Upstarts - Feb 98 - Report

1. Homework Assignments
   1. for the optical transceiver folks to provide input as to (a) the passband cut-off frequency; (b) the signal detect latency
      - ✓ on the assumption that the transceiver operates fully powered all the time;
      - ✗ not yet done - but will now evaluate the Tone Proposal (see below)
   2. for the PHY designers to provide input as to the power and implementation costs of sloppy and reasonably accurately controlled tones
      - ✓ conclusion - use crystal oscillator
   3. for the system designers to provide input as to the minimum disconnect/reconnect cycle time which must be detected
      - ✓ human relative real-time
2. Introduction to and review of V3 (based on P1394a D1.4)
   - modifications are cleaner than previous version
   - startup now takes note of a new "plug_present" bit
   - problems identified with current algorithm, but solutions believed to exist
   - modified version to be placed on web site, and incorporated into next draft
3. Tone proposal
   - Accepted in principle (see homework #1 above)
     - ✓ requires "signal detect" to be incorporated into electrical spec
4. Speed negotiation
   - nothing yet done, but will base this on the tone mechanism

P1394b upstarts - V3 overview

- Connectivity Management now based on P1394a D1.4
  - PJ generously provided the port state machine and C code sources
  - new version (V3) dated Feb 8th 1998
- Essence of the mechanism is unchanged (eager-Beta etc)
- One consistent change in port state machine and code
  - replace use of bias[i] by receive_ok[i]
    - ✓ In DS_mode, means bias[i]
    - ✓ in Beta_mode, means seen a continuous incoming signal (not just the occasional connect tone)
  - in essence, means that we can expect to receive full signalling
  - keep the term bias to mean P1394a TpBias
- No other change to the port state machine
  - most of the "actions" C code is unchanged as well
- Needed to find a home in our model for the P1394a continuously running PHY level (i.e. across all ports) machine
  - really deals with the PMD, but has to be placed "above" the port
  - most changes take place in this code
    - ✓ deals with determination of Beta mode operation
    - ✓ maintains the connected[i] flag in Beta mode

P1394b upstarts - V3 notes and issues

- New flag "*disconnected[i]*"
  - says that an external mechanism has determined that there is no physical connection
    - ✓ so don't even think about toning etc
- Unholy mix of shared variables and service calls
  - no attempt so far to clean this up
- New code in *resume actions* get the Beta Synchronisation going
- Toning when and only when P1394a says connect_detect_valid[i]
  - i.e. not during normal signalling
- Relies on "signal detect" - suggest starting with the Gigabit Ethernet spec for this
  - does NOT imply signal quality, reception of 8B10B, etc
- Disabled port issue
  - toning (AC coupling) cannot be used to track connection status
- Timing constants TBD
- Probably contains lots of bugs
- Details of speed capability notification not done

P394b upstarts - tone proposal -1

- Toning should be very low power,
  - the main time that toning is required is during the time that a port is suspended.
- Other requirements are:-
  - Must be capable of transmission through an optical transceiver (assumed cut-off frequency of 100 MHz, full swing PECL inputs);
  - Must be capable of transmission over POF and UTP (maximum frequencies of the order of 100-200 MHz).
  - Must be capable of overcoming the start-up latencies of an optical transciever (of the order of 500 microseconds);
  - Must be capable of detecting the transition from physical connection to physical disconnection or vice-versa in human-scale real-time (typically 50 milliseconds);

Tone proposal - 2

- open-loop transmission/reception of a regular tone.
  - Reception indicates a connection, lack of a tone indicates no connection.
- Transmit a “tone” every 34.133 milliseconds (122.88/2**23),
  - i.e. approx 30 tones a second.
  - tone comprises a signal of frequency 122.88 MHz
    - ✓ (S800 transmission rate / 4)
  - tone duration of 533.333 microseconds
    - ✓ (2**17 clocks of a 122.88 MHz clock).
    - ✓ for EMC reasons on UTP, it may be necessary to use a signal of half this frequency
    - ✓ it needs to be verified that this can pass through an optical transciever suffiecntly well to provide a signal detect at the far end.
  - previous proposals based on a “loose” clock are not considered further,
    - ✓ no significant power saving by using such a clock in place of a crystal oscillator.
  - transmitters are active for 1/256 of the time,
    - ✓ will not be consuming power otherwise.
- Signal detect circuit is used to detect that a valid signal is received.
  - latched, and the latch sampled at appropriate intervals. The latch is reset after each sampling,
    - ✓ indicates that a valid tone has been received since the last time a sample was taken.

Tone proposal - signal detect

- Based on Gigabit Ethernet

Receive conditions	SIGNAL_DETECT
Vinput Receiver < 200 mV pk-pk	FAIL
Other conditions Examples 1) Receiving neither a tone nor a non-8B/10B encoded data stream 2) Other end of the link undergoing power-on-reset (POR) transients 3) 200 mV (p-p) < V input Receiver < Minimum differential sensitivity 4) One of the differential lines is open	Unspecified
Receiving a tone or encoded 8B/10B characters AND Minimum differential sensitivity < V input Receiver < Maximum differential input	OK