802.1AS Hot Standby Amendment: 4 Domains

Rodney Cummings
National Instruments
Introduction

• This presentation is a response to this proposal, which shows 4 domains for 802.1AS hot standby
• This presentation assumes January PAR scope
  • No BMCA, 2 domains
Assumptions

• Time sync performance requirement is network-wide
  • Conformance/certification is per system (hardware product)
  • For example, see P60802 drafts

• Goal for hot-standby: maintain network performance
  • Unlike BMCA, goal is not to find best-performing path
  • All paths meet network requirement

• Use as many paths as possible for availability
What is a Domain?

- Message headers have distinct domainNumber value
  - Not relevant by itself... it's just a number

- Each domain carries a distinct time
  - Do two GMs carry different time? Yes
    - Yes; each GM has its own clock
      - "Clock" per 1588 definition: "A device that can provide a measurement of the passage of time since a defined epoch."
  - Do two paths carry different time?
    - Technically Yes, but under the previous assumptions... No
    - All paths meet network performance, so effectively the same

- Are there limitations on the path a domain can use?
  - Yes, but there are simple ways to work around limitations
Two Domains

GM1's clock uses the epoch from GM1

GM2's clock uses the epoch from GM1

- physical link
- flow of time, domain A
- flow of time, domain B
- arrow source is portState=Master
- arrow head is portState=Slave
- arrow disappears if Sync/FollowUp stop
Multiple Flows Into Relay

How do we support this?

• Assume we have boolean isSynced per port
• Initial portState configuration:

  • If isSynced for P2 becomes false, local hot-standby state machine changes configuration to:
Two Links Fail: Mitigated

- Physical link
- Red: flow of time, domain A
- Blue: flow of time, domain B

Unless otherwise shown:
- Arrow source is portState=Master
- Arrow head is portState=Slave
- Arrow disappears if Sync/FollowUp stop

IEEE 802.1, March 2020, Atlanta
Red domain A is retained by the "split" function, from blue domain B. portState=Master due to split is shown as 'Y'.

Other Two Links Fail: Mitigated

- arrow source is portState=Master
- arrow head is portState=Slave
- arrow disappears if Sync/FollowUp stop

physical link
flow of time, domain A
flow of time, domain B
Two Links & One GM Fail: Mitigated

"Split" function in R4 takes over for blue domain B.

- physical link
- flow of time, domain A
- flow of time, domain B

unless otherwise shown:
- arrow source is portState=Master
- arrow head is portState=Slave
- arrow disappears if Sync/FollowUp stop

IEEE 802.1, March 2020, Atlanta
Thank You