Next steps for LLDPv2 proposals

Paul Congdon (Huawei/Tallac)

Paul Bottorff (Aruba)

Paul Unbehagen (Big Switch Networks)

Mark Hantel (Rockwell Automation)

Scott Fincher (Extreme)

Background

- Initial LLDPv2 proposal - presented on 1/7/2019 at TSN call
  - http://www.ieee802.org/1/files/public/docs2019/new-congdon-lldpv2-consideration-0119-v01.pdf

- Evaluation of LLDPv2 proposal against LSVR requirements – Presented at IEEE 802.1 Interim in Hiroshima
  - http://www.ieee802.org/1/files/public/docs2019/new-congdon-lsvr-disco-requirements-for-LLDPv2-0119-v01.pdf

- Industrial considerations for LLDPv2 – Presented at IEEE 802.1 Interim in Hiroshima
  - http://www.ieee802.org/1/files/public/docs2019/new-hantel-industrial-LLDP-considerations-0119-v00.pdf

Updated motivation

- Why do we need to update LLDP?
  - LLDP is widely deployed in many environments
  - The number of TLVs sent in LLDPDUs continues to grow
    - New standards continue to defined new objects
    - A large number of Vendor Specific TLVs
  - Alternative protocols are being proposed to get around the single PDU size limit
  - Relying on Jumbo frames to support more TLVs is problematic in many environments
  - Summary: We need to be able to exchange more TLVs. - IETF Link State Vector Routing (LSVR) requirements are just one example use case where this is needed.

Objectives for a new version

- Support the ability to send more than 1 PDUs worth of TLVs
- Support the ability to limit LLDPDU size to meet timing constraints
- Support the ability to communicate with an LLDPv1 implementation (only the first PDUs worth of TLVs).
- Ensure the integrity of the full set of TLVs is received by partner
  - NOTE: This can be useful in v1 implementations as well
- Consider if there are other optimizations to address
  - E.g. Less frequent updates
  - E.g. New reachability addresses (Nearest-station or Nearest-Router)
  - E.g. allow larger TLVs and/or the ability of the contents to span multiple extension PDUs

Hiroshima meeting feedback

- Need for shrinking the LLDPDU size to meet Industrial TSN timing constraints

- We are probably using too much space in the Extension TLV and this could be done more efficiently.

- We should be able to meet all LSVR requirements, except 'liveness', but existing Connectivity Fault Management (CFM) or other In-situ Operations, Administration, and Maintenance (IOAM) solutions can be used.

Current LLDP operation reminder
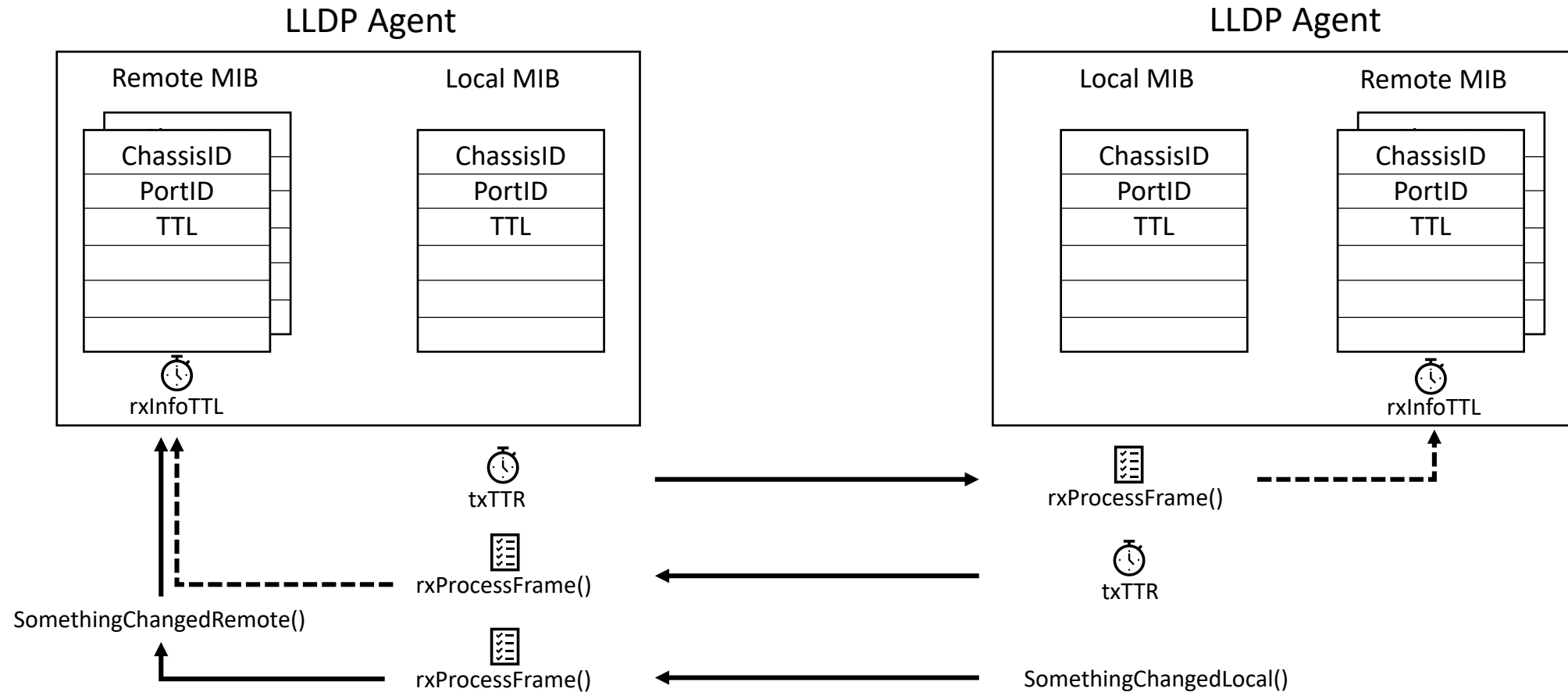
NOTE: Think of the Remote and Local MIBs as a database that must fit into a single PDU
Replace all values of the Remote MIB with contents of LLDPDU when something changes

Proposal

- Define a new mandatory (for v2 implementations) TLV that appears just after the current mandatory set of 3 TLVs.
  - ChassisID TLV + PortID TLV + TTL TLV + (new) ExtensionPDU TLV

- In the new TLV, define a vector that specifies:
  - The number of extension PDUs to be sent
  - An identity of each PDU (e.g. hash, checksum, version number or PDU number)
  - Acknowledges the receipt of partner extension PDUs

- The first v2 PDU looks like a standard v1 PDU with the extra ExtensionPDU TLV (i.e. will be received by v1 implementations).

- The new extension PDUs need to be ignored by v1 LLDP in a non-intrusive way. Options:
  - Force an error in the v2 PDUs – will cause error counters to increment
  - Use a new Ethertype for v2 extension PDUs - preferred

- The new PDUs need to have a mandatory format as well:
  - Includes at least the first two mandatory TLVs of a v1 PDU (ChassisID + PortID)
  - Includes new TLV that identifies the extension PDU.

- Optimizations:
  - There is no need to resend extension PDUs if nothing has changed, unless a previous extension PDU was not correctly received.
  - Only periodically send the 1st PDU.
  - TTL in 1st PDU relates to all extension PDUs.

- NOTE: The maximum size of a TLV defines the maximum number of extension PDUs that can be included. (depends on identity field)

Proposed LLDPv2 Operation
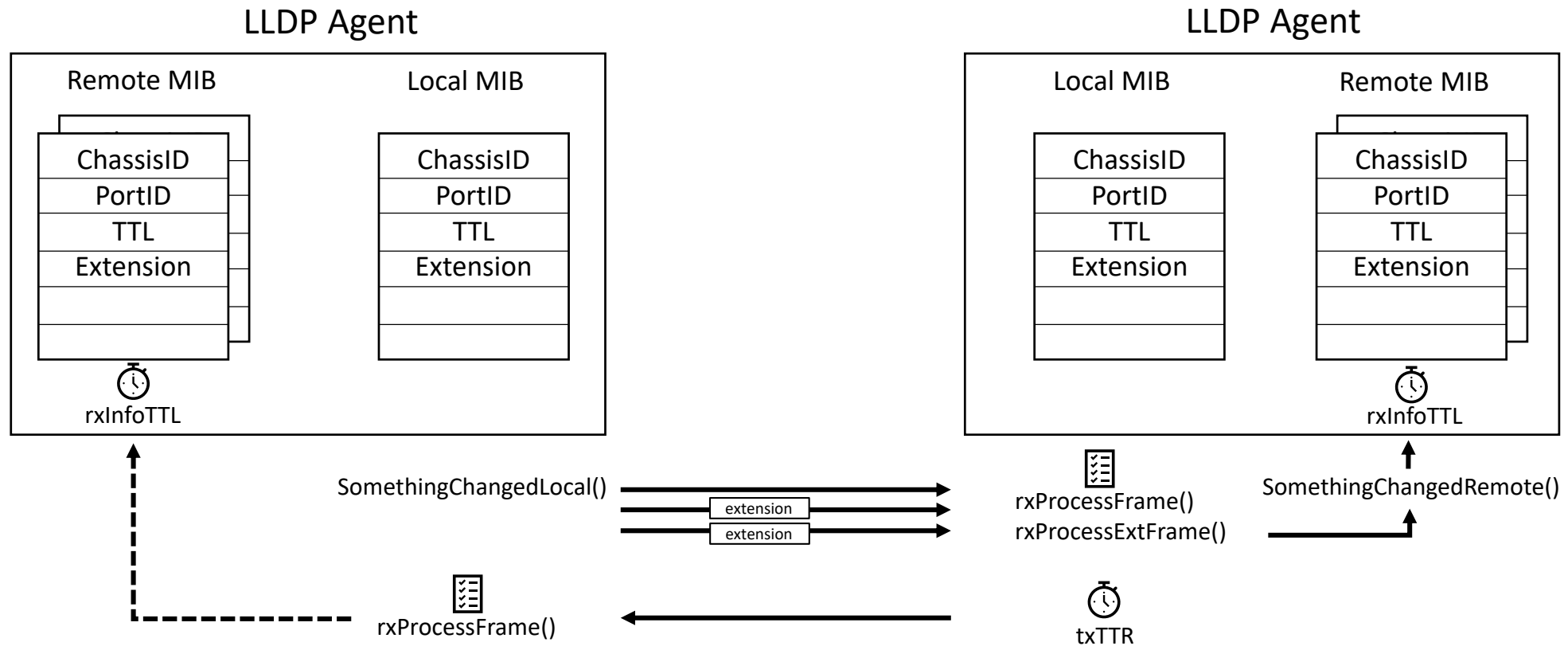
NOTE: Send primary LLDPDU and all extension PDU when something changes locally or retransmission is needed. If extension data has NOT changed, no need to send anything other than the primary LDPDU

Scope of work for a new project

- Propose the project is an amendment of 802.1AB
- New standard TLV definition – ExtensionPDU TLV
- New TLV definitions intended for Extension PDUs - Extension Description TLV
- New clause for extension PDU processing
- Updated state machines and new state machines for extension PDUs
- New feature to restrict LLDPDU size for all PDU types
- Augmented YANG and SNMP modules

Next steps

- Consider PAR and CSD development in May
- Need motion to develop and pre-circulate PAR and CSD
- Request presentation time at IETF LSVR to review with them in Prague?