

802.3da Clause 147 Multidrop Interoperability

Proposed Interpretation and Implementation

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Objective

- Objective four was stated somewhat vaguely
- Room for interpretation
- Goal for today is to build a consensus around a clear interoperability method

Objective 4 Support interoperability with Clause 147 multidrop

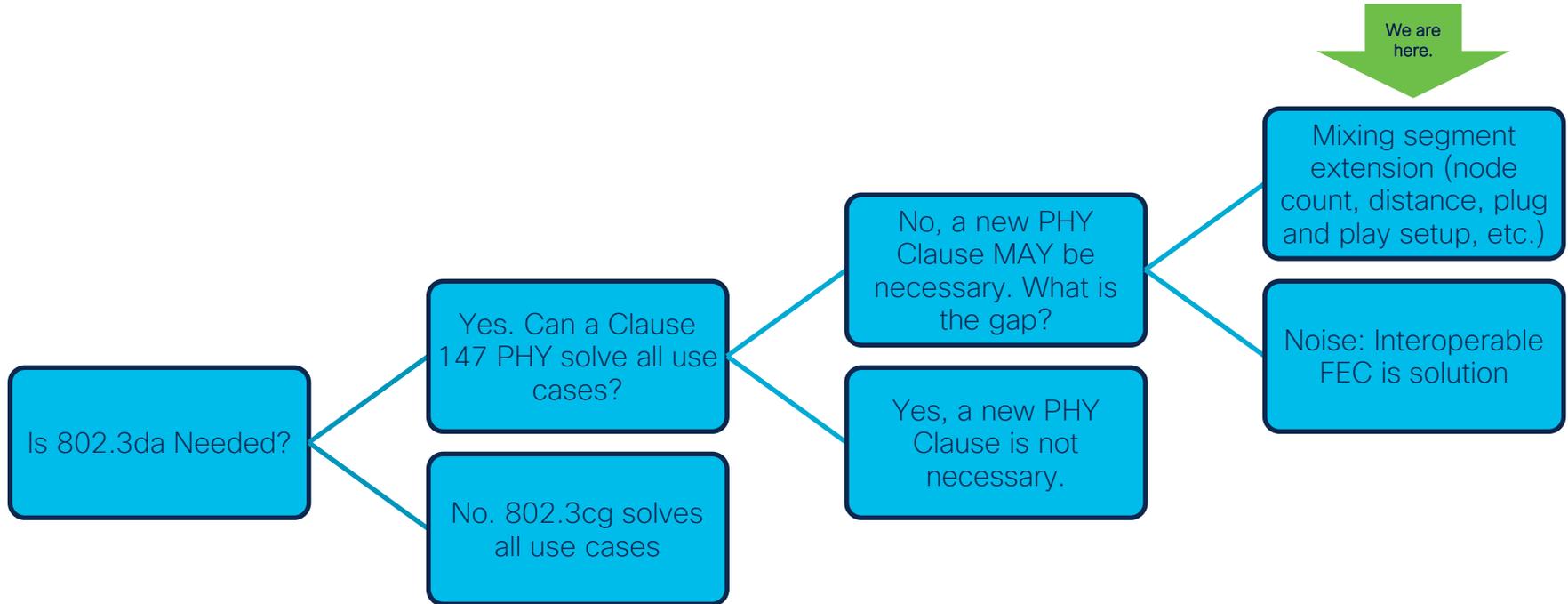
Previous Discussions

This presentation builds on these previous presentations:

- Suggested Interpretation of Objective 4 – March 17, 2021
https://grouper.ieee.org/groups/802/3/da/public/0321/potterf_da_01_031_021.pdf
- FEC for 802.3da – June 16, 2021
https://grouper.ieee.org/groups/802/3/da/public/061621/huszak_zimmerman_fec_3da_06162021.pdf

Options Overview

Decision Tree



Decision Consequences

- This presentation assumes that the Clause 147 PHY is not sufficient for 802.3da and the solution has many facets, one of which could be the optional, backwards-compatible FEC previously proposed by Huszak and Zimmerman
- Several further assumptions follow from the other objectives:
 - Clause 147 PHYs **are not guaranteed** to function on a subset of mixing segments for which 802.3da nodes **are guaranteed** to function
 - 802.3da nodes must operate according to Clause 147 to satisfy Objective 4, in addition to their native clause
 - 802.3da nodes must bear the burden of interoperability
- **Key Decision Point:** Will 802.3da alter Clause 147 line coding and encoding, or is it simply a receiver spec upgrade?

Proposal: Highest Common Capability

(Assumes coding changes that break Clause 147 receivers)

- A homogeneous 802.3da network will operate wholly within its PHY clause as long as nodes only capable of Clause 147 are not present
- Introduction of one or more Clause-147-only nodes has one of two outcomes:
 - All 802.3da nodes transition to Clause 147 operation
 - Network is corrupted by the Clause 147 node and becomes unreliable
 - This occurs if the mixing segment does not meet the Clause147 specification
- Removal of the last Clause-147-only node should allow native 802.3da operation to resume
- Powered networks are out of scope for interoperability as powering was out of scope for Clause-147
- Applies equally to Clause-147 network with a native 802.3da node added

Dynamic Clause Selection Method 1

- All 802.3da nodes encode their capabilities and operational state in the preamble of each frame
- Clause-147-only nodes can only send the 802.3cg prescribed preamble
- 802.da PHY monitors for 802.3cg preamble frames and sets a flag when encountered
 - When flag is set, network moves to Clause 147 operation
 - Flag can be cleared periodically, and when it remains un-set for a chosen time period (i.e. several minutes) 802.3da native clause communication resumes

Dynamic Clause Selection Method 2

- All 802.3da nodes encode their capabilities and operational state in an SPE Capabilities LLDP TLV
- Clause-147-only nodes implementations could:
 - Not send LLDP frames (very likely)
 - Send all LLDP frames without the SPE Capabilities LLDP TLV (also very likely)
 - Send all LLDP frames with the SPE Capabilities LLDP TLV TLV indicating only Clause 147 capabilities (unlikely)
- If a node follows any of these Clause-147-only behaviors and transmits a frame using Clause 147, all nodes shift to Clause 147 operation immediately and remain in this state until the last Clause 147 node leaves the network
- The last Clause 147 node's departure is established by the following:
 - A node not sending LLDP frames has not transmitted a Clause 147 frame withing a chosen period (on the order of minutes)
 - Nodes sending LLDP frames without the SPE Capabilities LLDP TLV, or with the TLV but indicating only Clause 147 capabilities, have allowed their LLDP TTL periods to expire without renewal, or sent a frame with TTL=0 to indicate shutdown of the node

Challenges

- For Method 1, the Clause 147 preamble definition may be insufficiently specific to allow reliable detection of a Clause 147 preamble
- 802.3da-capable nodes might continue Clause 147 transmissions past the prescribed transition point for some reason, but this should not trap the mixing segment in Clause 147 operating mode
 - Capabilities fields in the Method 1 preamble or the Method 2 LLDP TLV will prevent re-triggering Clause 147 operation
- Some data loss may be inevitable during shifts, but these events should be coincident with topology changes, during which some data loss is already expected and handled by higher layers

Questions and Discussion