

The background image shows a large, modern industrial facility, possibly a factory or data center, with high ceilings, complex piping, and structural elements. A semi-transparent teal rectangular box is overlaid on the lower-left portion of the image, containing white text. The overall aesthetic is high-tech and industrial, with a blue and yellow color palette. In the background, there are faint, glowing yellow rectangular outlines and streams of binary code (0s and 1s) in blue and white, suggesting a digital or data-centric environment.

Adding Support for per-Port Multiple Instances of ECP in 802.1Q

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Introduction

- ❑ The Edge Control Protocol (ECP) in Clause 43 of IEEE Std 802.1Q-2018
 - specifies a simple and lightweight transport protocol operating between two peers over 802 links
 - provides reliable delivery (sequence number + ACK + retransmit) and flow control
 - can use either a Group (multicast) or an Individual (Unicast) MAC address as the destination address
 - defines a service interface for use by different Upper Layer Protocols (ULPs)
 - is already used by two 802.1 protocols: VDP¹ and PE CSP²
 - is currently chosen as one of two alternative data transport mechanisms for LRP³
 - **however, allows only a single instance of ECP per port**
- ❑ This presentation describes the current limitation of ECP in supporting only one instance per port and the consequences of such a limitation. The proposal is to extend ECP by adding support for multiple ECP instances with an amendment to 802.1Q.

¹ Virtual Network Interface Discovery and Configuration Protocol (IEEE Std 802.1Q-2018 Clause 41)

² Port Extender Control and Status Protocol (IEEE Std 802.1BR-2012)

³ Link-local Registration Protocol (P802.1CS D1.6)

ECP Issue

- ❑ The presentation <[cs-finn-discovery-association-0118-v03.pdf](#)> points out the problem of missing support for multiple ECP instances on a bridge port by the current ECP specification in 802.1Q.
- ❑ Because of this limitation, the current LRP draft contains the following text that describes the constraints imposed on its applications that use ECP.

In subclause 6.7.1

Because ECP allows only a single instance of ECP per physical port, which instance converses with only one neighbor system, ECP can have multiple point-to-point associations (item i in 6.3.1) only if an ECP instance is used by more than one application. The associations are multiplexed by a field in the LRPDUs to distinguish their LRPDUs.

In Annex B.5, item e)

If other protocols (e.g. Edge Virtual Bridging, clause 40 of IEEE Std 802.1Q-2014) also use ECP, then the choice of the ECP destination MAC address used has to be coordinated with those other protocols.

ECP Issue (added to v2)

- In IEEE Std 802.1Q-2014, ECP is described only in the context of an Edge Virtual Bridge.
 - It appears to this author that the MIBs allow one to create a single instance of ECP on an ordinary Bridge Port.
 - But, this is not supported by the descriptions of the managed objects in Clause 12. (See, for example, 12.26 EVB management.)
- The Upper Layer Protocol (ULP) determines the ECP destination MAC address. But, there is no provision to have difference sequence numbers for different remote addresses or different ULPs.
- There is no indication in 802.1Q of what would happen if two different ULPs on the same Bridge Port want to use two different destination MAC addresses for ECP.

and also the values of the ECP parameters

General Problems with Limitation of One ECP Instance per Port

- ❑ One instance of ECP allows
 - using exactly one destination MAC address (for group MAC address, it means only one transmission scope, a.k.a. reach)
 - having only one set of values for the ECP parameters (maxRetries and ackTimerInit)
- ❑ For multiple ULPs that desire to use ECP on the same port, the limitation of one ECP instance per port imposes the constraints that
 - they MUST use the same destination MAC address – this is infeasible because the existing ULPs do require use of different group MAC addresses (see next slide)
 - they MUST agree on the same values of the ECP parameters – this prevents some ULPs to use a discovery protocol to negotiate ECP parameters over links, e.g. VDP using LLDP EVB TLV.
- ❑ For LRP (as one ULP to ECP), allowing only one ECP instance per port prevents running more than one LRP application on the same port that demand use of different destination MAC addresses for ECP and desire to configure the ECP parameters differently.

Need for Multiple ECP Instances with Different MAC Addresses

The ECP destination MAC address is determined by the ULP and can be one of the group MAC addresses that differ in term of the scope of transmission scope within a network (reach) or a specific unicast MAC address.

- VDP (802.1Q & P802.1Qcy):
 - the **Nearest Customer Bridge group MAC address**
 - a unicast MAC address
- PE CSP (802.1BR):
 - the **Nearest non-TPMR Bridge group address**
 - a unicast MAC address
- LRP (P802.1CS):
 - RAP (P802.1Qdd) intends to use the same **Individual LAN Scope group address** as MSRP
 - Other future LRP applications using ECP may have different requirements on MAC address

Table 8-1—C-VLAN and MAC Bridge component Reserved addresses

Assignment	Value
Bridge Group Address, Nearest Customer Bridge group address ^a VDP	01-80-C2-00-00-00
IEEE MAC-specific Control Protocols group address	01-80-C2-00-00-01
IEEE 802.3 Slow_Protocols_Multicast address	01-80-C2-00-00-02
Nearest non-TPMR Bridge group address PE CSP	01-80-C2-00-00-03
IEEE MAC-specific Control Protocols group address	01-80-C2-00-00-04
Reserved for future standardization	01-80-C2-00-00-05
Reserved for future standardization	01-80-C2-00-00-06
MEF Forum ELMI protocol group address ^b	01-80-C2-00-00-07
Provider Bridge Group Address	01-80-C2-00-00-08
Reserved for future standardization	01-80-C2-00-00-09
Reserved for future standardization	01-80-C2-00-00-0A
EDE-SS PEP Address (IEEE Std 802.1AEcg™ [B10])	01-80-C2-00-00-0B
Reserved for future standardization	01-80-C2-00-00-0C
Provider Bridge MVRP Address	01-80-C2-00-00-0D
Individual LAN Scope group address ^c , Nearest Bridge group address LRP/RAP	01-80-C2-00-00-0E
Reserved for future standardization	01-80-C2-00-00-0F

Multiple instances of ECP are needed to support running multiple ULPs on the same port that require use of different destination MAC addresses, e.g. for different reaches.

Need for Multiple ECP Instances with Different Configurations

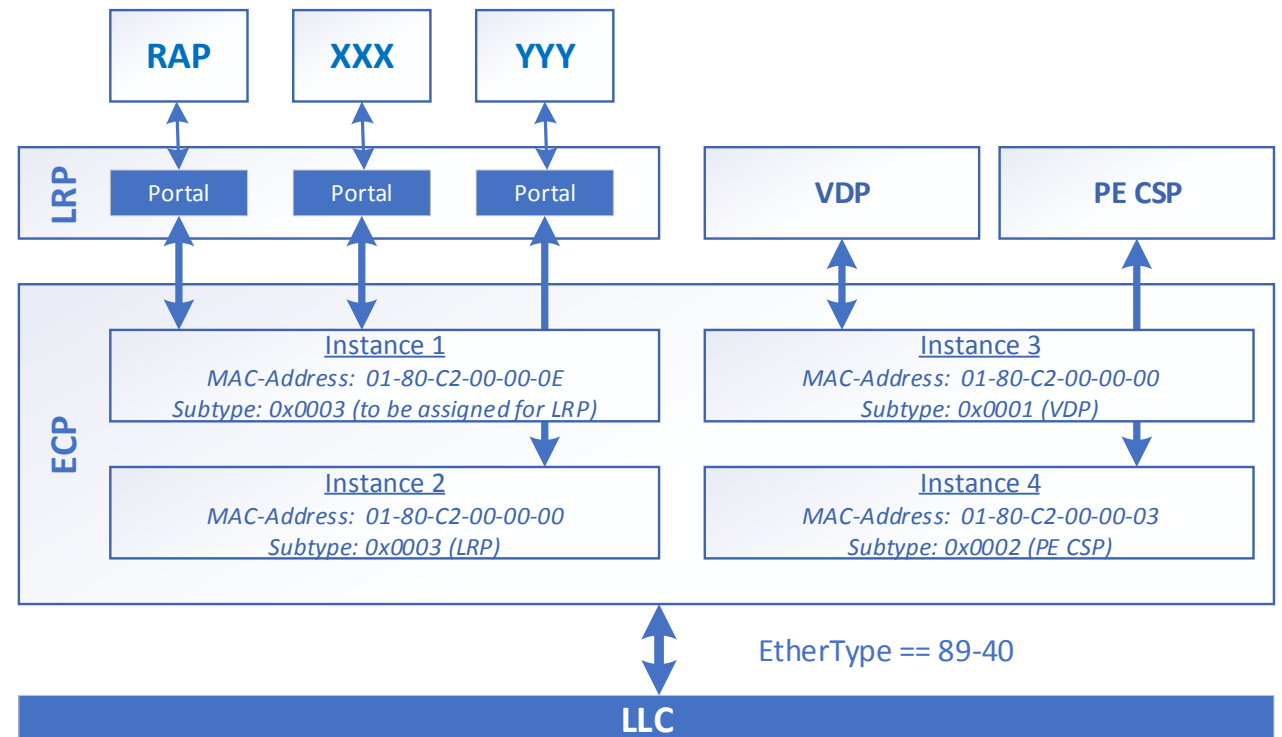
- ❑ Each ECP instance has two configuration parameters – **maxRetries** and **ackTimerInit**
 - Their values are determined by each ULP.
 - 802.1Q specifies in Table 12-28 (ECP table entry) only read-only managed objects for ECP and thus does not provide management configuration via the ECP's managed objects.
- ❑ Different ULPs of ECP can specify their own ways of configuration of the ECP parameters
 - For the EVB application (802.1Q Clause 40-42)
 - EVB managed objects (R/W) in Table 12-19 for local configuration
 - LLDP EVB TLV for negotiation between the link ends (802.1Q Annex D.2.12)
 - LRP currently specifies the fixed values for the ECP parameters set by provisioning
 - may add support for negotiation through exchange of LLDP ECP discovery TLV

Multiple instances of ECP per port are needed to allow each ULP to configure the ECP parameters differently and independently.

Amending ECP to Add Support for Multiple Instances per Port

Proposal for an amendment to 802.1Q that adds support for multiple ECP instances per port

- enable creation of multiple instances of ECP on a port for each pair of (destination MAC address, ULP subtype) upon request by the ULPs
- Each instance configured by the attached ULP and operating independently
- Need no changes to the ECP functionality
- The amendment won't be a large amount of work (ECP in 802.1Q has 7 pages in clause 43 and one half page for management in clause 12)



Example use of multiple ECP instances on a bridge port

ECP on Management Port

- There is no indication in 802.1Q of whether it is allowed to run ECP over the LLC on a management port and using an individual MAC address as the destination address
- If adding support for running multiple ECP instances over the management port, it may open up opportunity for LRP to support slave/proxy using ECP

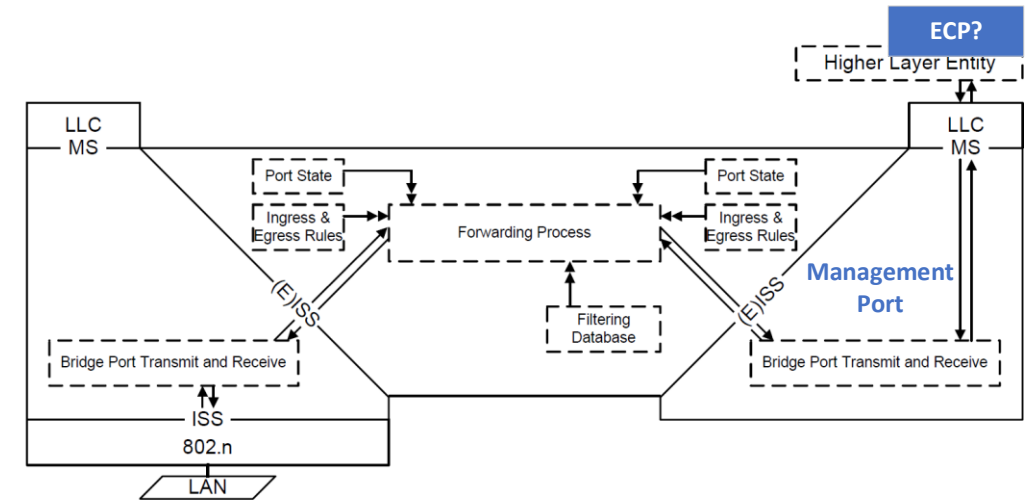
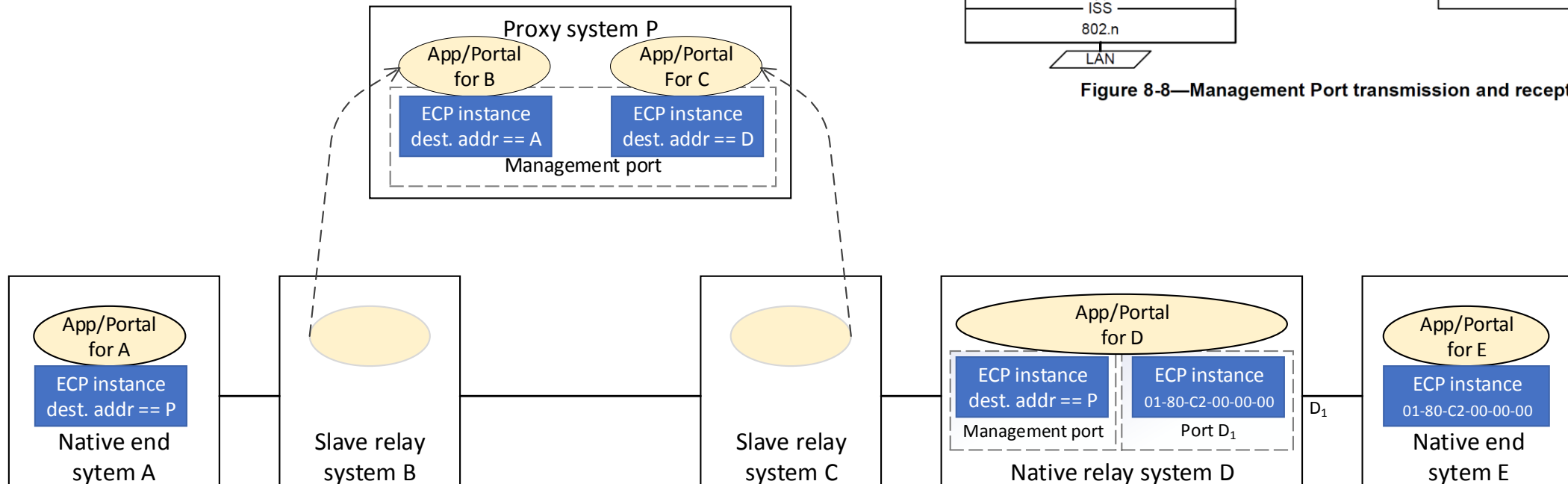


Figure 8-8—Management Port transmission and reception



Thank You!



Discussion