

Fine-grain Suspend

David R. Wooten
Compaq Computer Corp.

Problem Statement

- 1394B interface is likely to consume more power than legacy interfaces (consequence of higher speed)
- Don't want the higher power to limit applications of 1394 in power sensitive applications
- Having a way to shut down and quickly restart a 1394B connection could save considerable power

Possible Solutions

- Use suspend/resume as defined by 1394A
 - Pro: already exists
 - Con: causes a bus reset every time a connection is shut down and restarted
- Define new, lighter weight suspend/resume (Pause) for 1394B
 - Pro: might avoid problems with existing ‘solution’
 - Con: yet another thing to invent and add to the Silicon

Presumed Application

- Within portable
- Single hop to pause (pause to leaf node)
- Device is never a power provider
- Device does not use power that is managed by other than processor in portable

New Solution Parameters

- Restart in under 3ms (1/2 rotation of 10K RPM drive)
- No bus reset due to link starting or stopping
- Reduce power in a port by 90%
- Symmetric restart (either end can wake up link)
- Nominal impact on PHY Silicon

Restart Time

- Need to detect that restart is desired, start and stabilize oscillator, establish bit synch, byte synch and scrambler synch.
- Currently, have estimate of $< 1\text{ms}$ for everything except time needed to detect that restart is desired (don't know how to do that yet -- another action for the Upstarts?)
- Need other estimates for how long this would take.

Elimination of Resets

- If reset occurs while link is paused, PHY will synthesize a PHY packet for the suspended device.
- If node number of upstream PHY is changed, then can have upstream PHY generate reset when link is resumed or figure out how to tell the paused PHY that it's node ID has changed.

Closure

- Need to decide if this is worth pursuing
 - Do we put it in 1394B, or
 - do we let someone define this as a value add?
- Need to validate assumptions
 - All within a box? (is this for portables only)
 - Support single hop only?