IEEE 802.17 RPR Working Group

Some thoughts on

Using Ethernet PHYs for P802.17

Tom Alexander

Summary of the issue

- P802.17 presently claims to use "Ethernet" PHYs (1000BASE-X, 10GBASE-X)
- However, there are some significant differences
  - The P802.17 MAC is not identical to the Ethernet MAC
  - The PHY specifications in P802.17 require several differences from normal "Ethernet" PHYs
- This is likely to cause the 802.3 group to raise objections during Sponsor Ballot
  - Claiming that our PHYs are "Ethernet" with these differences is asking for trouble

Partial list of the deltas

- Frame sizes
  - Both maximum and minimum frame sizes are different
- GigE PHY differences
  - No half-duplex
  - No carrier extension support
  - Signal fail required
  - Interframe behavior and carrier extend (35.2.3.1 and 35.2.3.5 of 802.3-2000) not supported
  - PHY autonegotiation not supported and doesn't make sense
  - GigE PHY fault behavior not supported
- 10GE PHY differences
  - RF/LF functionality for 10GE PHYs not supported by RS
  - Signal fail required
  - MAC IPG not as specified in 46.2.1 of 802.3
- Others may exist

Some of the key issues

- Common issues between GigE and 10GE PHYs
  - Frame size differences between Ethernet and RPR – already been discussed
    - Note that 802.3 has consistently and strongly rejected any attempt to legitimize jumbo frames
    - This alone is likely to cause significant issues during Sponsor Ballot
  - Ethernet fault behavior is different
    - A received remote fault causes the Ethernet RS to shut down the whole link
    - The RPR RS doesn't do this

- Significant GigE issues
  - Carrier extension is used in full-duplex mode for alignment
  - GigE PHYs may not function without autoneg
    - You don't want to go there!
  - GMII PHYs are not required to support signal fail as a physical pin
    - Some merely send a link status signal to an LED

- Significant 10GE Issues
  - RF/LF functionality not supported by RPR
  - XGMII PHYs are not required to support signal fail as a pin (only as a fault condition in a register)

What does this mean?

- We may not be able to convince 802.3 that the existing 802.3 PHY specifications will work unchanged for RPR
  - Even without frame size differences, there’s a lot of other issues
- In this case, we certainly won’t be able to convince them that existing Ethernet PHYs will be usable without change
  - “Existing” is an extremely stringent requirement
- As a result, we are likely to run into considerable problems if we claim to be specifying “Ethernet” PHYs in our draft
  - Quote from 802.3: “Ethernet is what **we** say it is”

A suggestion

- Remove all mention of the word “Ethernet” from the normative portions of the draft
  - Rename the “Ethernet” PHYs to something else (e.g., the “PacketPHY” with “PacketPHY1G” and “PacketPHY10G” variants)
  - These effectively become RPR-defined PHYs
- Define the “PacketPHYs” mostly by direct reference to the relevant clauses of 802.3, with appropriate exceptions
  - This is mostly the way it is done today, anyway
- Many existing Ethernet PHYs will match almost all of the “PacketPHY” requirements
  - There may be some minor issues, but these should be easily dealt with
- There should be no further questions about Ethernet PHY compatibility
  - If we don’t claim that these are Ethernet PHYs, 802.3 loses interest
  - We can then do what we want to these PHYs, within reason
- Our PAR lets us define new PHYs
  - And no, neither the PAR nor the 5 Criteria require us to use Ethernet PHYs

This has been done before

- 802.3 Fast Ethernet PHY
  - Stolen from FDDI
  - Removed many of the special FDDI codes and functions
- 802.3 Gigabit Ethernet optical PHY
  - Stolen from the Fibre Channel FC-0 and FC-1 layers
  - Initial 802.3z draft referred to ANSI material, final draft was stand-alone (ostensibly referring to all-new Si)
  - Most Fibre Channel PHY vendors found it surprisingly easy to sell into the GigE optical PHY market ☺

I'll probably be introducing a motion to this effect on Thursday