PTP Architecture

Futures

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Current problem

Multiple PTP profiles
• sometimes mutually incompatible

Only 802.1AS is explicitly future-proofed
• explicit layering and tight definition, support for multiple L2 technologies
• but very limited flexibility, no explicit interface with IPv4/v6, no defined way to bridge to other profiles
Is this really a problem?

Yes, I think so:

• There **will** be places where different profiles intersect (telecom/any other, power/802.1AS, default 1588/802.1AS, etc) - we really should define how these operate

• There are good ideas in all of the profiles that could be shared

• There will be new technologies and they should be available for all profiles with minimal problems
Legacy interoperability

Integrating default profiles are a requirement

• Integrating 802.1AS, telecom, power are extremely important

Intent is to provide a bridge between new generation PTP and legacy

• Won’t necessarily be plug-and-play, but it might be, depending on the profiles
A possible approach

Use something like the 802.1AS layering

• replace the 802.1AS “media independent” specification with a core 1588 version
• have media dependent sections for each profile
“for each profile”?

each profile could be:

• a spec for a “media dependent leg”
• interfaces to define how the link uses BMCA, or if not, how the BMCA-set parameters are controlled
  - frankly, this will be the hard part
IPv4 isn’t a “media”

but it could be, from the point of view of the media-independent part:
Structure of a specification

Core media-independent spec:
- Clock capabilities and API
- Transparent clock/boundary clock
  - (can be the same spec, see [1])
- Interface to media dependent sublayer

Media-dependent spec(s):
- Interface to other media dependent layer (if needed)
- “Event” definition / timestamping / delay measurement
- Some may need to be done by specific layer 2 standards group (e.g., 802)
This is just an idea

... but the intent is to allow all the 1588 systems to have a defined level of interoperability, and to specify how the various profiles can work together
And for equipment vendors ...

It’s possible to build “universal” PTP switches / routers / bridges

• even endpoints
... and for other standards groups

Well defined interfaces will allow more independent work to enhance PTP

- 802.1AS, in particular, could shift to 802 media-specific requirements, and be a more specific subset of the 1588 core rather than a redefinition of OC/TC/BC
Thanks!

References

• Geoffrey M. Garner, Michel Ouellette, and Wie Jianying, Equivalence of the IEEE 1588 Boundary Clock and Peer-to-Peer Transparent Clock for Synchronization Transport, contribution to ITU-T SG 15, Q13, COM 15 – C1001 – E, May, 2010

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• Geoffrey M. Garner, Michel Ouellette, and Michael Johas Teener, Using an IEEE 802.1AS Network as a Distributed IEEE 1588 Boundary, Ordinary, or Transparent Clock, ISPCS ’09, Portsmouth, NH, USA, September 2010