# Need for
# 4-Lane 10G
# Ethernet Backplane Support

Backplane Ethernet Task Force
IEEE P802.3ap

Long Beach, CA

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# Outline

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# Current IEEE 802.3ap Objectives

- Preserve the 802.3/Ethernet frame format at the MAC Client service interface
- Preserve min. and max. frame size of current 802.3 Std.
- Support existing media independent interfaces
- Support operation over a single lane across 2 connectors over copper traces on improved FR-4 for links consistent with lengths up to at least 1m
  - Define a 1 Gb/s PHY
  - Define a 10 Gb/s PHY
- Consider Auto-negotiation
- Support BER of 10^-12 or better
- Meet CISPR/FCC Class A

[Last Updated March 22, 2004]

# Backplane Standards Landscape

- 1G definition is needed now
- 10G Serial support will be needed in the future
- Cost/performance of 10G Serial will eventually come down.
  - In the mean time, to deploy 10G solutions, system vendors must use 4-lane 10G technology
- Blade System Vendors are beginning to develop 4-lane 10G capable Backplanes.
  - Timing is right for adoption
  - Next generation backplanes being designed to accommodate 1G, 4-lane 10G, and Serial 10G
    - Positioned to take advantage of 10G Serial as soon as it becomes competitive from a cost/performance perspective

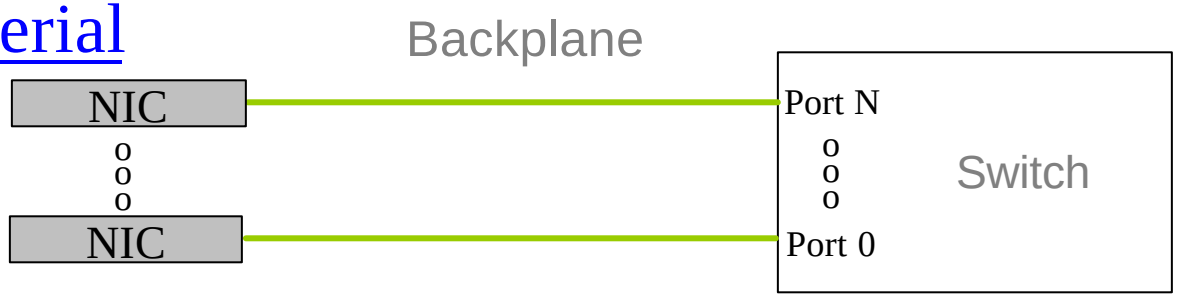
# 10G Observations

| 4-Lane | Serial |
|---|---|
| More signals & pins on Switch/Blade connectors. | Fewer Signals & Pins on Switch/Blade connectors. |
| Larger Connector limit's Backplane & Switch form factor options.<br>Lower speed connectors are typically denser and lower cost per pin | Smaller but higher performance connector. |
| Lower cost PCB materials but will require more layers for added signals | PCB material and connector cost higher to support higher frequencies |
| Core Switch Chips ports limited by package size/pin count. | Core Switch Chips can have lower pin count and package size, but increased power. |
| Smaller PCB footprint possible due to current ability to integrate 4-lane 10G "XAUI", etc. into MAC/PHY components | Near term, PCB footprint larger due to external XAUI to serial SerDes components (integration further out) |

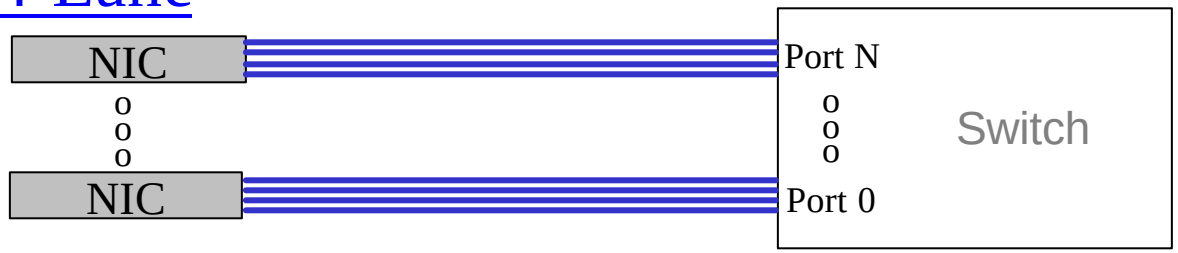
Bottom line:
- Both approaches have pro's and con's
- Both approaches MUST be supported

# Backplane Configurations

## 1G Serial



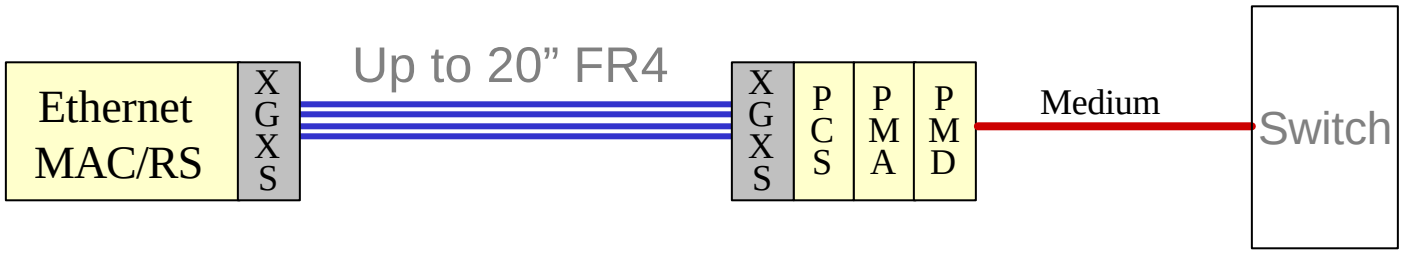

## 10G 4-Lane



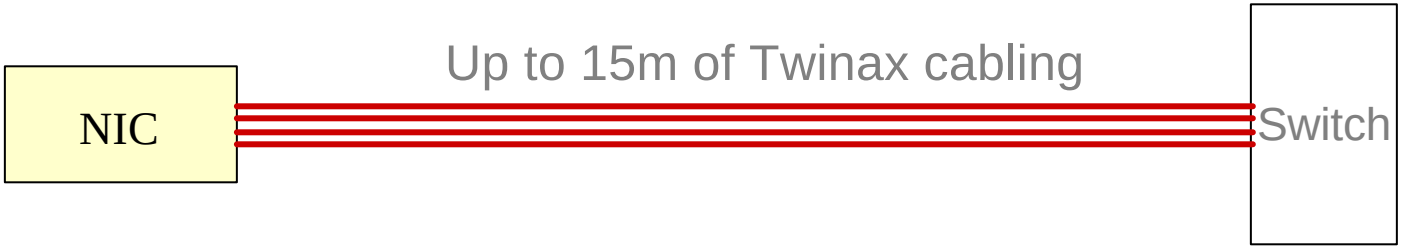

## 10G Serial

# 4-Lane 10G Copper Support Today

## 4-Lane XAUI




## 4-Lane 10GBase-CX4




There is no standard for transmitting & receiving 10G Ethernet over 20" to 1 meter of enhanced FR4

# Need 4-lane 10G Standard for FR4 Backplanes

- Many “DIFFERENT” definitions exist for filling the 20”-1m gap:
  - Extended XAUI
  - Enhanced XAUI
  - CX-4 Lite
  - ….. Pick your favorite vendor and your marketing term
- Technology vendors are developing various pre-emphasis and receive side equalization schemes
- These schemes are proprietary and in all likelihood will not interoperate
  - Multi-vendor compatibility will be an issue
- System vendors NEED an interoperable 4-Lane 10G standard for up to 1M of enhanced FR4.

# Recommendation

- Add support for 4-lane 10G operation to the Backplane objectives:
  - Support operation ……. over copper traces on improved FR-4 for links consistent with lengths up to at least 1m
    - Define a 1 Gb/s PHY
    - **Define a 4-Lane 10 Gb/s PHY (3.125 Gb/s per lane)**
    - Define a 10 Gb/s PHY