S1600BASE-T
How, Why, and When?

S800BASE-T Study Group
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HOW ??

• Piggy-back off the S800BASE-T work.

  1394b Link  →  1394b PHY (modified)  →  S800 Reconciliation Sub-layer  →  GMII

  GbE PHY  →  S800BASE-T

• S800BASE-X can be implemented with existing PHY chips (e.g., BCM5421S)

• Supporting S800BASE-X should be a benefit to LAN hub/switch vendors
  ⇒ E.g., Nortel BayStack 420-24T Switch – 24 1000BASE-T ports and 1 fiber port for uplink connection
S1600BASE-T

• S1600 Reconciliation sub-layer will encapsulate an S1600 bit stream into a 2Gb/s Ethernet bit stream
  ➔ Reconciliation sub-layer will be very similar to S800
  ➔ Need to define the “2GMII” interface
• Allows encapsulation (reconciliation) and PHY to be resolved separately
• 1394b S1600 PHY chips are not yet available
  ➔ Modifications to the 1394b S1600 PHY spec are needed (timing issues, etc.)
  ➔ We can include the reconciliation sublayer modifications so that all S1600 PHYs are compatible with Ethernet operation.
WHY S1600BASE-T?

- Larger networks
  ⇒ Shared vs. switched bandwidth
- Disk applications (RAID)
  ⇒ Disk access speeds > 500 Mb/s
- Video and home networking applications
- Show evolutionary path
  ⇒ For consumers and equipment manufacturers
Video/Home Networking

- Price of wide-screen TV’s is dropping rapidly.
- Home entertainment network equipment, such as ENA from BridgeCo
- HD equipment is becoming more available and affordable.
  - IEEE Spectrum, June 2003, “HDTV – Broadcasters and distributors are finally getting – and giving – the picture.”
  - CNET review of JVC HD Camcorder (5/23/2003): “This camcorder is a harbinger of things to come, proving that HD image-acquisition technology has already trickled down to a price competitive with that of standard-definition gear.”
Home Networking Features

- **Quad picture-in-picture** -- Allows viewing a program while monitoring several other channels.

![Quad picture-in-picture diagram]
Other possible features ...

- **Channel Surfing** -- preprogrammed with your favorite 16 channels.

- **Hybrid modes** -- User-defined, any combination of $\frac{1}{4}$ and $\frac{1}{16}$ sized windows
# Video capacity of 1394 bus

<table>
<thead>
<tr>
<th>Speed</th>
<th>Max. single channel (Mb/s)</th>
<th>Max total isochronous BW (Mb/s)</th>
<th>SDTV MPEG-2</th>
<th>HDTV MPEG-2</th>
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<tr>
<td>S100</td>
<td>64</td>
<td>80</td>
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<tr>
<td>S200</td>
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<th>SDTV MPEG-2</th>
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<tr>
<td>Max. single channel</td>
<td>61883-2</td>
<td>61883-3</td>
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<tr>
<td></td>
<td>Data Rate (Mb/s)</td>
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**Conclusion** – In a home with several TV’s it is not hard to exhaust the capacity of an S800 network.
WHEN ??

There are several advantages to defining the S1600 Reconciliation Sub-layer sooner rather than later:

- Only need to submit one autonegotiation proposal to the IEEE 802.3 committee
- Get the reconciliation circuitry built into the first generation of S1600 chips
- Encourage innovative designs of 2 Gb/s PHYs
- Have plenty of bandwidth ready for innovative applications (residential and commercial)

⇒ Ken Wacks (Chair of ISO/IEC SC25/WG1) – “If you give us the bandwidth, we’ll find the applications.” (3/7/2003)
Recommendation

- Develop the S1600 Reconciliation Sub-Layer spec as soon as possible
  - Build on the S800 work
  - DO NOT delay the S800 spec.
- This allows chip vendors to incorporate the S1600 Reconciliation Sub-layer into new PHY chips
- The S1600 spec will encourage the development of standard (and/or proprietary) 2Gb/s PHYs.

Diagram:

1394b Link — 1394b PHY (modified) — S1600 Reconciliation Sub-layer — 2GMII — PHY