



# S800 over Cat5 (requirements/charter proposal)

**Michael Johas Teener**  
**[teener@apple.com](mailto:teener@apple.com)**

# 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:  
*Combine 1394-1995, 1394a-2000, 1394b-2002, 1394b errata, and S3200 improvements into one document.*
- 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.

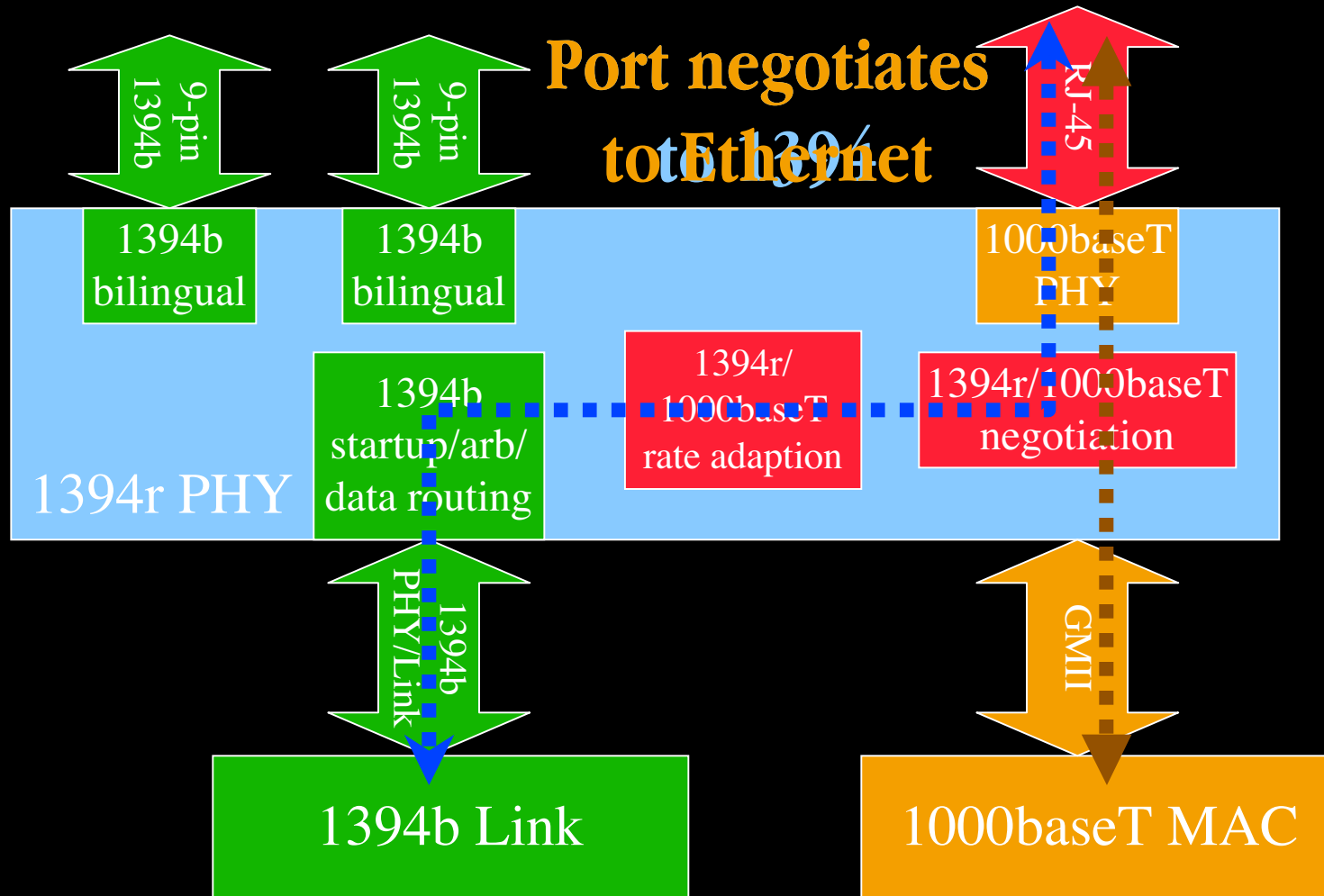


# Technical justification

- 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  $\approx$  983.1 Mbit/sec
- There is clearly enough bandwidth at the 1000baseT PHY to accept a fully encoded 1394b S800 stream



# Possible interconnection



# 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.”

