Plan for the Week

- Hear presentations
  - 28 technical presentations
  - Topics:
    - Backplane Channel Model
    - Auto-Negotiation
    - Test Methodology
    - 10Gb/s serial PHY

- Build confidence in proposed channel limits (and identify areas where corrections are required).

- Identify candidate architectures for 10Gb/s Serial PHY and Auto-Negotiation.
Accomplishments

- Adopted a timeline.

- Presentations.

- Adopted definition of “improved FR-4”

- Identified additional points of agreement on auto-negotiation.

- Signaling Ad Hoc group will be formed to create a framework for comparison of various signaling techniques.
IEEE P802.3ap Timeline

- **CFI**
  - **NOV 2003**
  - **JAN 2004**
  - **MAR 2004**
  - **JUN 2004**

- **PAR**
  - **You are here**
  - **First Technical Presentation**

- **SEC**
  - **NesCom**

- **TF Review**
  - **NOV 2004**
  - **JAN 2005**
  - **JUL 2005**

- **WG Ballot**
  - **D1.0**
  - **D2.0**
  - **D3.0**

- **Sponsor Ballot**
  - **Approved by Task Force (July 2004)**
  - **Standard!**

- **RevCom**
  - **JUN 2006**
## Presentations (1/2)

<table>
<thead>
<tr>
<th>Presenters</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandich</td>
<td>System Vendor Requirements for 10Gb/s Backplane</td>
</tr>
<tr>
<td>Goergen</td>
<td>Backplane Channel Ad Hoc Recommendations</td>
</tr>
<tr>
<td>Goergen</td>
<td>FR-4 Definition III</td>
</tr>
<tr>
<td>Goergen</td>
<td>Channel Compliance to Proposed: Test Cards</td>
</tr>
<tr>
<td>Moore</td>
<td>Specifying a Channel Through Impulse Response</td>
</tr>
<tr>
<td>Peters</td>
<td>AdvancedTCA channel data and comparisons to proposed channel model</td>
</tr>
<tr>
<td>Anderson</td>
<td>S-params for IEEE Channel Ad Hoc</td>
</tr>
<tr>
<td>Seemann</td>
<td>Further Channel Model Data</td>
</tr>
<tr>
<td>McCallum</td>
<td>A Migration Path from 6.25Gb/s Operation to 10Gb/s Operation</td>
</tr>
<tr>
<td>Kim</td>
<td>Compatibility Negotiation Considerations</td>
</tr>
<tr>
<td>Szczepanek</td>
<td>Serdes Compatible FLP AN Proposal</td>
</tr>
<tr>
<td>Ghiasi</td>
<td>Serdes Compatible Auto-Negotiation for Backplane Ethernet</td>
</tr>
<tr>
<td>Ganga</td>
<td>802.3ap Auto-Negotiation with Clause 28 State Machines</td>
</tr>
</tbody>
</table>
## Presentations (2/2)

<table>
<thead>
<tr>
<th>Presenter</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kim</td>
<td>New Base Page/Selector Field Proposal</td>
</tr>
<tr>
<td>Moore</td>
<td>Receiver Testing Using Interference Tolerance Measurements</td>
</tr>
<tr>
<td>Waschura</td>
<td>Thoughts on testing of devices with $10^{-15}$ confidence using test times historically used for $10^{-12}$.</td>
</tr>
<tr>
<td>Altmann</td>
<td>Power &amp; Complexity Discussion Guidelines</td>
</tr>
<tr>
<td>Anderson</td>
<td>Signaling Analysis Using IEEE Channel Ad Hoc Templates</td>
</tr>
<tr>
<td>Abler</td>
<td>PAM-4 versus NRZ Signaling: &quot;Basic Theory&quot;</td>
</tr>
<tr>
<td>Liu</td>
<td>A Comparison of NRZ and PAM-4 Using the IEEE Channel Model</td>
</tr>
<tr>
<td>Warke</td>
<td>A Study of NRZ Signaling Over Proposed IEEE Ethernet Backplane</td>
</tr>
<tr>
<td>Brunn</td>
<td>Edge-Equalized NRZ</td>
</tr>
<tr>
<td>Brink</td>
<td>Comparison of PAM-4 and NRZ signaling based on measurements from a dual-mode device</td>
</tr>
<tr>
<td>Brink</td>
<td>Proposal for 10Gb/s single-lane PHY based on PAM-4 signaling</td>
</tr>
<tr>
<td>Sinsky</td>
<td>10Gb/s Duobinary Signaling over Electrical Backplanes</td>
</tr>
<tr>
<td>Barazande-Pour</td>
<td>Crosstalk and Receiver Equalization for 10G Serial Ethernet</td>
</tr>
<tr>
<td>Von Herzen</td>
<td>Some Applications for Backplane Ethernet</td>
</tr>
</tbody>
</table>
Move to adopt the Dk/Df values defined in goergen_01_0704, (pdf) page 5, as the minimum definition of “Improved FR-4” with modification to temperature tolerance from “0 to 55°C” to “0 to 70°C.” Reference goergen_01_0704, goergen_01_0504, and goergen_02_0304.

Passsed (All: 41/0/6, 802.3: 14/0/6)
Auto-Negotiation (TF Motions)

- Clause 45 Register Set and Clause 45 MDIO interface be adopted.
  
  Passed (All: 35/0/15, 802.3: 16/0/5)

- Auto-negotiation at a minimum include port-type (e.g. 1G 1 lane, 10G 4 lane, 10G 1 lane) negotiation and any parameter exchange required to select the proper PMA.
  
  Passed (All: 39/0/8, 802.3: 19/0/4)

- Auto-negotiation not be restricted to existing base page definitions.
  
  Passed (All: 34/0/11, 802.3: 17/0/6)
Auto-Negotiation (Additional Poll)

- **Straw Poll:** Auto-Negotiation Signaling / Methodology Proposals
  - Option A - Prefer [Clause 28, SSP - modified link pulse].
  - Option B - Prefer [Clause 37, Serdes – 8B/10B].
  - Option C - Prefer a solution, and other than presented.
  - Option D - Prefer a solution, and I do not care which.

- **Results:**
  - Option A – 18
  - Option B – 11
  - Option C – 2
  - Option D – 5
Signaling

Three signaling methods being considered for the 10G serial backplane PHY:

- NRZ
- PAM-4
- Duobinary
New Objective (TF Motion)

- Move to augment the existing 802.3ap objectives to include defining a 4-lane 10Gb/s PHY for operation over the 802.3ap channel model. Add the following bullet to the objectives:
  - Define a 4-lane 10Gb/s PHY for operation over the 802.3ap channel model.

  Passed (All: 32/10/3, 802.3: 11/1/1)

- Modify “Distinct Identity” criteria, bullet #2, to:
  - The standard will define at most one single lane PHY for 1Gb/s, at most one single lane 10Gb/s PHY, and at most one four-lane 10Gb/s PHY.

  Passed (All: 40/0/4, 802.3: 23/0/1)

- Move that the IEEE P802.3ap Task Force request approval of the amended 5 criteria and objectives, as shown in agenda_01_0704, by the 802.3 WG and request that the 802.3 WG forward the 5 Criteria to the 802 SEC for approval.

  Passed (All: 37/0/0, 802.3: 20/0/0)
IEEE P802.3ap 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
- Define a 4-lane 10Gb/s PHY for operation over the 802.3ap channel model.
- Consider auto-negotiation.
- Support BER of 10^-12 or better.
- Meet CISPR/FCC Class A.
Distinct Identity (original)

Substantially different from other 802 and 802.3 specifications
One unique solution for problem
Easy for document reader to select relevant spec.

- The current 802.3 specification does not explicitly cover backplane transmission. XAUI is for chip-to-chip applications. 10GBASE-CX4 is for box-to-box (cabling) applications. 1000BASE-X has no electrical specification, and 1000BASE-CX is specified for coaxial cable.

- The standard will define at most one PHY for 1Gb/s operation and at most one PHY for 10Gb/s operation.

- The specification will be done in a format consistent with the IEEE document requirements thus making it easy for implementers to understand and design to.

- The proposed specification will use copper media similar to other high speed networking technologies (Fibre Channel, IB4X) but does so with the IEEE 802.3 MAC as the over-riding layer which will result in higher compatibility and lower cost for Ethernet systems.
Distinct Identity

Substantially different from other 802 and 802.3 specifications
One unique solution for problem
Easy for document reader to select relevant spec.

- The current 802.3 specification does not explicitly cover backplane transmission. XAUI is for chip-to-chip applications. 10GBASE-CX4 is for box-to-box (cabling) applications. 1000BASE-X has no electrical specification, and 1000BASE-CX is specified for coaxial cable.

- The standard will define at most one single lane PHY for 1Gb/s, at most one single lane 10Gb/s PHY, and at most one four-lane 10Gb/s PHY.

- The specification will be done in a format consistent with the IEEE document requirements thus making it easy for implementers to understand and design to.

- The proposed specification will use copper media similar to other high speed networking technologies (Fibre Channel, IB4X) but does so with the IEEE 802.3 MAC as the over-riding layer which will result in higher compatibility and lower cost for Ethernet systems.
Motion

Move that 802.3 approve the amended Backplane Ethernet 5 Criteria (Distinct Identity) and objectives.

- TECHNICAL (75%)
- Moved – A. Healey on behalf of the Task Force
- Second – N/A
- 802.3 Voters (Y/N/A): 56/0/3
- MOTION PASSES
Future Meetings

- September 2004 Interim
  - ???

- November 2004 Plenary
  - Week of November 14.
  - San Antonio, TX
  - Hyatt Regency
Thank You!