

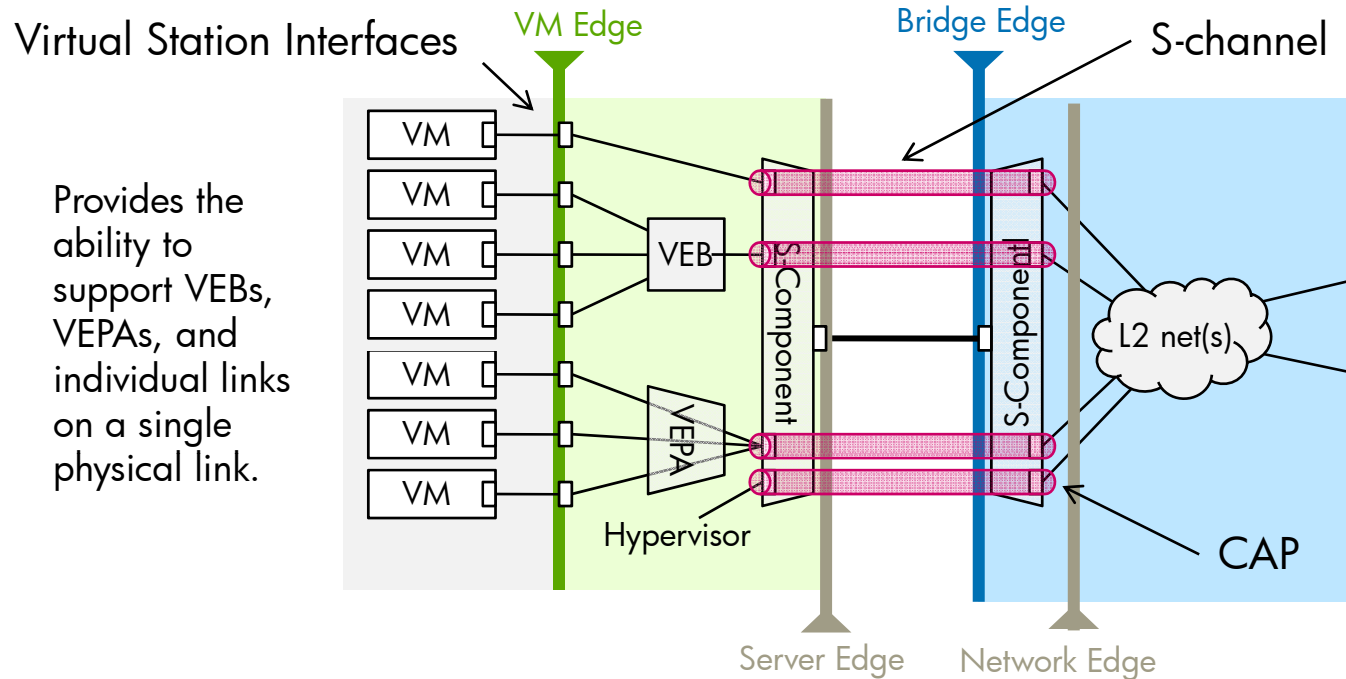
# EVB Basic Architecture

V9

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# EVB Overview



Provides the ability to support VEBs, VEPA, and individual links on a single physical link.

- **Virtual Station Interface (VSI)** is the attachment points for virtual machines and is the protocol layers used to implement the functions of the attachment point. Included in the VSI functions are the: 1) LLC layer functions, 2) 802.3 MAC address filter functions 3) VSI control functions, 4) VSI management functions.

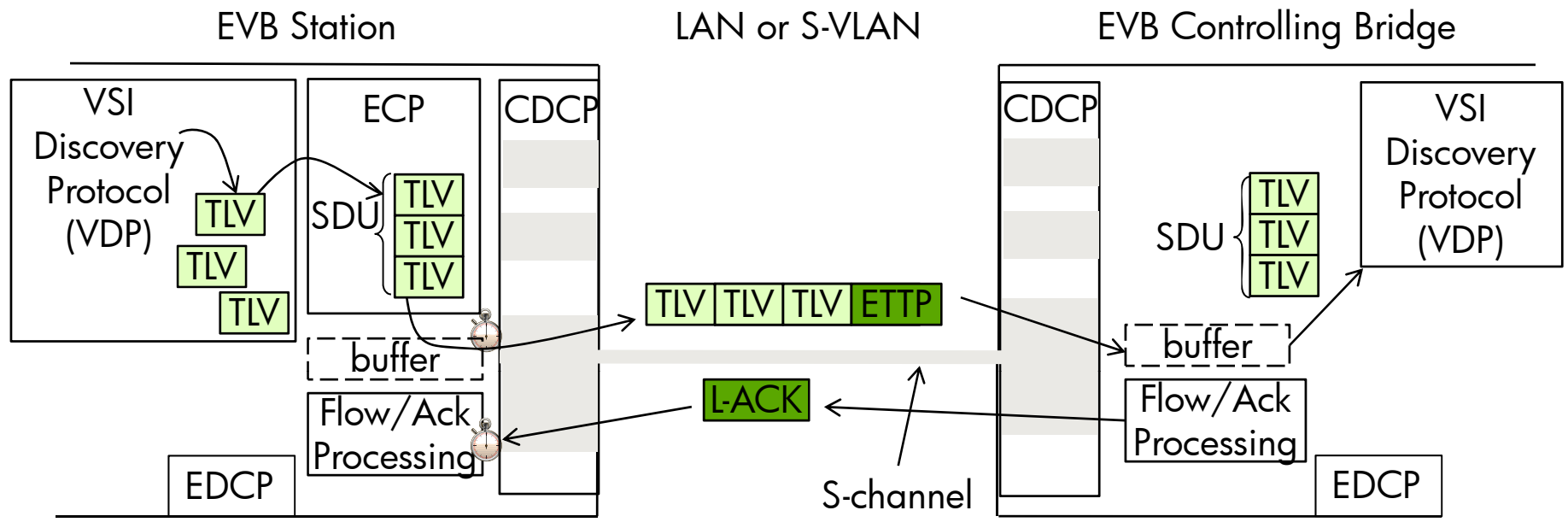
- **S-channel** is a Point-to-point S-VLANs which spans over Port-mapping S-VLAN components (802.1Qbc) or M-components (802.1Qbh) and between Provider Access Ports (PAPs). Only a single S-channel can exist on a PAP.

- **S-channel Access Port (CAP)** is the name for the non-S-tagged Bridge Port (Provider Access Port of a Port-mapping S-VLAN component (802.1Qbc)) that terminates an S-channel.

- **Virtual Ethernet Bridges (VEB):** a specialized bridge within the station used for bridging support between multiple virtual stations interfaces and an external network

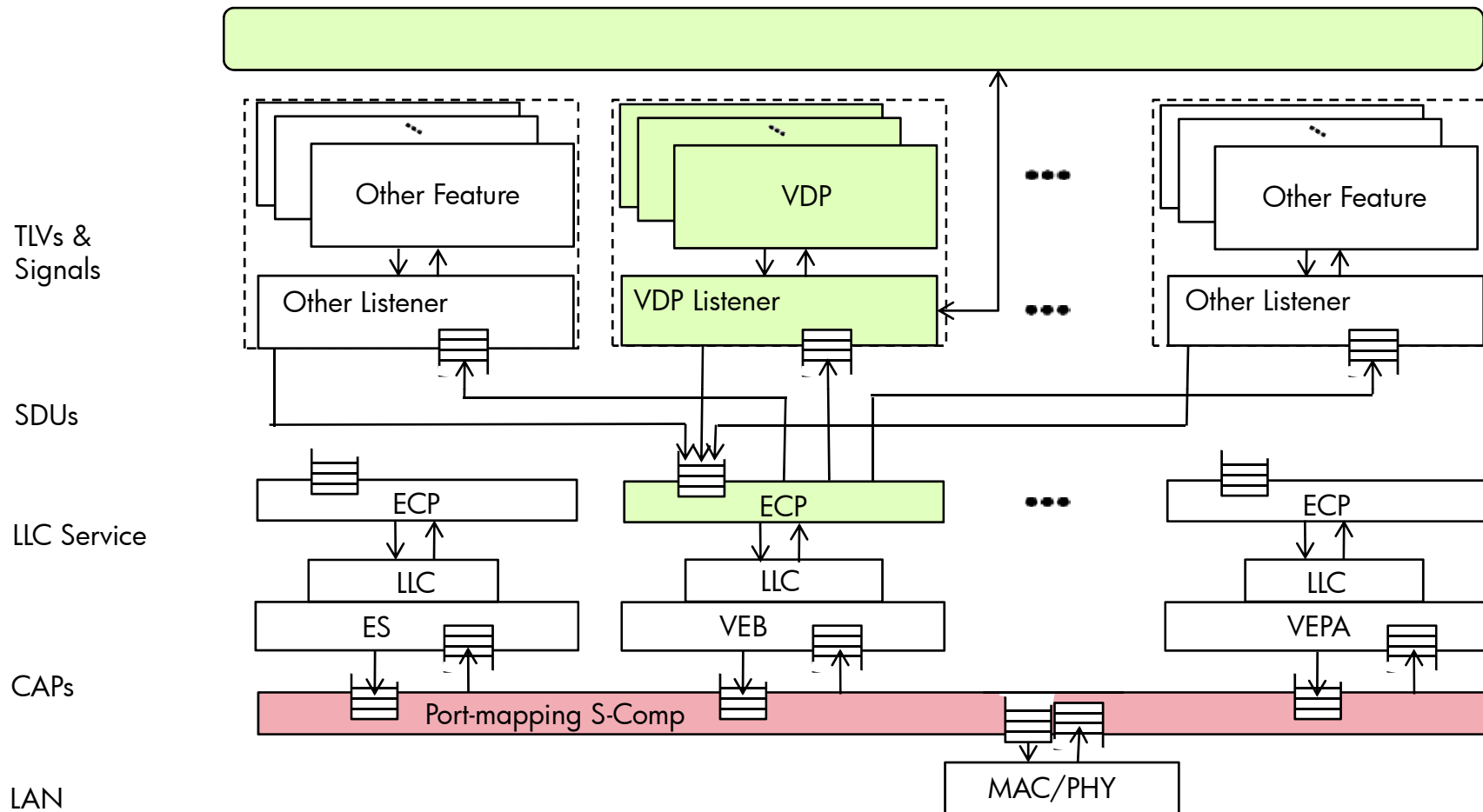
- **Virtual Ethernet Port Aggregator (VEPA):** a specialized bridge within a station which operates in collaboration with an adjacent, external bridge to provide bridging support between multiple virtual stations interfaces and an external network

# EVB VSI Control Overview



- Virtual Station Interface (VSI) Discovery and Configuration Protocol (VDP) coordinates network resources for Virtual Machines (VMs) and packs and unpacks VDP TLVs into PDUs which are handed to ECP for delivery.
- Edge Control Protocol (ECP) provides reliable delivery of SDUs between the station and bridge and between the port extender and bridge
- Edge Discovery and Configuration Protocol (EDCP) is an LLDP based protocol used to discover and configure VEPA, ECP and VDP
- S-channel Discovery and Configuration Protocol (CDCP) is an LLDP based protocol used to configure the S-VLANs.

# Example VSI Discovery Implementation

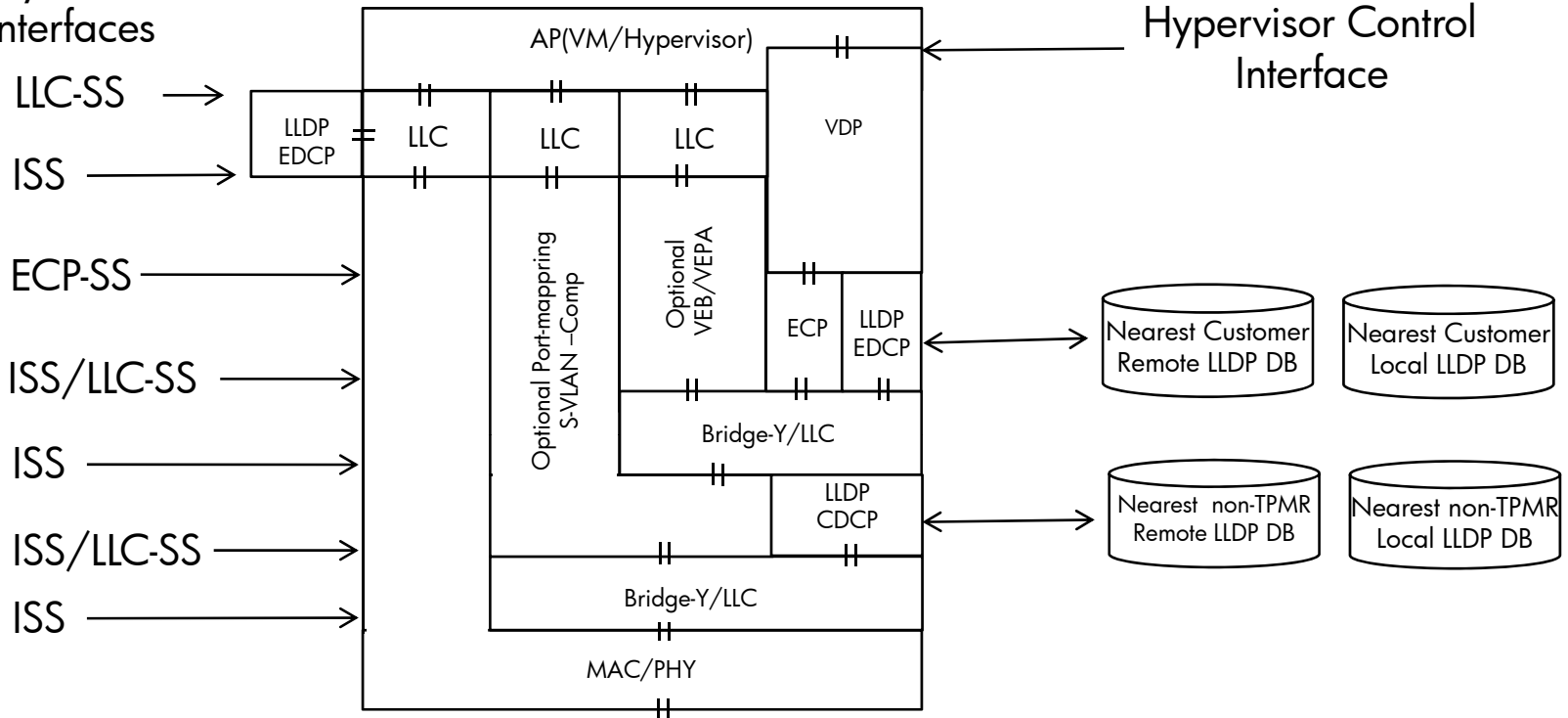


- There is one VDP per VSI. The VDP handles all VSI state transitions. It sends and exchanges TLVs and Signals from listener.
- There is one listener per ULP. The listener handles packing and unpacking TLVs into PDUs.
- There is one ECP per S-channel. It provides reliable SDU delivery for SDUs which are placed in its transmit queue by the listeners. It also delivers SDUs to the appropriate listener.

# EVB Stack Architecture

Sublayer Service

Interfaces

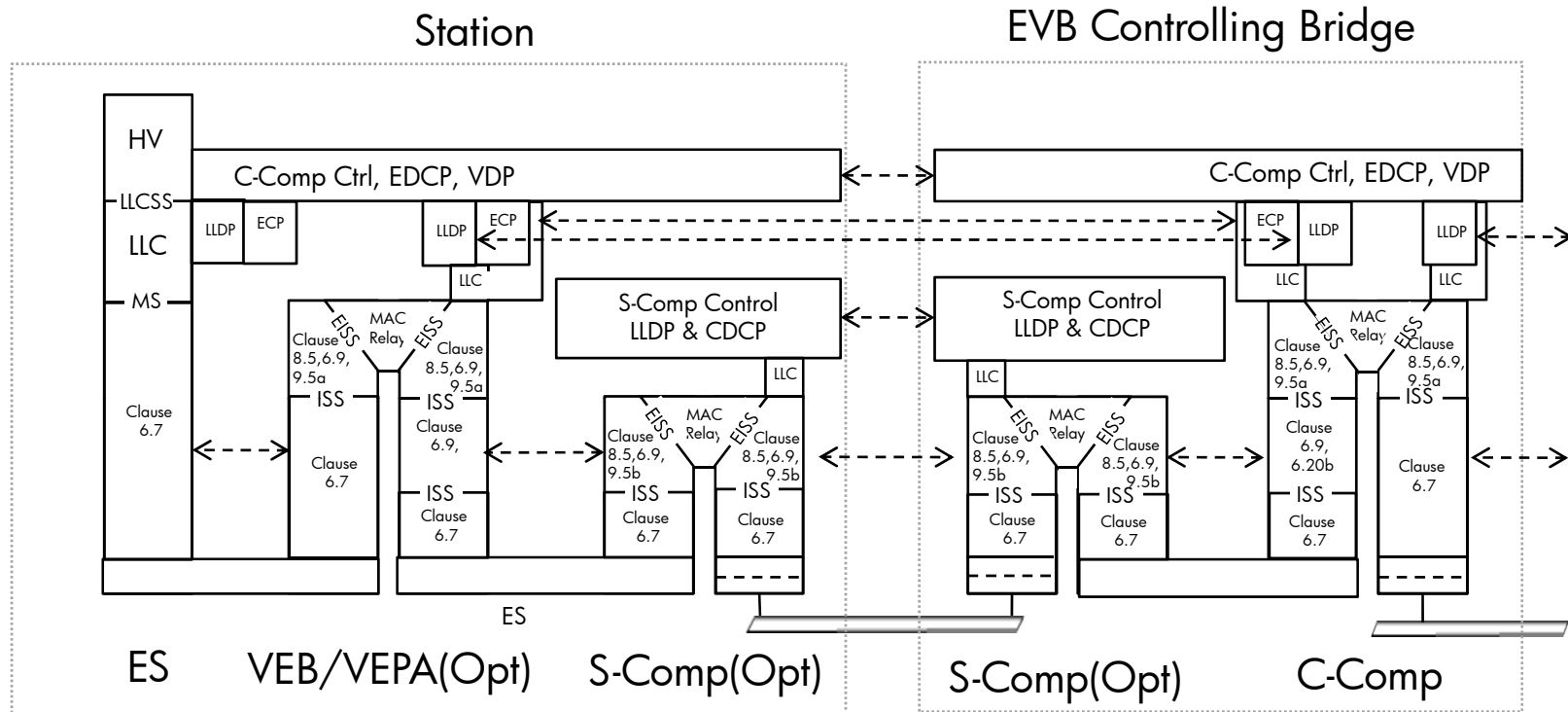


- MAC: Media Access Control 802 2001 subclause 6.2.3 and 802.1Q Rev 2010 subclause 6.1
- ISS: Internal Sublayer Service 802.1Q Rev 2010 subclause 6.6
- LLC: Link Layer Control Protocol see 802 2001 subclause 6.2.2 and 802.2 ( note: see 802.1AB 2009 subclause 6.7 )
- LLC-SS: Link Layer Control Protocol Sublayer Service 802.1AB-Rev 2009 subclause 6.7
- LLDP: Link Layer Discovery Protocol 802.1AB Rev 2009
- CDCP: S-channel Discovery and Configuration Protocol is an LLDP based S-channel discovery protocol
- EDCP: Edge Virtual Bridge Discovery and Configuration Protocol is an LLDP based EVB discovery protocol
- ECP: Edge Control Protocol new link layer protocol
- ECP-SS: Edge Control Protocol Sublayer Service new service interface for ECP to ULP
- S-Comp: Draft 802.1Qbc Port mapping S-VLAN component subclause 5.10 & S-VLAN component 802.1Q Rev 2010 subclause 5.6
- VEB/VEPA: C-VLAN component 802.1Q Rev 2010 subclause 5.5

# Address Choices for LLDP

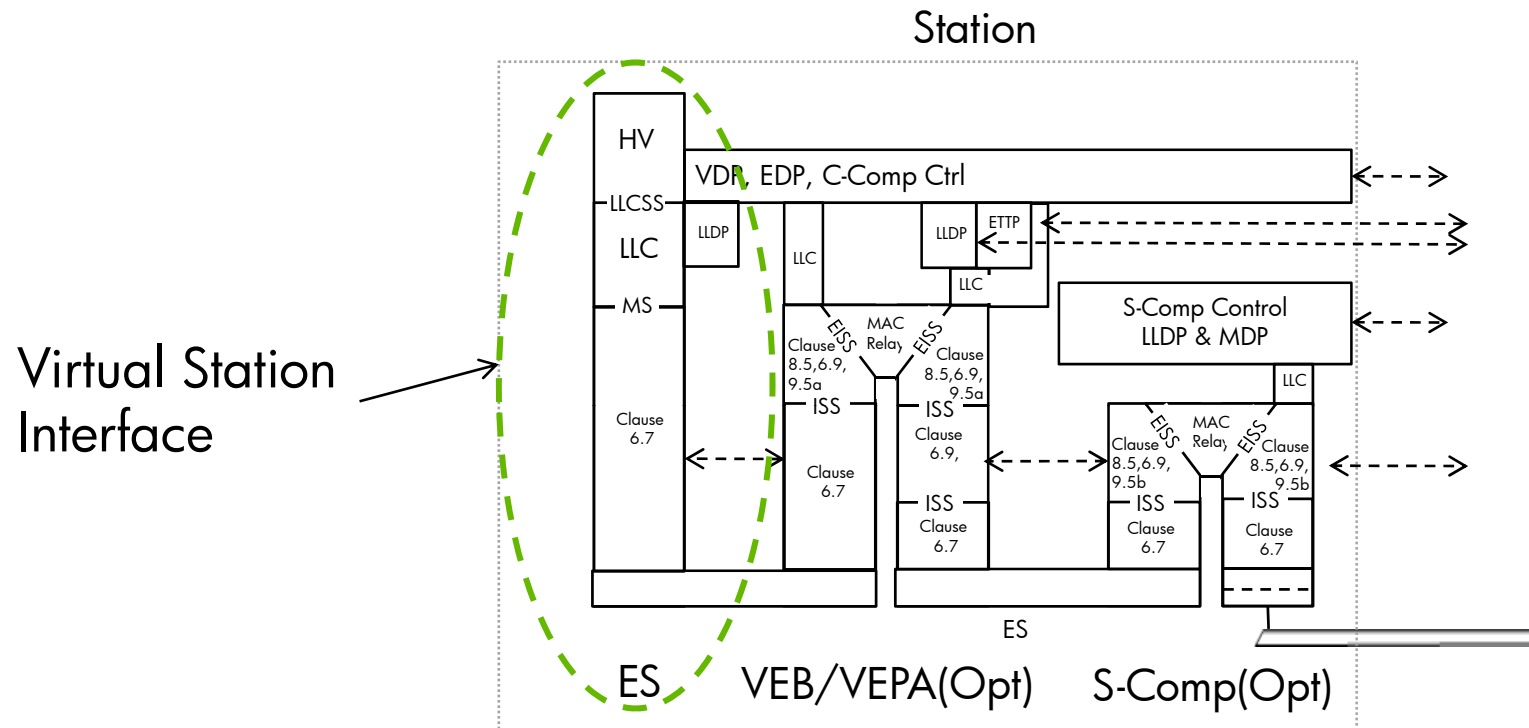
- The Port-mapping S-VLAN component used to implement S-channels is a conformant S-Comp and therefore we use Nearest non-TPMR bridge address (01-80-C2-00-00-03) for LLDP at CDCP.
- The second LLDP database is at an LLC SAP of the ES/VEB/VEPA. Both of these are addresses by the Nearest Customer Address: 01-80-C2-00-00-00.
- If we don't have an S-Comp then (see LLDP clause 7.4)
  - we only send and receive on the nearest customer bridge address
  - we discard any nearest non-TPMR bridge addressed frames
  - we discard any nearest bridge addressed frames
- If we have both S-Comp and ES/VEB/VEPA then we
  - send on both nearest customer bridge and nearest non-TPMR bridge
  - we discard any nearest bridge addressed frames

# Bridge “Baggy Pants” Model



- A station uses a dual relay. The outside relay is an S-VLAN aware component. The inside relay is a VEB or VEPA. Stations also have an ES layer providing LLC service to the Hypervisor and VMs.
- Both the S-Comp and VEB/VEPA relays are optional. The S-Comp can terminate in a ES rather than a VEB/VEPA.
- An S-channel is implemented using the peered S-Comps. An LLDP database exists on each exterior facing leg of the S-Comp
- Each VEB or VEPA has an LLDP database on it’s exterior facing legs

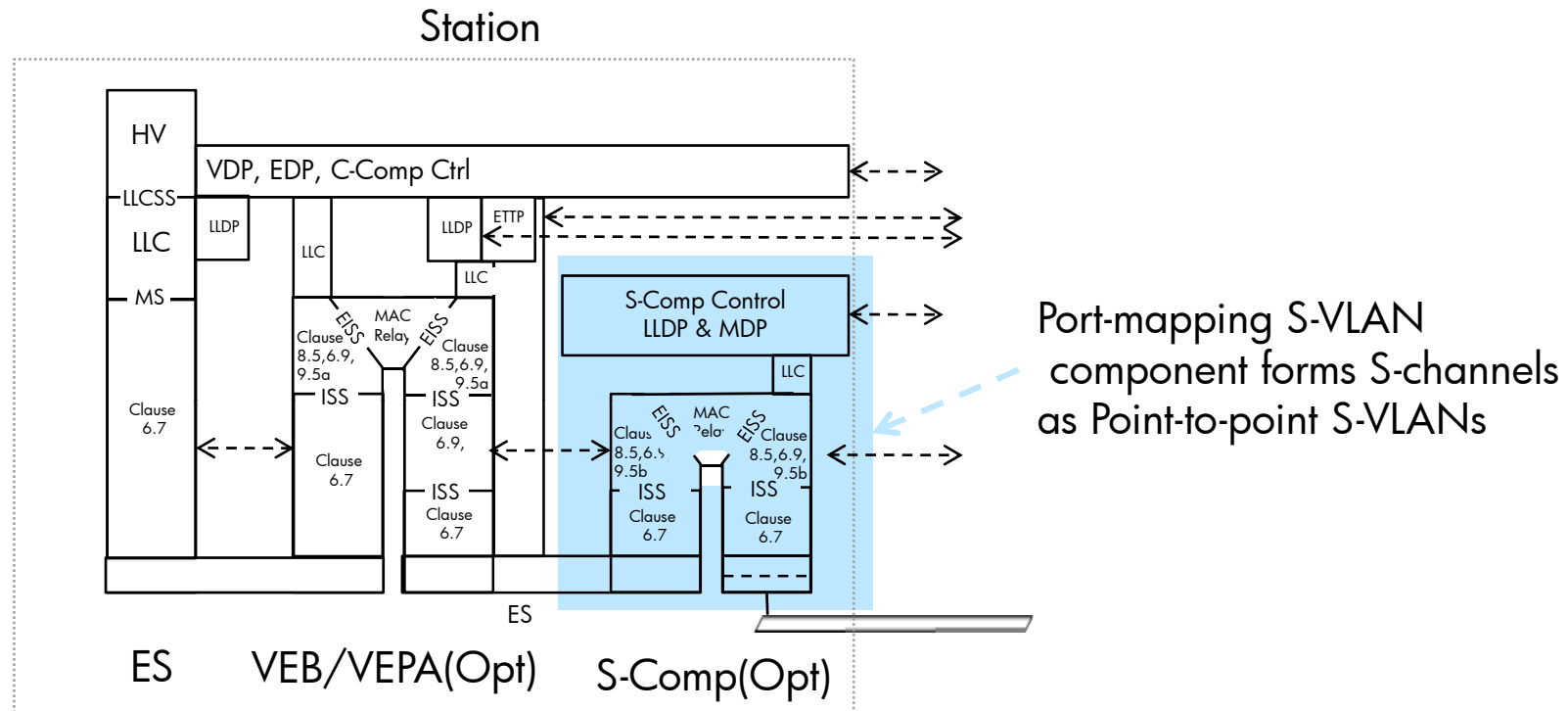
# What is a VSI?



- Virtual Station Interface (functional definition or reference point definition?)
  - 1)ES LLC used to form the SAP for attaching the VM
  - 2)ES MAC address filter for an station and group addresses
  - 4)VDP control
  - 5)Management for VSI functions

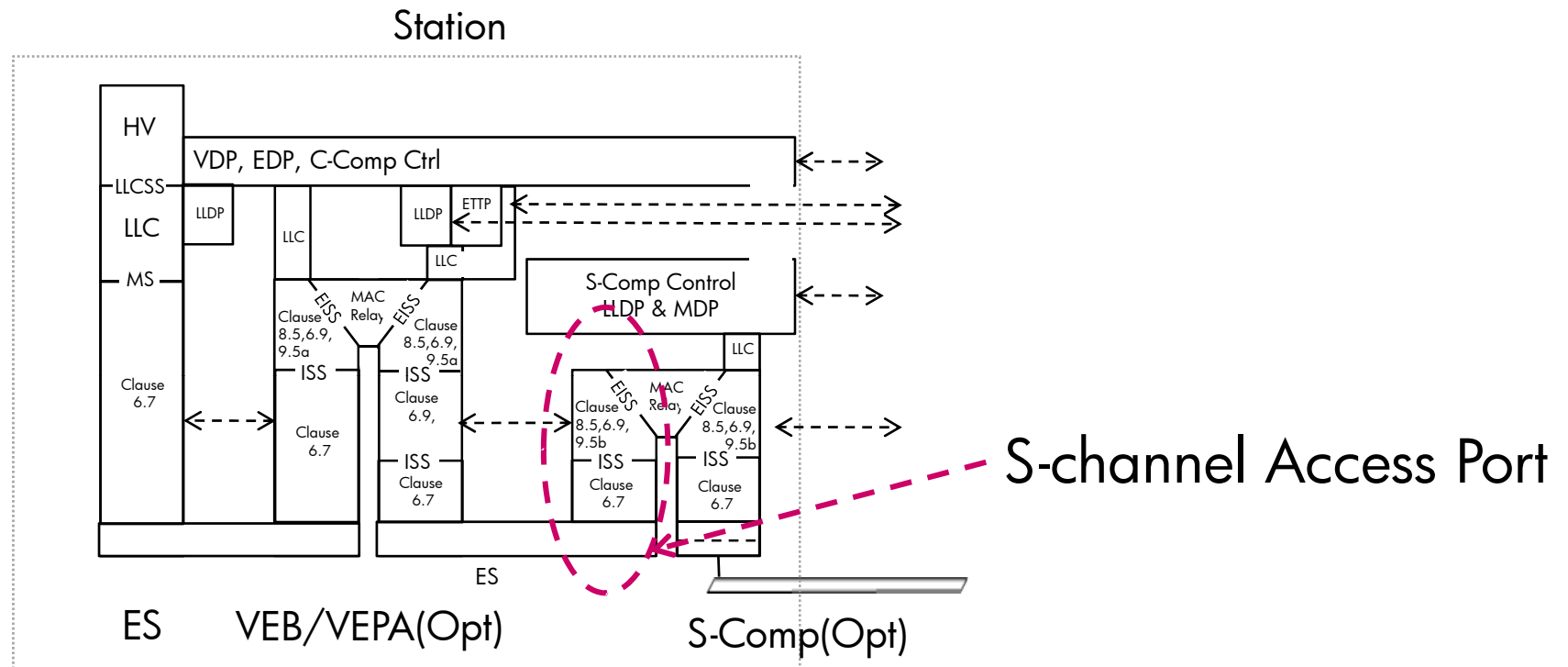


# What is a S-channel?



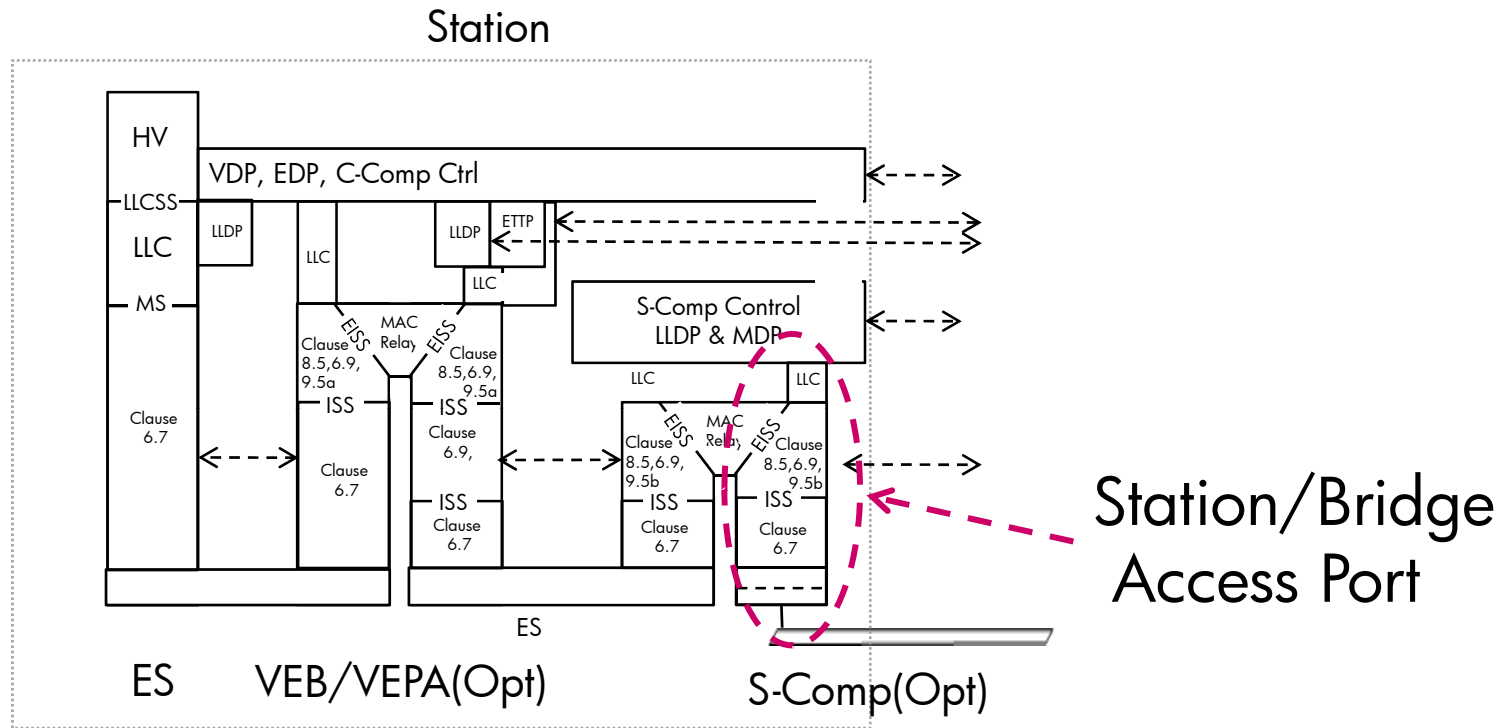
- S-channels:
  - 1) are pt-pt S-VLANs formed by Port-mapping S-VLAN components
  - 2) begin and end at an S-channel Access Port (CAP)
  - 3) frames are always S-tagged in the channel and always un-S-tagged by the CAP
  - 4) Only a single S-channel may terminate (or begin) at a each CAP
  - 5) Multiple S-channels pass through the Station Bridge Access Port to the external LAN

# What is a S-channel Access Port (CAP)?



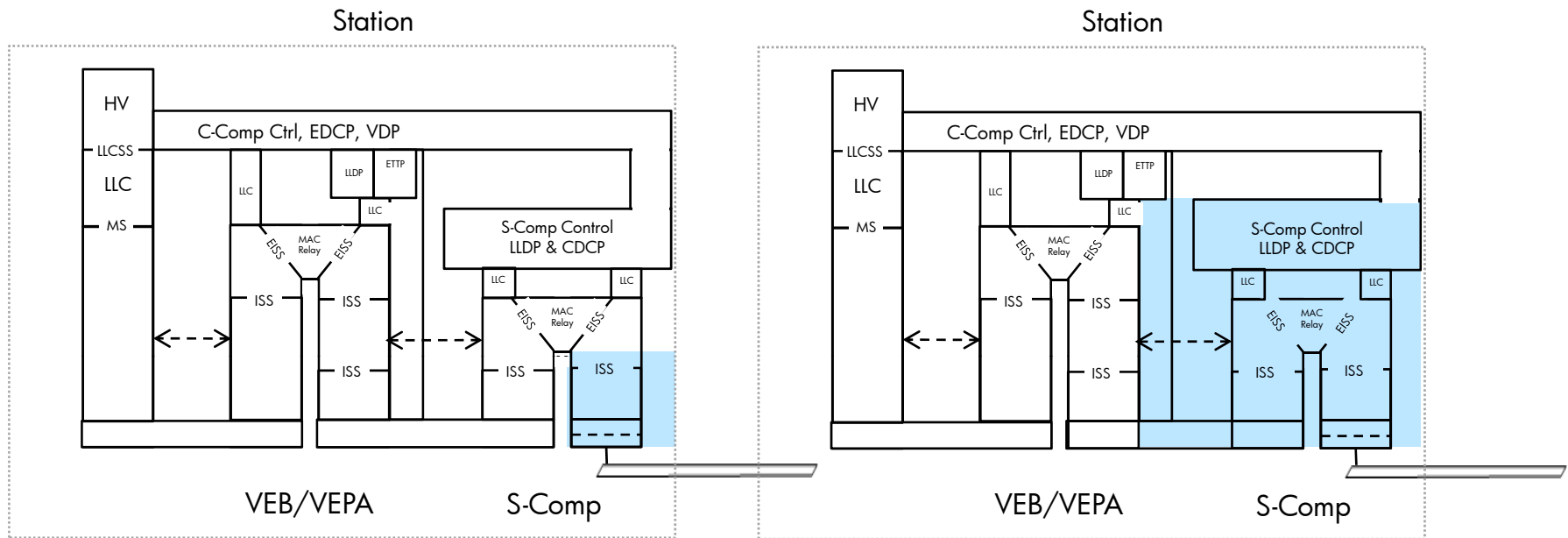
- S-channel Access Port (CAP)
  - 1)The Bridge Port of the Port-mapping S-VLAN component where an S-channel terminates
  - 2)Always un-S-tagged by the CAP

# What is a Station/Bridge Access Port(SBAP)?



- Station Bridge Access Port (SBAP)
  - 1)The Bridge Port of the Port-mapping S-VLAN component where an S-channel connects between the station and Bridge
  - 2)A S-channel is always S-tagged at the SBAP

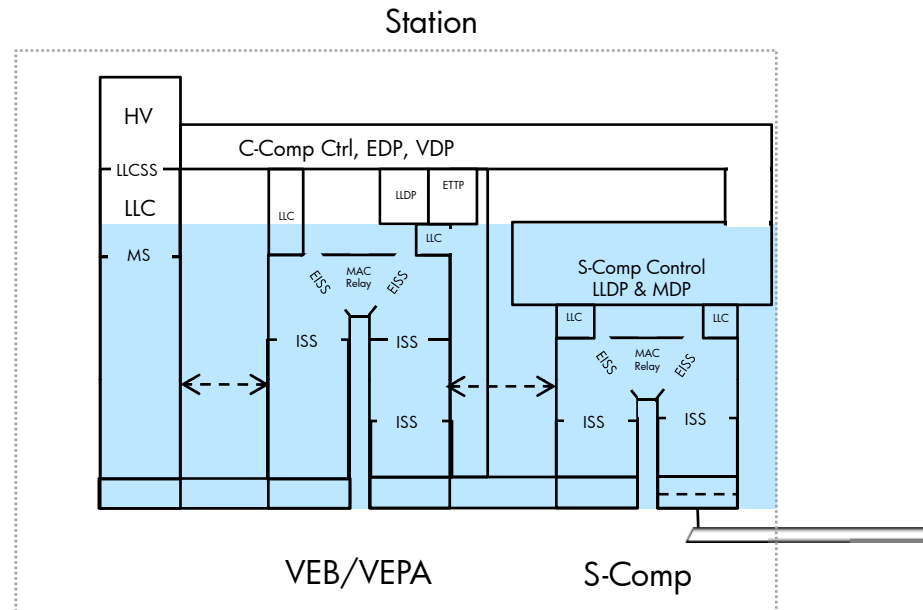
# Some Adapter Types



- Link Adapter Provides
  - Ethernet MAC
  - Frame IO PF/VF

- S-channel Adapter Provides
  - Ethernet MAC
  - Frame IO PF/VF
  - S-Comp (Simplified S-VLAN Relay)
  - LAN Link Layer Discovery (LAN-LLDP)
  - S-channel Discovery and Configuration Protocol (CDCP)

# Some Adapter Types Continued

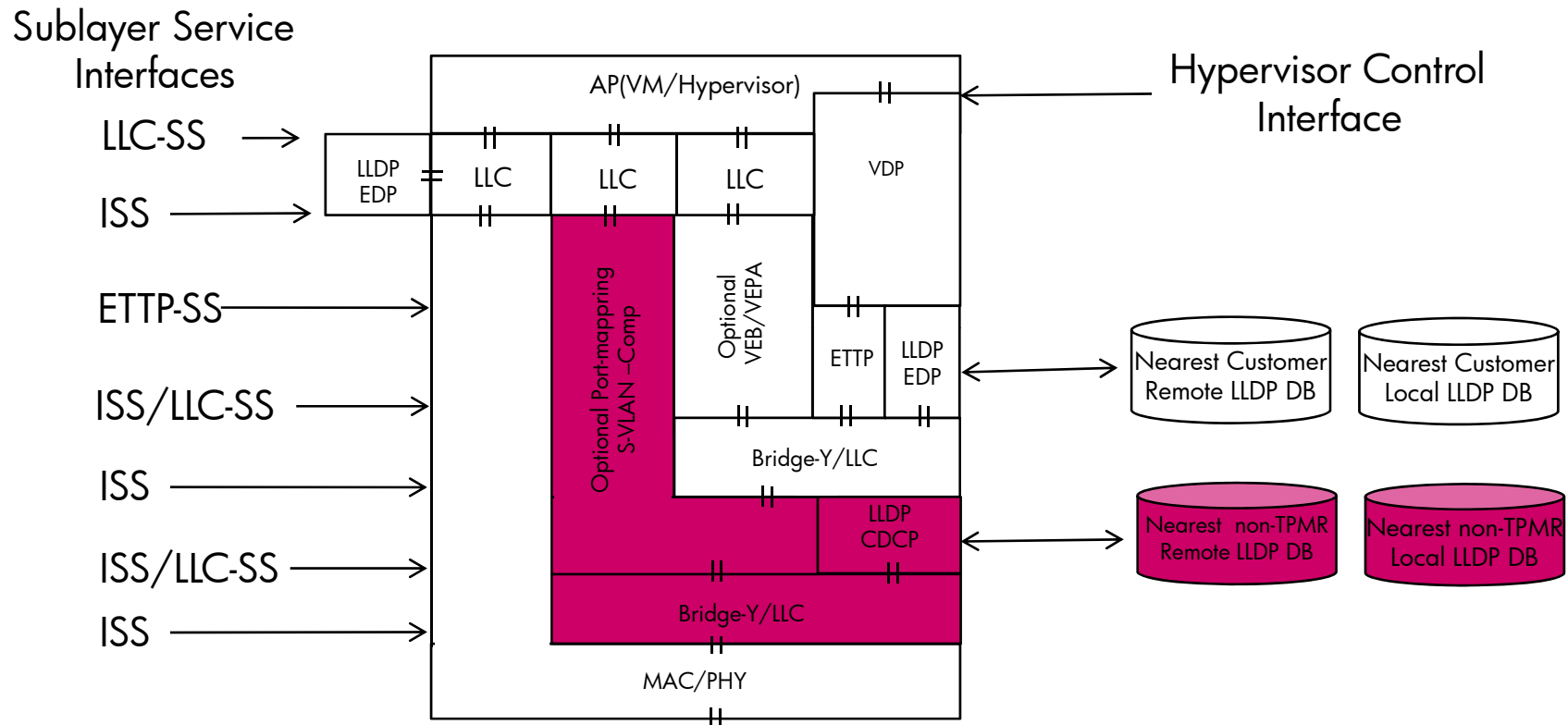


- S-channel/VEB Adapter Provides
  - Ethernet MAC
  - Frame IO PF/VF
  - S-Comp (Simplified S-VLAN Relay)
- Continued
  - LAN Link Layer Discovery (LAN-LLDP)
  - S-channel Discovery and Configuration Protocol (CDCP)
  - VEB (or VEPA)

# New Service Interface for ECP

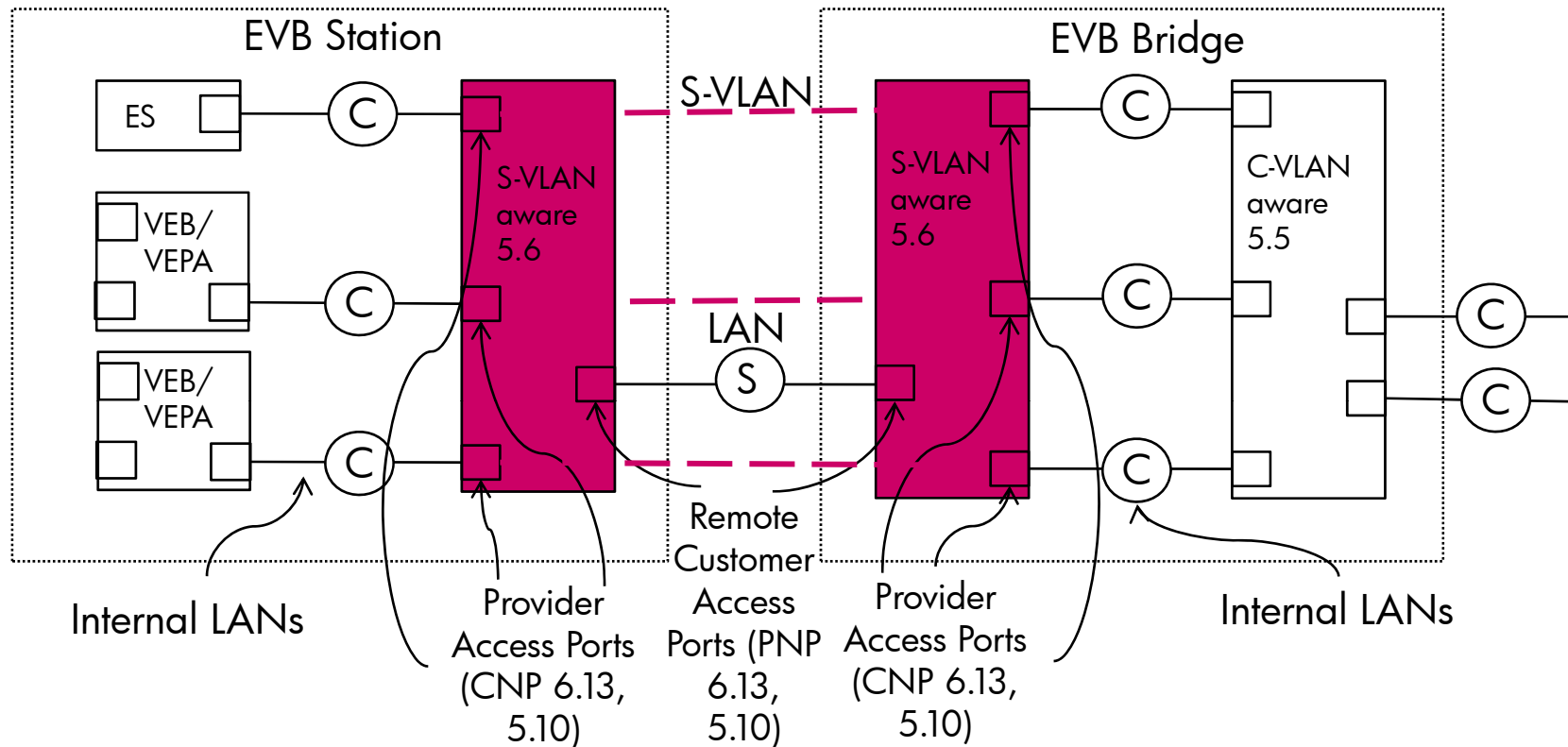
- Parameters:
  - List of TLVs (7 bit ULP type, 9 bit length, tlv-list)
    - TLV list contains TLVs from a single ULP
  - Signals: None
- Primitives (Unconfirmed Service)
  - ECP\_UNITDATA.request (ulptype, ulptlv-list )
  - ECP\_UNITDATA.indicate (ulptype, ulptlv-list )
- No other new service interfaces
  - VDP Listener to VDP is implementation dependent
  - Hypervisor to VDP is also implementation dependent
  - All other service interfaces are ISS, EISS or LLC-SS

# S-channel Architecture



- S-Comp uses 802.1Qbc Port-mapping S-VLAN component and LAN Level LLDP to run MDP

# EVB Bridge Component



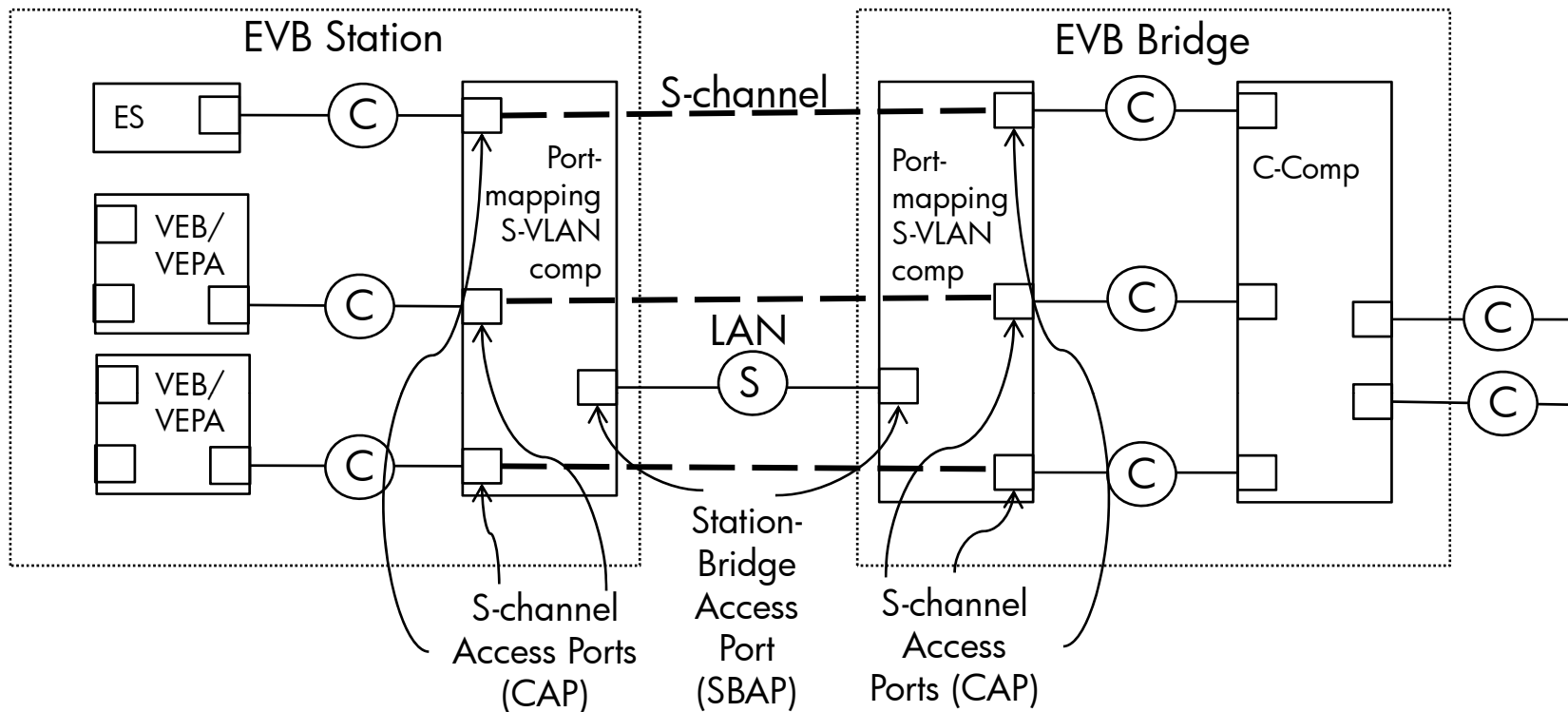
- A Port-mapping S-VLAN component (802.1Qbc) is used to implement S-channels
- Components disable spanning tree and MAC learning
- 1-1 relationship between PAP to C-Comp Bridge Ports of the EVB Bridge
- 1-1 relationship between PAP to VEB/VEPA Bridge Ports or End-Station ports of the EVB Station



# Thoughts on Naming?

- **LAN** – the link between station and bridge
- **S-channel** – a pt-pt S-VLAN implemented between a station and Bridge over Port-mapping S-VLAN components
- **S-TAG** – the tag used to implement S-channels
- **Port-mapping S-VLAN component** – a bridge component used to implement S-channels
- **S-channel Access Port (CAP)** – a CNP (or Qbc PAP) used to terminate a S-channel in a station or bridge
- **Station Bridge Access Port (SBAP)** – a PNP (or Qbc RCAP) used between a station and bridge to implement S-channels

# S-channel Components



- CAP and SBAP are same definitions as PAP and RCAP
- S-TAG remains unchanged and with same name
- S-channel is a point-to-point S-VLAN terminating at a CAP

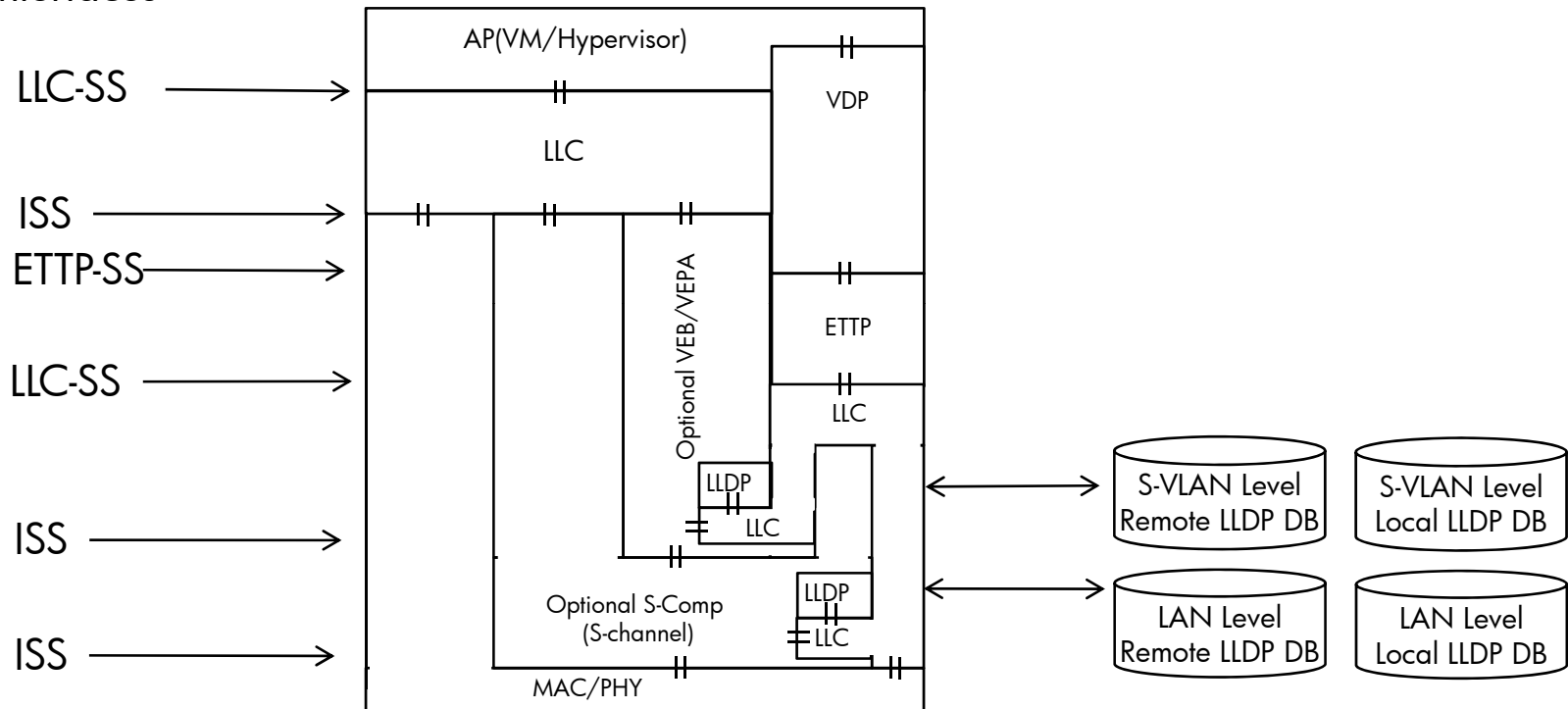
# Summary

- EVB Layer Model
  - S-Comp profile for S-channels
  - VEB/VEPA bridges
  - ETTP client of LLC (like LLDP)
  - SDU service interface between ETTP and ULPs
- S-channel naming
  - Each S-channel is a point-to-point S-VLAN of 802.1Qbc
  - A S-channel terminates at a CAP (renamed from PAP)
  - The LAN between Station and Bridge terminates at a SBAP ( or renamed RCAP)

# **BACKUP SLIDES**

# EVB Stack Architecture

## Sublayer Service Interfaces



- Virtual Station Interfaces (VSIs) are created/deleted using the Virtual Station Interface Discovery and Configuration Protocol (VDP). VDP interfaces to the Hypervisor to co-ordinate VM creation and ETPP to communicate with the Bridge.
- Edge TLV Transport (ETTP) may be connected to a LAN through a MAC, to a VEB/VEPA internal bridge port, or ES
- If S-channels are present then two levels of LLDP databases exist, one at the LAN and one at the S-channel. If S-channels don't exist then only a single LLDP database exists.

# EVB Stack Architecture – Simplified View

Sublayer Service

Interfaces

LLC-SS

ISS

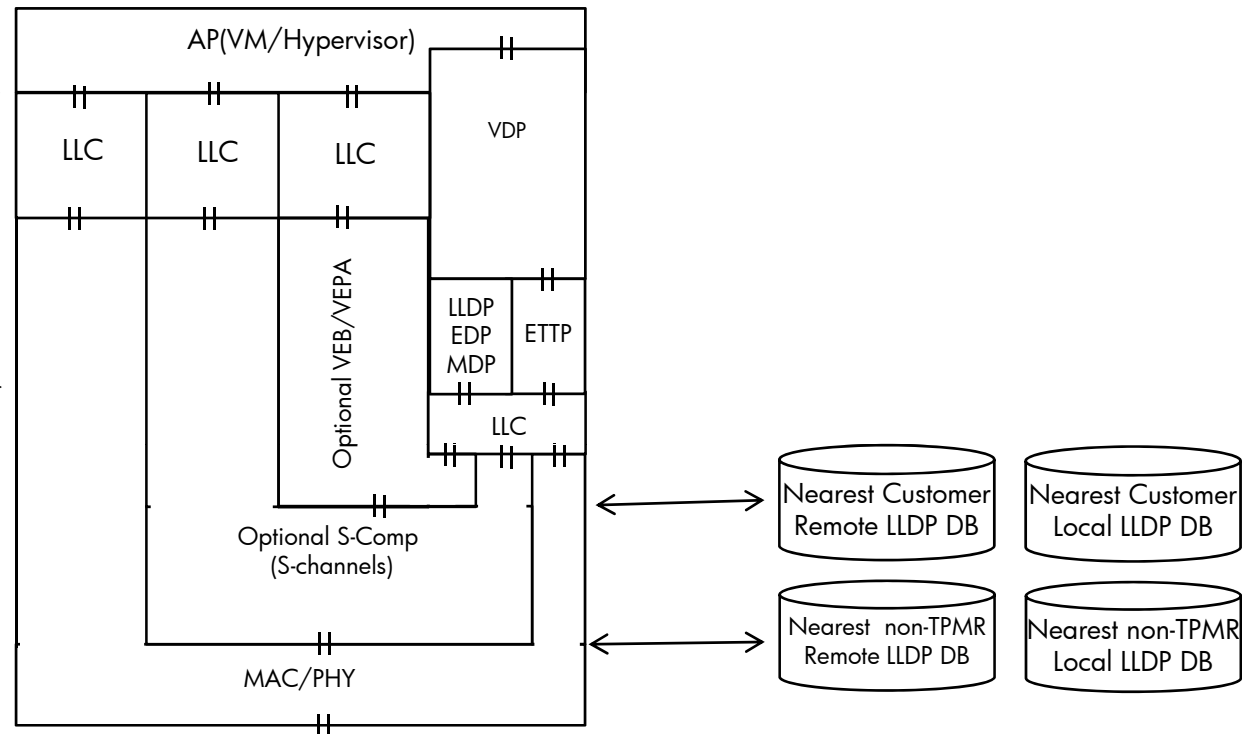
ETTP-SS

LLC-SS

ISS

ISS

ISS



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