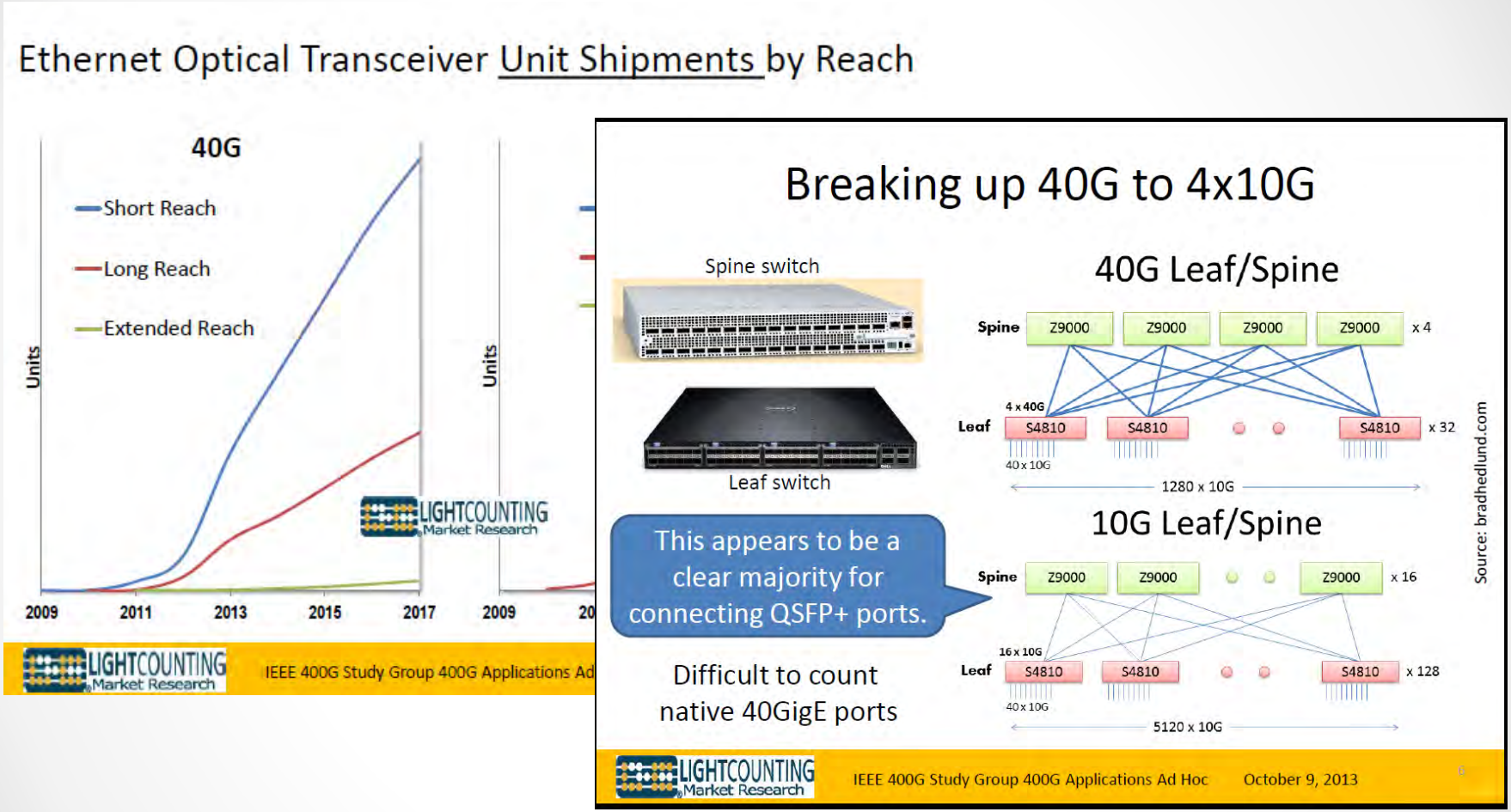
Port Density Implication

From 100GbE Backplane / Cu Cable CFI



- Increased 10GbE port density based on QSFP will enable lower cost 10GbE.
- Increased usage of 40GbE ports will enable lower cost 40GbE ports.

Market Adoption of 40GbE



Source: Dale Murray, LightCounting,
http://www.ieee802.org/3/400GSG/public/adhoc/app/murray_app_01a_1013.pdf

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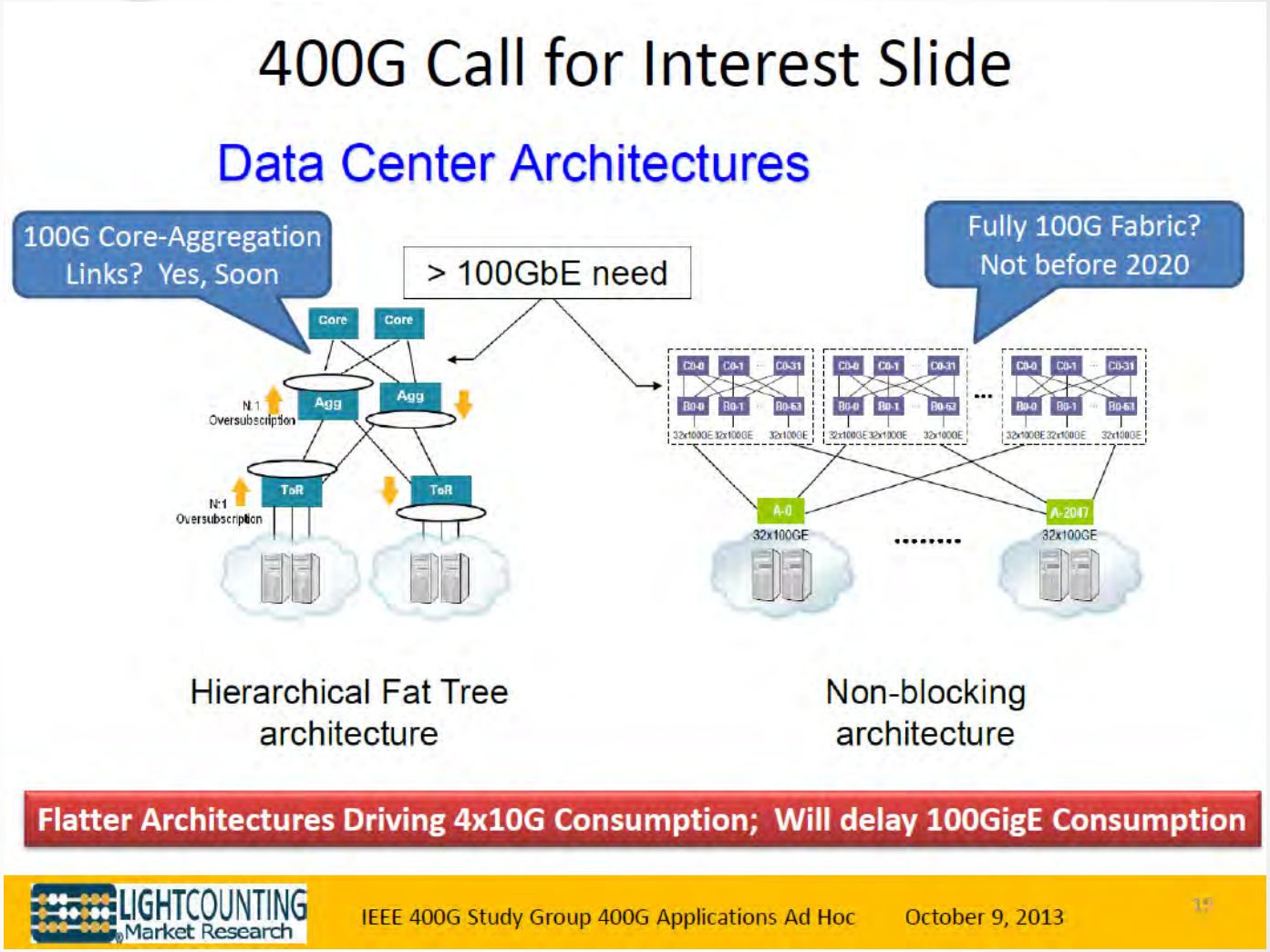
Looking to the Future

Future Breakout Scenarios



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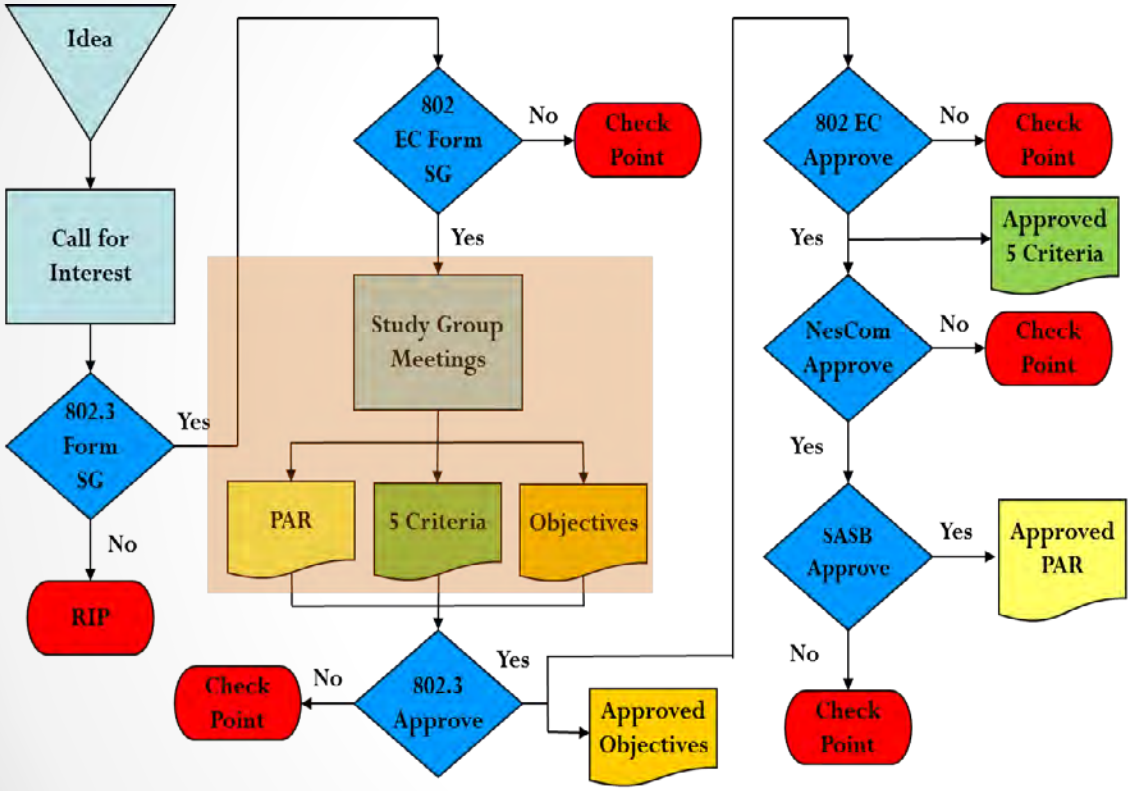
Cabling Standardization

- **ISO/IEC 24764, Information Technologies – Generic Cabling Systems for Data Centres:** Specifies the MPO interface for termination of more than two optical fibres at the Equipment Outlet (EO), including the use of single mode optical fibres.
- **ISO/IEC 14763-2, Information technology – Implementation and Operation of Customer Premises Cabling – Part 2:** Planning and Installation; provides guidance on administration and polarity maintenance. Both multimode and single mode optical fibres are supported.
- **IEC/SC 86B (in development):** Product specifications to ensure connector intermateability of 12 and 24 fibre MPO connectors.
- **IEC/SC 86A**: Published recommendations for color coding of single mode and multimode optical fibre ribbons.

Project Objectives



Note: At "Check Point", either the activity is ended, or there may be various options that would allow reconsideration of the approval.

Objectives
A project's contract with the IEEE 802.3 WG

But

Describes the goals of the project to the industry

Observations for 400GbE

- Reasonable assumption that 40G/100G will ship in greater volumes than 400G.
- Multiple higher density 40G/100G scenarios envisioned by 400GbE time frame.
- Multiple scenarios can be envisioned where 400GbE ports could support higher density / lower rate 40GbE and or 100 GbE PMDs. Some include:
  - 400 GbE based on 16 x 25 Gb/s
    - Could be divided into 4 ports of 100G @ 4 x25Gb/s
  - 400 GbE based on 8 x 50 Gb/s
    - Run 50Gb/s at 40 Gb/s for 8 ports of 40GbE
    - Divide into 4 ports of 100G @ 2 x 50Gb/s
  - 400 GbE based on 4x 100Gb/s (assuming modulation)
    - Divide into 4 ports of 100G @ 1 x 100Gb/s
    - Change modulation to support 40G and support 4 ports @ 1 x 40 Gb/s

Conclusions

- The market is adopting this "breakout functionality" with 10GbE / 40GbE
  - Breakout functionality – the ability to use a port in a lower rate / higher density mode of operation
- Providing an upgrade path forward could further improve this scenario
- "Breakout functionality" will enhance broad market potential of 400GbE by enabling adoption to support higher density / lower rate lower speeds to enable lower 400GbE cost.
- Consider objective for breakout functionality?
- Proposed objective–
  - Provide appropriate support for breakout functionality