LNI 4.0 / IEEE 802.1 WG Liaison

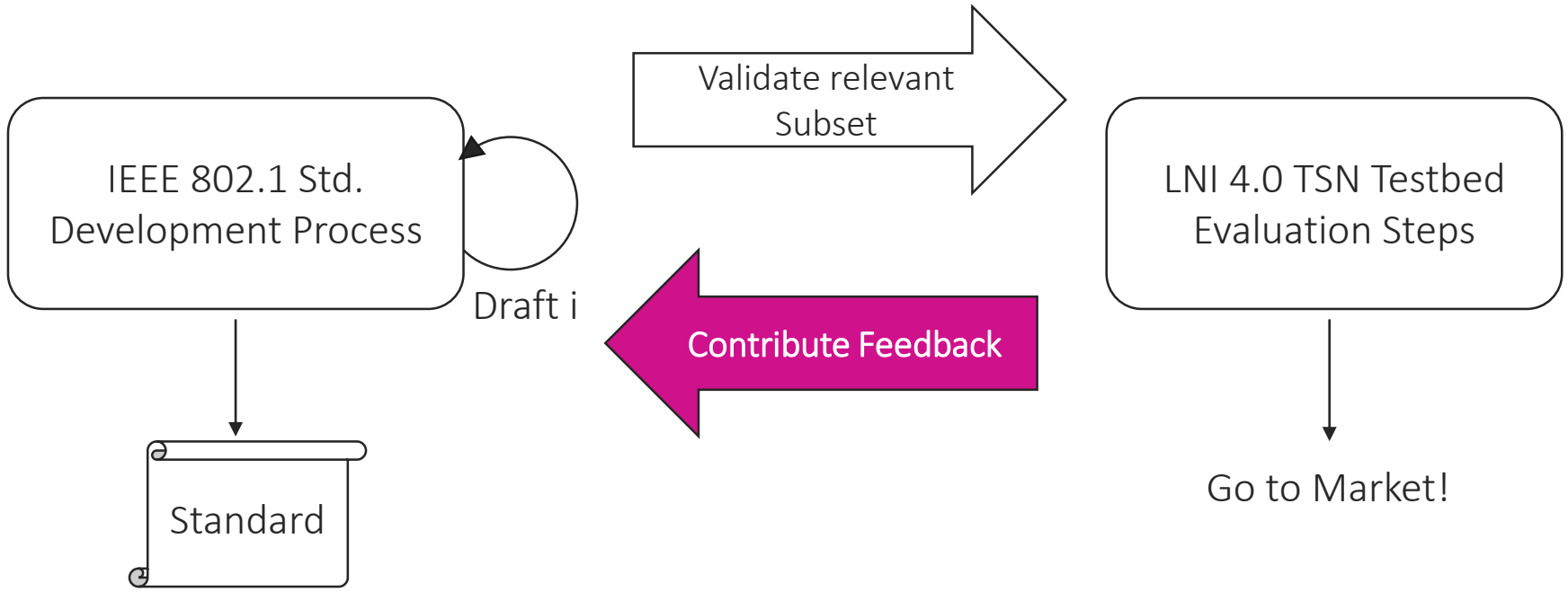
Whitepaper
LRP/RAP for LNI 4.0 TSN Testbed

18.05.2020

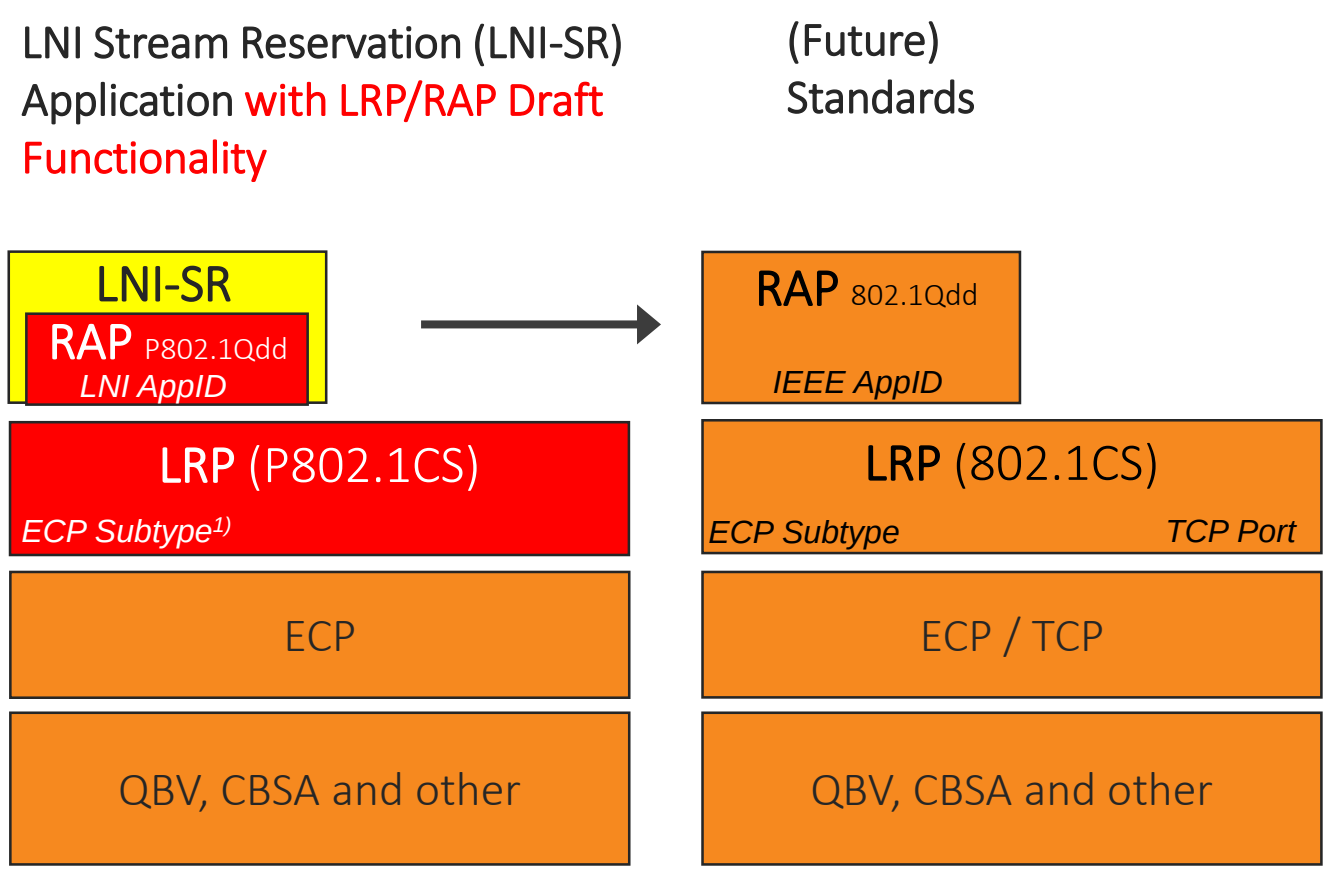
LNI 4.0 Tasks

Drive solution for dynamic Industry 4.0 M2M use-cases:

- Provide Proof of concept for distributed stream configuration model
- Contribute feedback to standardization: Whitepaper LRP/RAP for LNI4.0 TSN Testbed
  - http://www.ieee802.org/1/files/private/liaisons/liaison-LNI40-LRP_RAP-whitepaper-0420-v1.pdf
- Perform plug-fests to achieve cross-vendor interoperability



LNI 4.0: Approach to Distributed Stream Reservation



1) will be specified just before SA Ballot commences

IEEE 802.1/IETF Standard | IEEE 802.1 Draft Standard | LNI Community

LNI 4.0: LNI-SR Application

- The LNI-SR Application is an organization specific LRP Application, identified by the Labs Network Industrie 4.0 CID based AppID (EA-2A-DB-01).
- The LNI-SR Application implements the LNI relevant subset of the RAP draft functionality.
- The LNI-SR Application implements organization specific enhancements (Labs Network Industrie 4.0 CID based TLVs) to the RAP draft functionality.
- The LNI-SR required enhancements (.1Qbv) will be contributed to RAP.
- Goal is easy migration from LNI-SR Application to IEEE Std 802.1Qdd/IEC IEEE 60802.

LNI 4.0: Whitepaper LRP/RAP for LNI 4.0 TSN Testbed

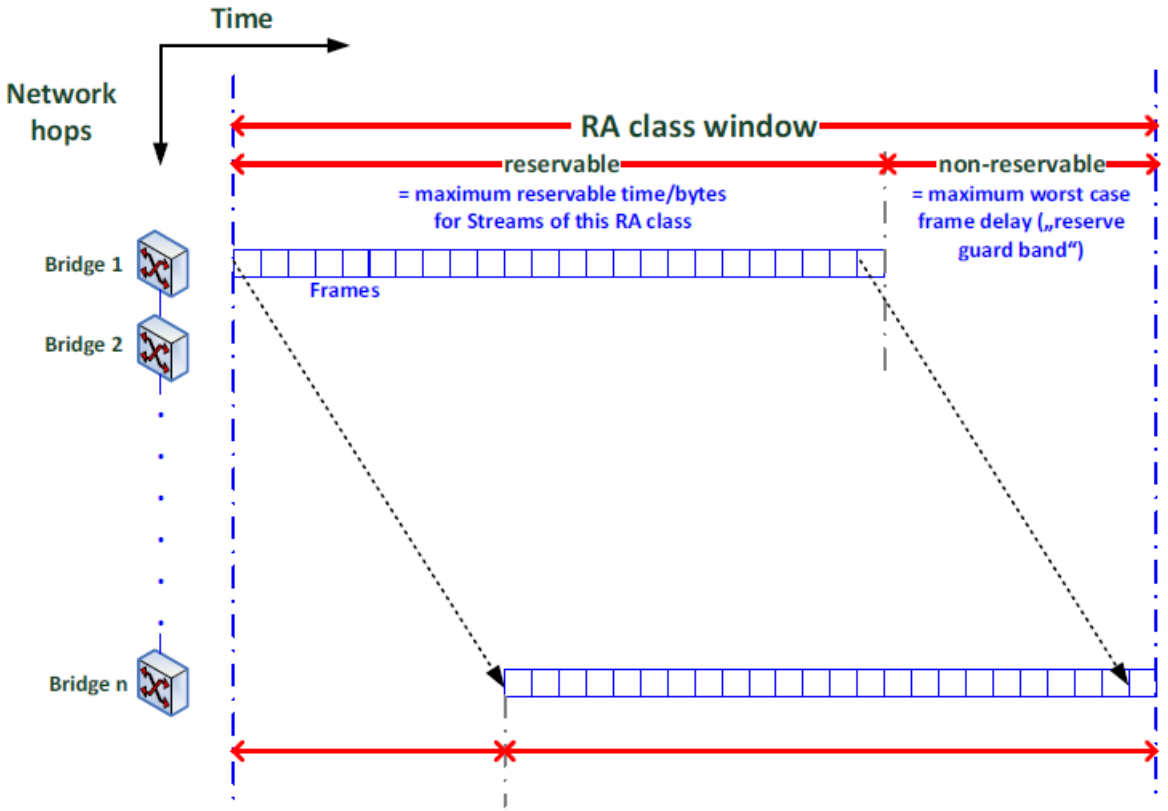
Overview

- Available at <http://www.ieee802.org/1/files/private/liaisons/liaison-LNI40-LRP_RAP-whitepaper-0420-v1.pdf>
- Adopted from previous whitepaper:
  - Principles of Distributed Stream Reservation
  - LNI 4.0 Data Plane Mechanisms
    - Linear Topology
    - Scheduled Traffic for LNI 4.0 Applications
    - Configuration
    - Synchronization
    - End-Station Stream Transmission Behavior
- NEW LNI 4.0 Stream Reservation Stack based on LRP/RAP Drafts

LNI-SR: Stream Reservation and Scheduled Traffic

Recap: Stream reservation and scheduled traffic - they fit under constraints

- linear topology with restricted bridge diameter
- identical RA class windows configuration in the gating cycle of all Bridges



LNI-SR: RAP usage

- Two LNI-CID based RAclass Specifications with LNI-SR Organizational Enhancement sub-TLV
  - EA-2A-DB-01 (LNI-SR class High)
  - EA-2A-DB-02 (LNI-SR class Low)

LNI_SR_Enhanced_RAclass_Descriptor sub-TLV:

Type = 0xFF
Length = 30[1)]
OID/CID = EA-2A-DB
LNI_SR_RAclass_Properties sub-TLV (see Table 8)
LNI_SR_WorkingClock_DomainID_List sub-TLV (see Table 9)

LNI_SR_RAclass_Properties sub-TLV:

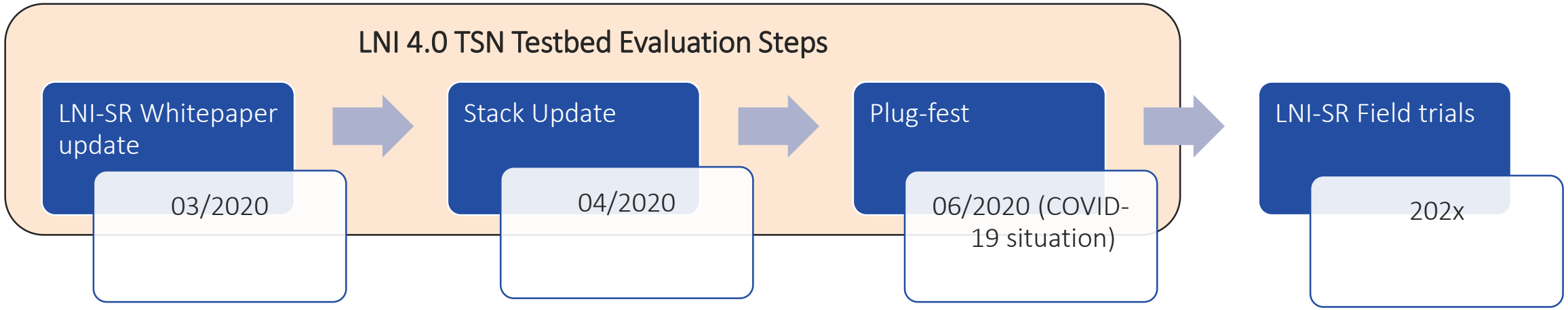
LNI-SR sub-TLV Type = 0x01
LNI-SR sub-TLV Length = 20
LNI_SR_RAclassMaxHopCount (see 8.1.1.1)
LNI_SR_RAclassMaxLANPropagationDelay (see 8.1.1.2)
LNI_SR_RAclassWindowOffset (see 8.1.1.3)
LNI_SR_RAclassWindowLength (see 8.1.1.4)
LNI_SR_RAclassMaxBridgeLatency (see 8.1.1.5)
LNI_SR_RAclassVID (see 8.1.1.6)

LNI_SR_WorkingClock_DomainID_List sub-TLV:

LNI-SR sub-TLV Type = 0x02
LNI-SR sub-TLV Length = 1[2)]
LNI_SR_RAclassWorkingClockDomainID (see 8.1.1.7)
<further WorkingClockDomainIDs if supported>

LNI 4.0: Next steps

- Make the new stack available for LNI members
- Plugging the new stack
- Deliver feedback to IEEE



Questions ?

LNI 4.0 Testbed TSN partners

(37, 14 Small Medium Enterprises)