S800 over Cat5
(requirements/charter proposal)

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Goals

• Take advantage of Gigabit Ethernet technology to use Category 5 unshielded twisted pair cabling for S800 transport 1394b links

• Allow appropriate negotiation to be done so that the endpoints can select which of 5 protocols to be used:
  – 10baseT Ethernet
  – 100baseTX Ethernet
  – S100 1394b
  – (S400 1394r)
  – 1000baseT Ethernet
  – S800 1394r
Sidebar: what is 1394r?

- New PAR (project action request) from IEEE to update/revise 1394-1995. (Dave, can you explain?)
- I think it is:
  

- So I propose adding S800 (and maybe S400) over Cat5 to 1394r
Goals (continued)

• Allow a simple hub-like-thing to be built that:
  – Connects all endpoints that negotiate to Ethernet using standard hub or switch technology
  – Connects all endpoints that negotiate to 1394 using standard PHY or 1394.1 technology
  – Bridges IP data between the two network domains

• For the end user, the objective is to have a single RJ-45 socket that is labeled “network”, and works for any kind of connection.
Technical justification

• 1000baseT links are full duplex 1000 Mbit/sec transports at the PHY (4x250Mbit/sec at the cable) . . . 
  – -100ppm tolerance = 999.9 Mbit/sec
• 1394b S800 links are full duplex (10/8)*8*98.304 Mbit/sec at the cable (983.04 Mbit/sec) . . . 
  – +100ppm tolerance ≈ 983.1 Mbit/sec
• There is clearly enough bandwidth at the 1000baseT PHY to accept a fully encoded 1394b S800 stream
Possible interconnection

Port negotiates to Ethernet

1394r PHY

1394b bilingual

1394b生物质

1394b startup/arb/data routing

1394b Link

1000baseT MAC

1000baseT PHY

1394r/1000baseT negotiation

1394r/1000baseT rate adaptation

1000baseT PHY/Link

GMII

RJ-45

1394b bilingual

9-pin

1394b

9-pin

1394b
Requirements

- At PHY/Link interface must appear to be standard 1394b PHY
- At GMII must appear to be standard 1000baseT PHY
- When network port negotiates to be 1394, must appear to be standard 1394b port connection to 1394 management software
  - Looks like network unconnected to Ethernet software
- When a network port negotiates to be Ethernet, must appear to be standard Ethernet connection to Ethernet management software
  - Looks like unconnected port to 1394 software
More requirements

- Must support 1394b S100 as defined, and S800 using 1000baseT modulation
- Must support 10baseT, 100baseT, 1000baseT (full and half duplex) Ethernet
- Negotiation preference set at device endpoint (NOT at hub/switch/bridge). E.g., Apple would prefer FireWire for Mac OS X, others may prefer alternate connections.
  - Or do we always prefer 1394?
Proposed charter

“Develop method for building S800 1394b links over Cat 5 wiring using 1000baseT technology. It must be possible to build a PHY that can negotiate to use either 1000baseT (and 100baseT and 10baseT) Ethernet or S800baseT (and S100baseT) 1394. Running at other speeds (such as S400 and S1600) will also be investigated.”