1588 and 802.1AS Synergies: Challenges and Opportunities

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Introduction

It's IEEE Std 1588-2008 and IEEE Std 802.1AS-2011

- ... so we are done, right?

Clearly we are not

- IP vs Layer 2, profile proliferation™, redundancy, shared media (e.g., WiFi, g.hn)
- "802.1AS is higher performance and lower cost"
- "1588 is more compatible"

“1588” advantages

(“1588” means one of the IPv(x) profiles)

A “1588” PTP domain doesn’t require time-aware switches (BC or TC)

- for existing networks with expensive infrastructure … e.g., telecom
- sophisticated filtering required to compensate for variable delays

802.1AS advantages

Higher guaranteed performance

- all switches/bridges are "time-aware" (802.1AS Ethernet switches are mathematically equivalent to a peer-to-peer TC)
- fast phase convergence via explicit phase difference propagation

Many fewer options

- two-step only, all devices BMCA-aware, all switches/bridges are "TC-equivalent" BC's

Support for many L2 networks

- Ethernet, EPON, WiFi, MoCA, powerline

Fully defined higher-layer service definition

- abstract interfaces suitable for HW and SW

Other problems

What is “routable” PTP?

- a wide-area PTP requires a time-aware router ... what does that look like? ... how do we deal with the scalability issues?

Interaction with NTP

- most common time protocol for major OS’s

Definition of bridging between PTP domains

- need a precise definition for a boundary clock, current spec is too loose

Proposed new 1588v3 work

1588v3 should adopt the layering model used in 802.1AS

- keep L2-specific operation out of 1588
- provides a high-level abstract interface for PTP

1588v3 should work with the IETF on a new "wide area PTP"

- define the bridging between a "local" and "routable" domains

Proposed new 802.1AS work

Provide L2 timing information for 1588v3

- update L2 abstract interface to support 1588v3

Define “concatenated” 2-step model

- follow-up immediately follows event frame
- equivalent timing performance and computation load of 1-step, but compatible with SW-based 2-step devices

Work with 1588v3 to provide end-to-end quality information

- common service interface and information exchange

Some controversy?

Personal opinion:

1588v3 should deprecate "TC's"

- allowed, but should encourage using 802.1AS for LANs
- IPv(x) 1588 should assume 802.1AS services for event propagation and path definition

802.1AS and 1588v3 should be merged and repartitioned

- "L2" spec defines PTP over a subnet
- "IP" spec defines PTP over the internet

Organization?

New 1588v3 study group colocated with 802.1AS meetings

- IEEE 802.1 meets 6 times per year
  - 1588 could use same venue

Define repartition

- update 802.1AS revision PAR (already approved)
- new 1588v3 PAR

Continue to colocate meetings

- PTP community will likely be interested in other 802.1 time-sensitive networking efforts

Thank you!