Consideration of LLDPv2

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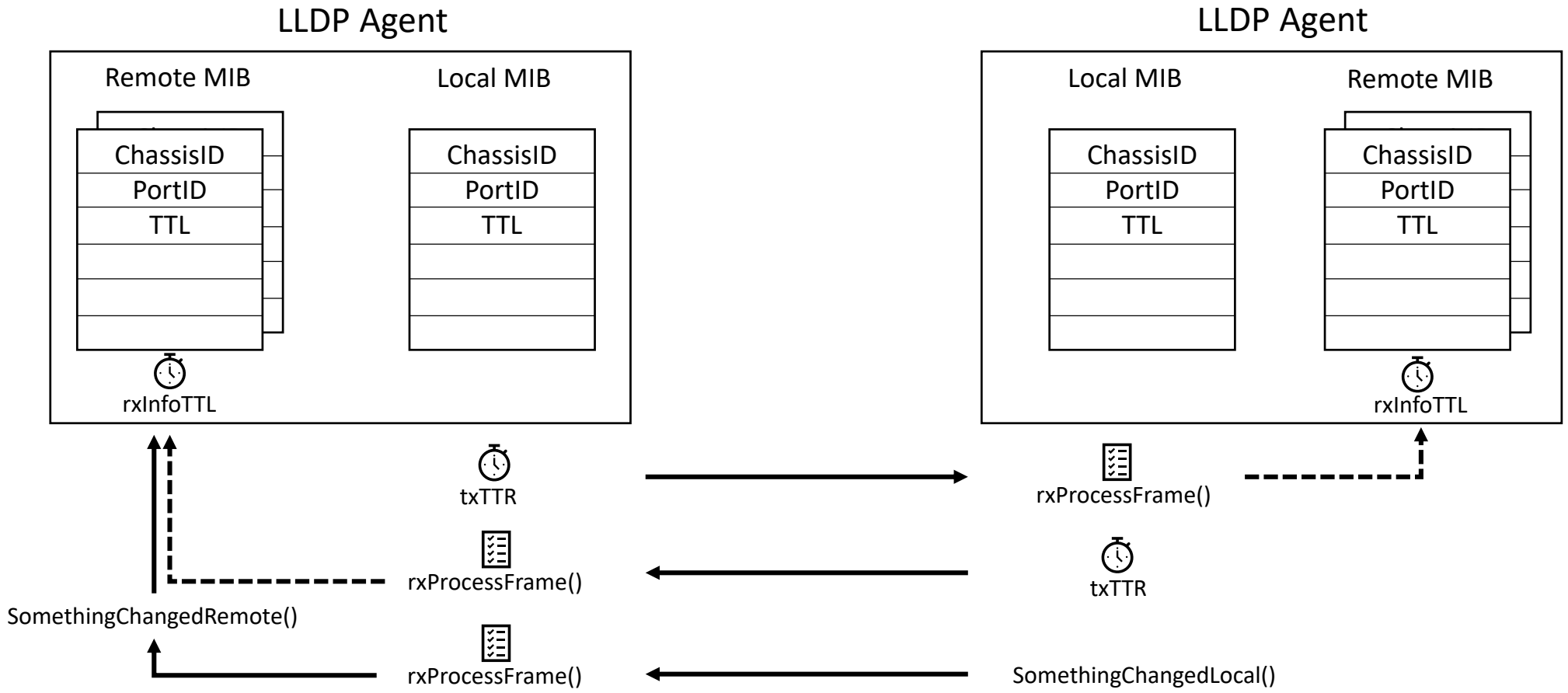
Why do we need to update LLDP?

- 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.

Objectives for a new version

- Support the ability to send more than 1 PDUs worth of TLVs
- 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)

Current LLDP operation reminder

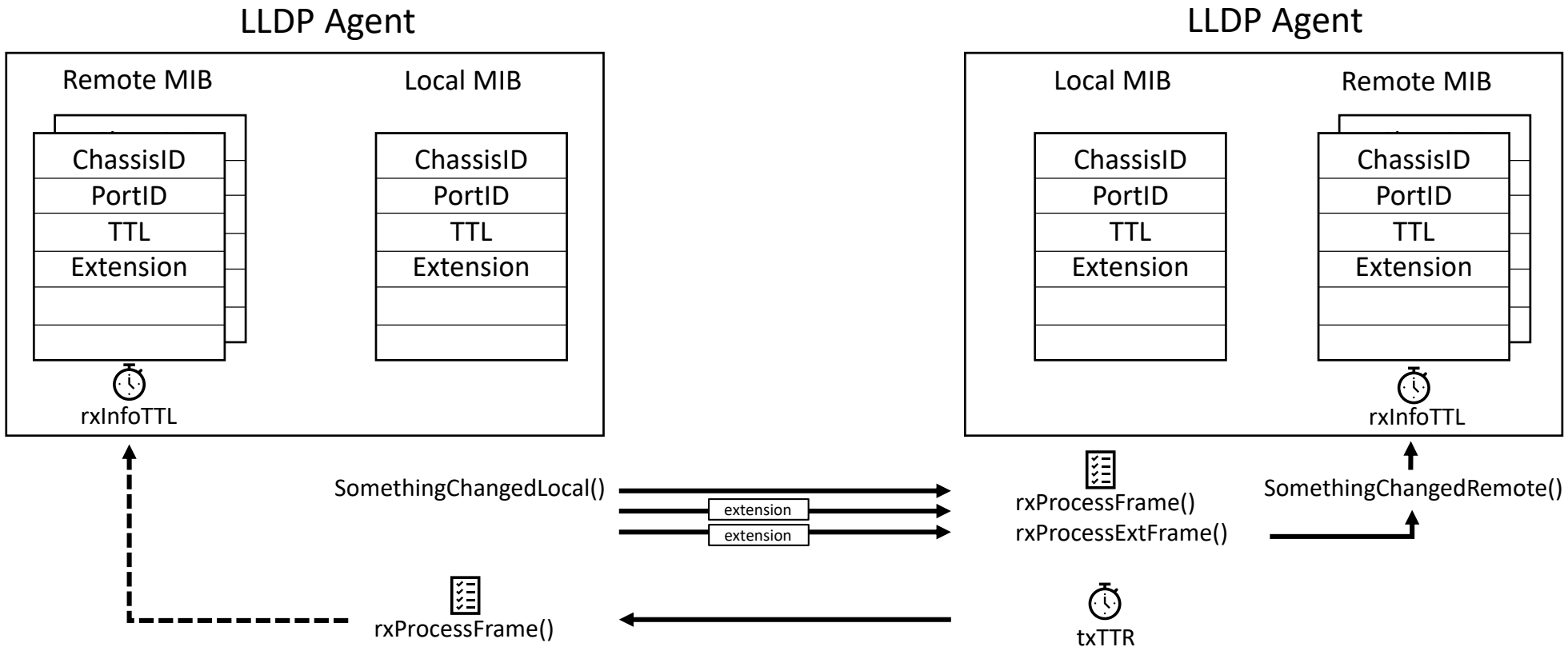


NOTE: Think of the Remote and Local MIBs as a database that must fit into a single PDU
Replace all values of the Remote MIB with contents of LLDPDU when something changes

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.
  - 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)

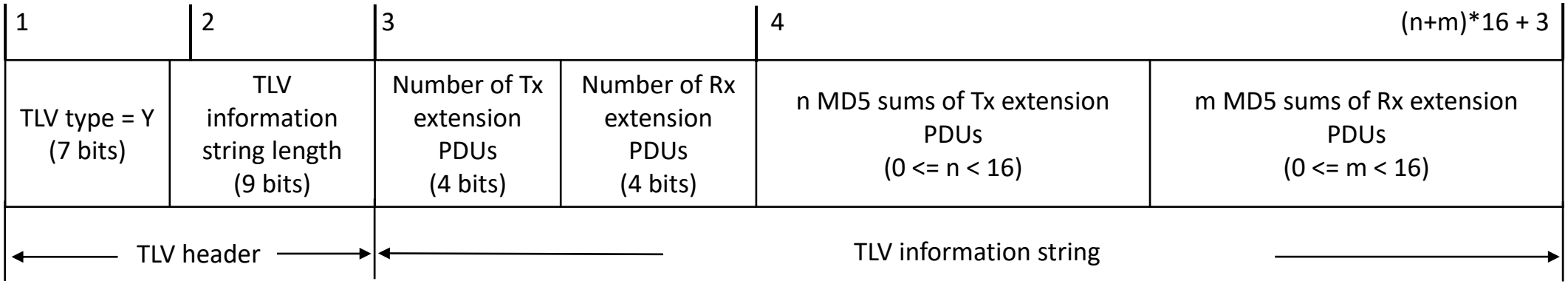
Proposed LLDPv2 Operation



NOTE: Send primary LLDPDU and all extension PDU when something changes locally

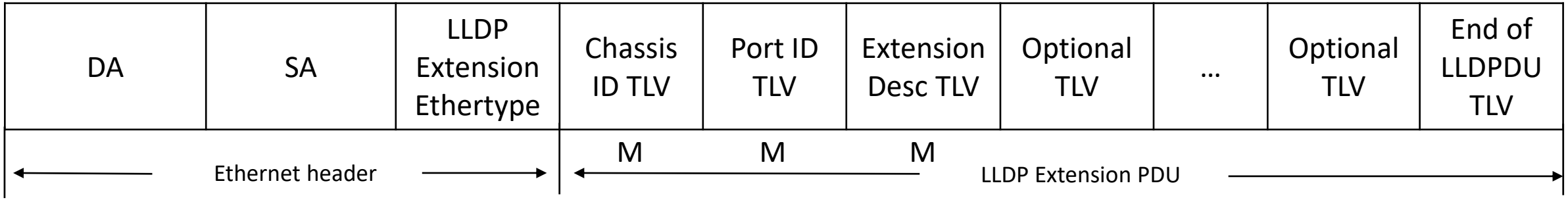
If extension data has NOT changed, no need to send anything other than primary LLDPDU

Example Extension TLV



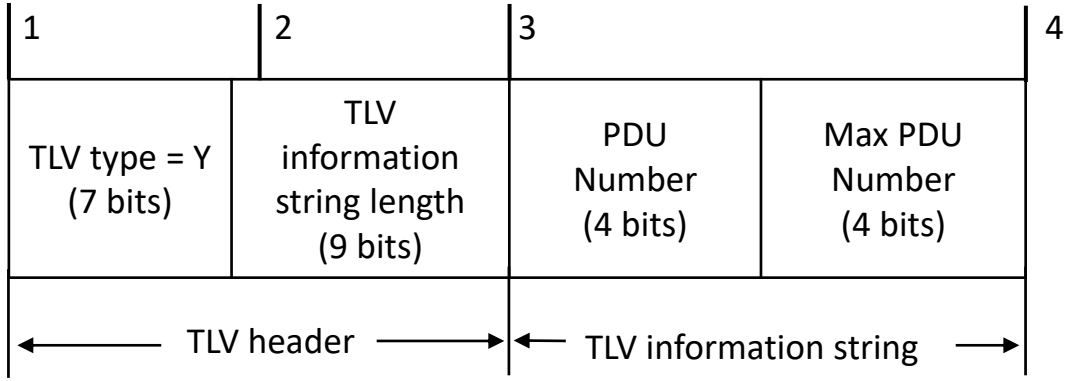
- TLV Type
  - probably use the next reserved type (i.e. 9)
- Number of Tx and Rx extension PDUs
  - If using MD5 Sum of 16 bytes, can only pack 30 sums into a TLV
- MD5 Sums
  - Should cover the entire extension LLDPDU

Example Extension PDU



- LLDP Extension Ethertype
  - New Ethertype allows LLDPv1 implementations to ignore these frames
- Chassis ID + Port ID are mandatory
  - Note TTL from 1st PDU should apply and is not needed here
- Extension Description TLV
  - Numbers the extension PDU in the sequence of all extension PDUs

Example Extension Description TLV



- TLV Type
  - Another new base TLV type (i.e. 10)
- PDU Number and Max PDU Number
  - For example PDU 1 of 5

Questions / comments / TBDs

- How to define the extension PDU TLV?
  - It needs to contain a vector of information for all extension PDUs
  - It needs to acknowledge received extension PDUs.
  - The smaller the identity field, the more extension PDUs that can be supported (e.g. CRC-16 or MD5 Hash?)
  - We could define two extension TLVs – one for Tx and one for Rx to support more extension PDUs
  - Should the MD5 Hash cover all PDUs or individual?
- When to send the 1st PDU as an ACK of received extension PDUs?
  - Need a final bit in the extension PDUs or a PDU number scheme?
  - Define another End of LLDPDU TLV?
- Retransmission strategy? SACK or just retransmit the entire sequence?