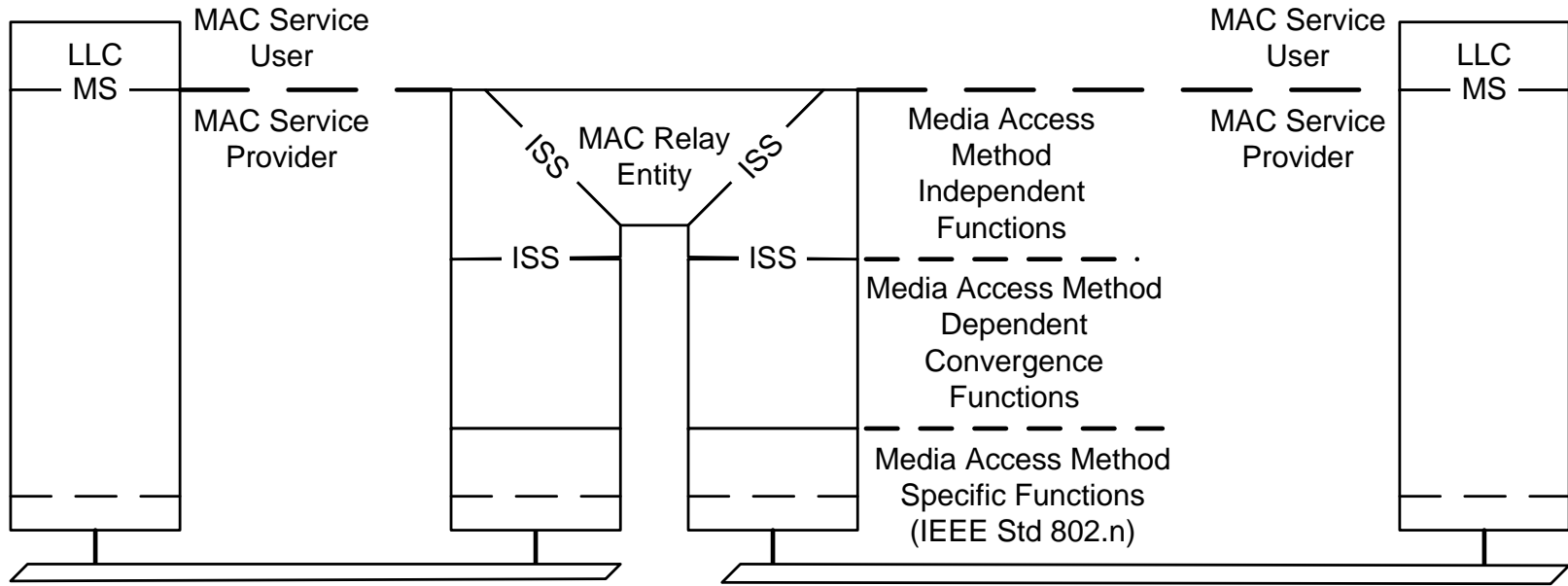# BRIDGE COMPONENTS
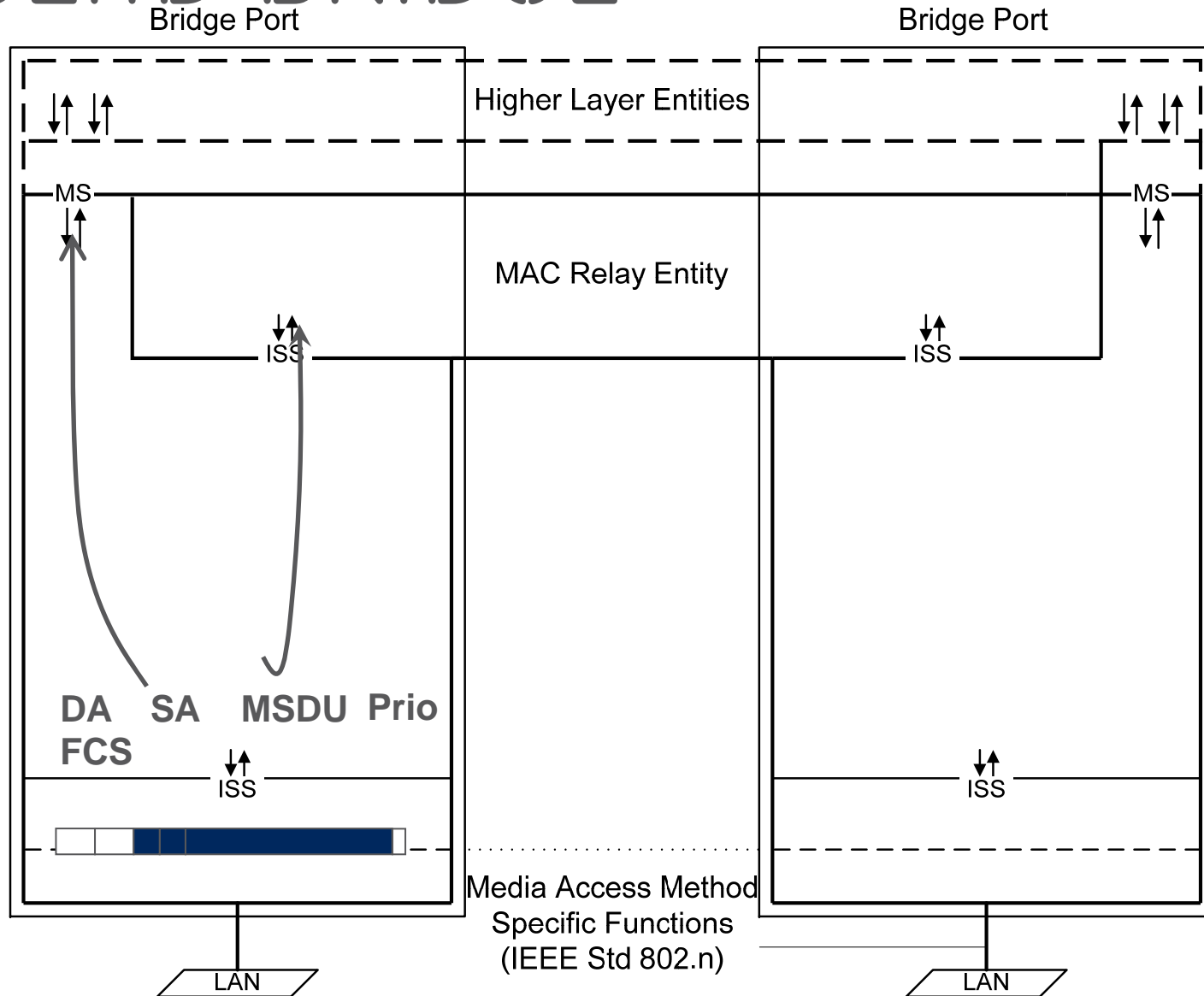
Panagiotis Saltsidis

ERICSSON

INTRODUCTION

› A Bridge is "by definition" what the associated standard defines it to be and accordingly the specification text has the absolute authority in the classification of the various variant systems.

› Nevertheless such classification needs to follow specific and consistent taxonomy rules in order to avoid proliferation of specified systems and to enable a consistent categorization of new systems.

› Since support for various control and management protocols play very limited role on the current taxonomy of Bridge "species" this presentation will be focusing on the data plane supportive functions of each specified system in order to classify systems that need to satisfy ECMP requirements.
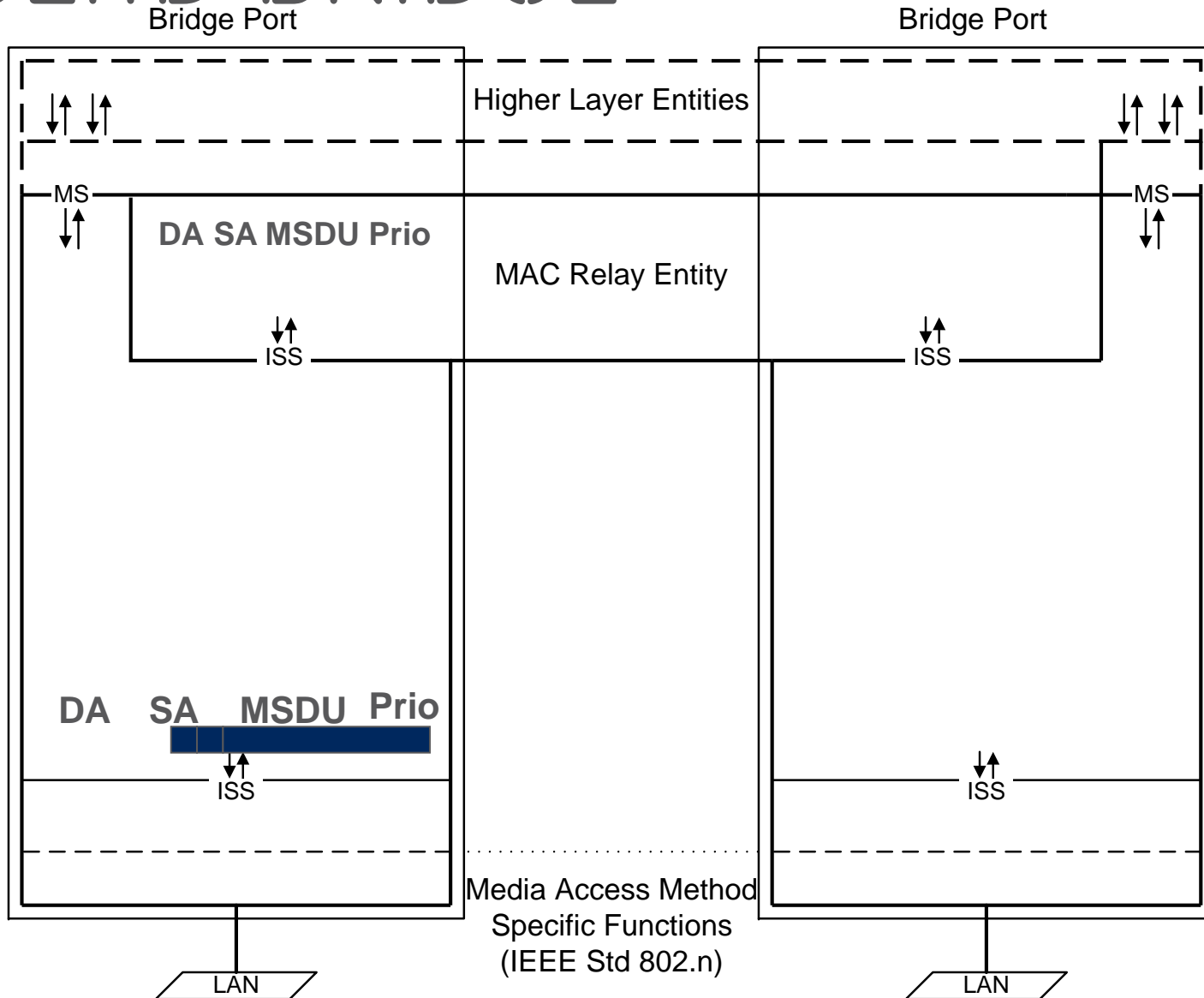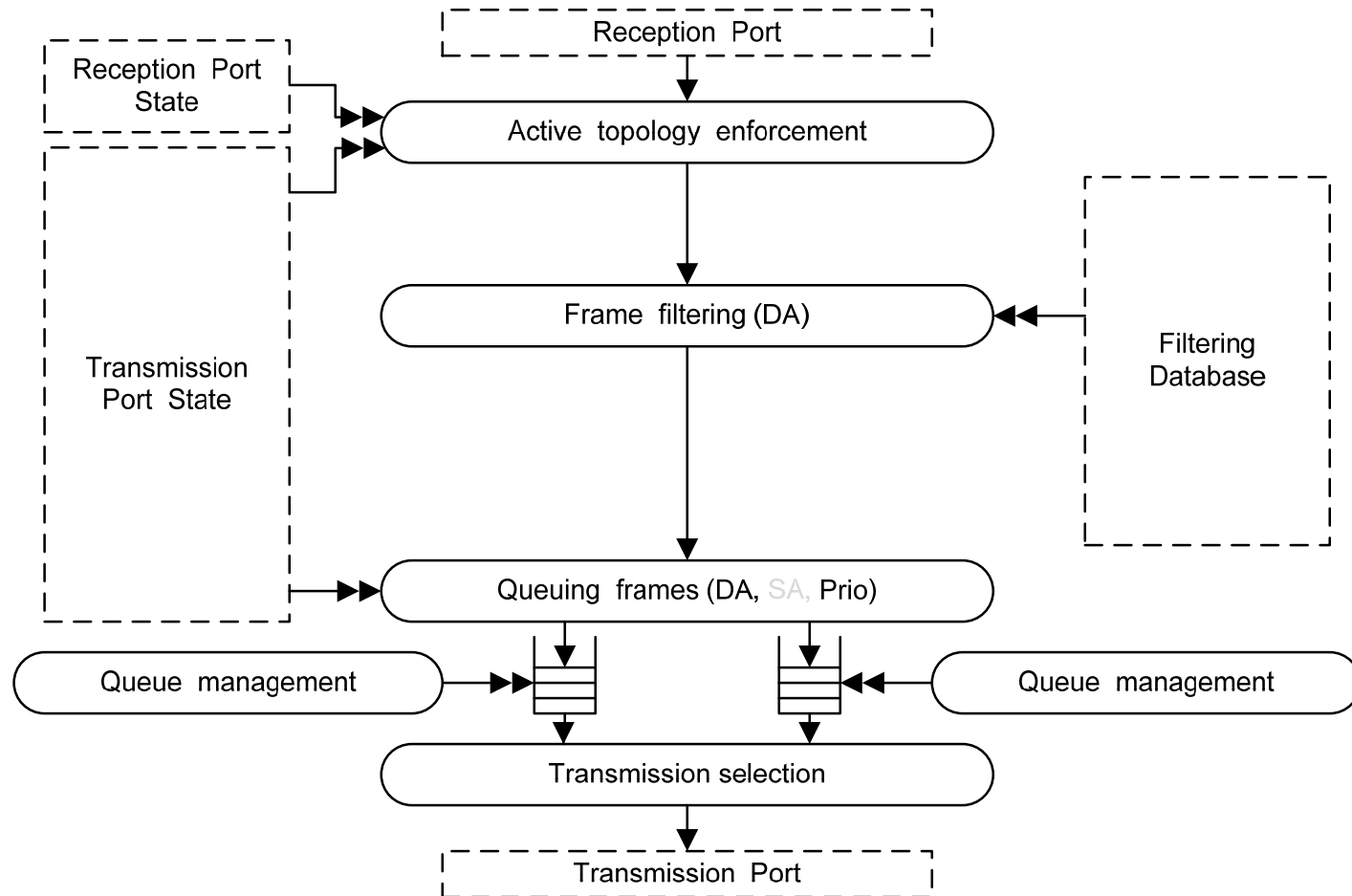
MAC SERVICE

802.1D BRIDGE

Bridge Port   Bridge Port

Higher Layer Entities

MS   MS

MAC Relay Entity

ISS   ISS

DA SA MSDU Prio
FCS

ISS   ISS

Media Access Method
Specific Functions
(IEEE Std 802.n)

LAN   LAN

802.1D BRIDGE

Bridge Port

Bridge Port

Higher Layer Entities

MS

MS

DA SA MSDU Prio

MAC Relay Entity

ISS

ISS

DA   SA   MSDU Prio

ISS

ISS

Media Access Method
Specific Functions
(IEEE Std 802.n)

LAN

LAN

FORWARDING PROCESS

ENTERING THE MAC RELAY

Bridge Port

Bridge Port

Higher Layer Entities

MS

MS

DA SA MSDU Prio

MAC Relay Entity

ISS

ISS

ISS

ISS

Media Access Method
Specific Functions
(IEEE Std 802.n)
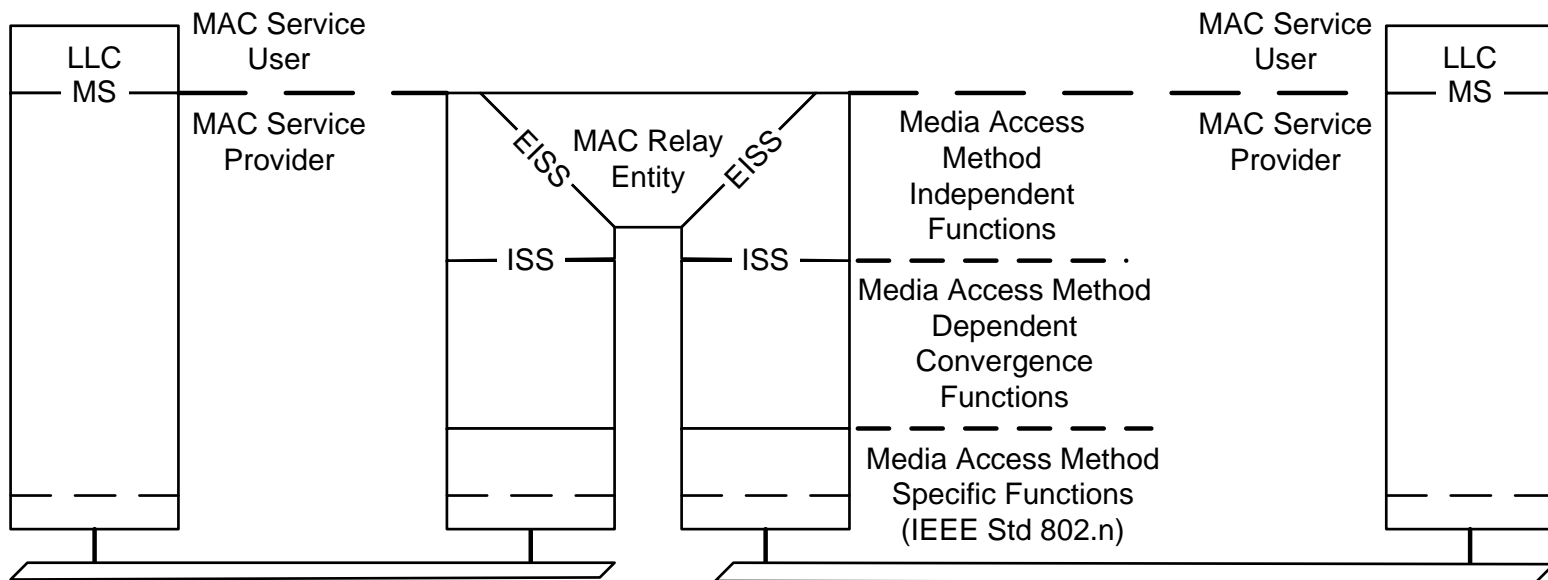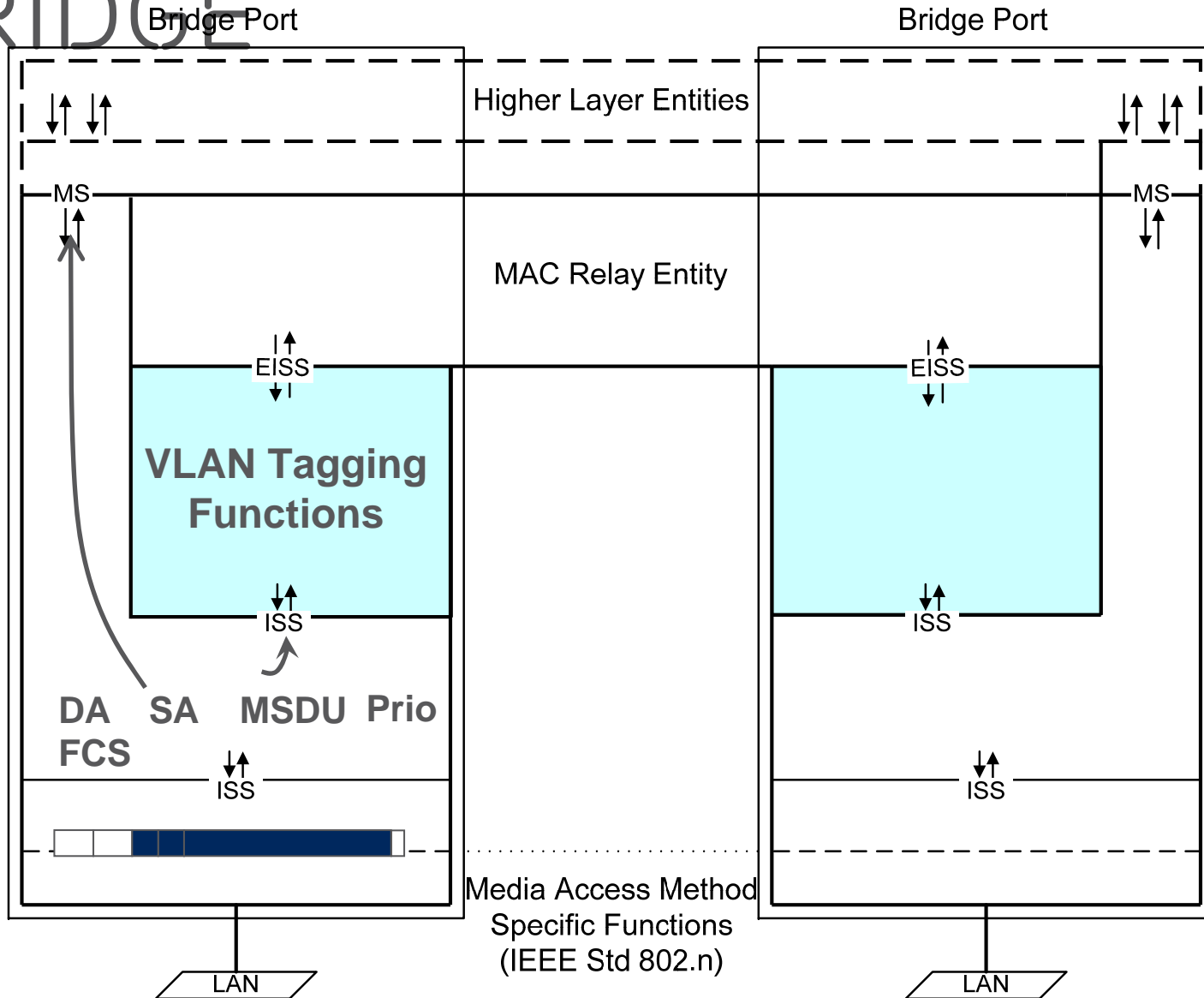
LAN

LAN
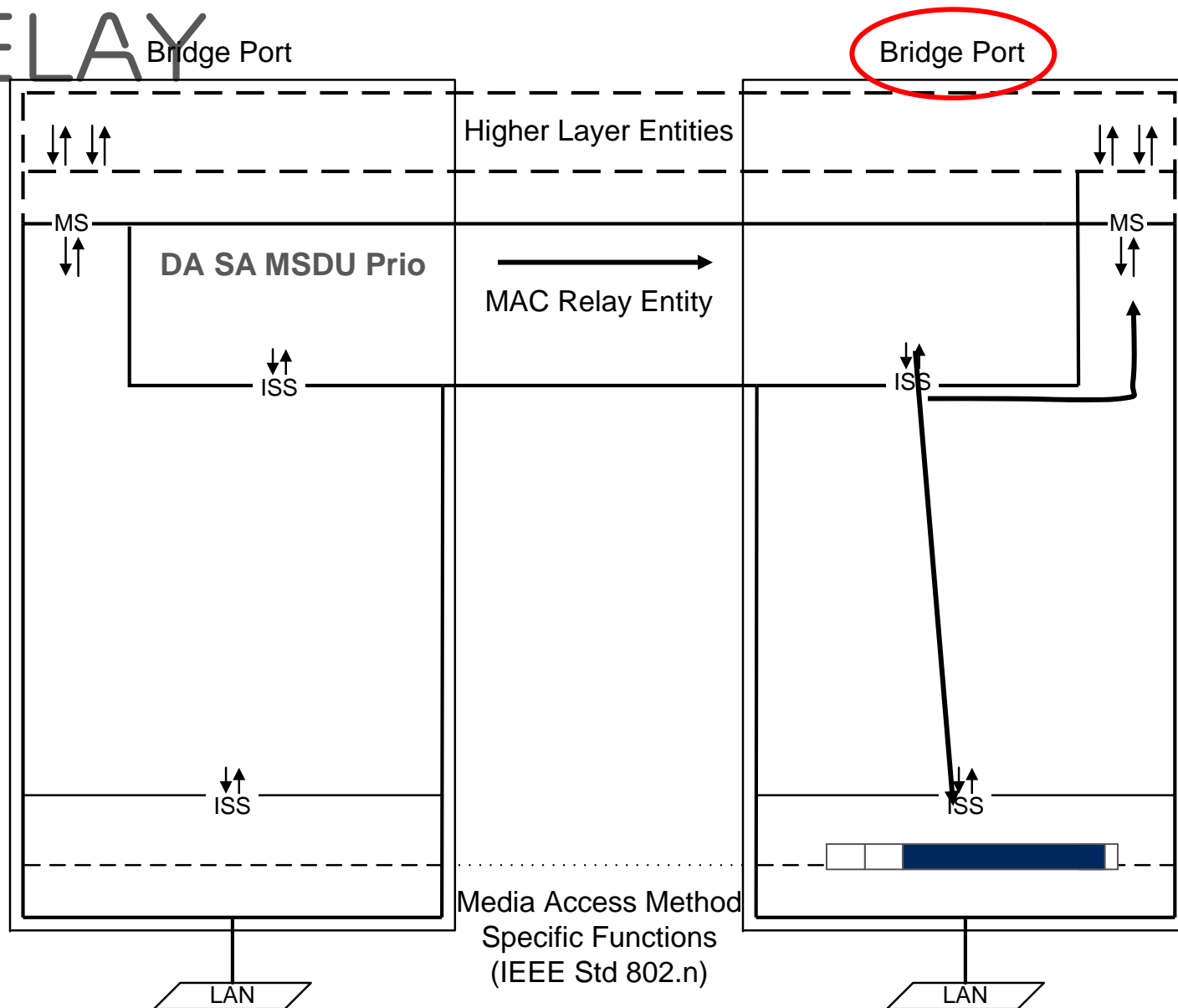
ENTER VLANS... 802.1Q

› VLANs allow different communities to share a physical Local Area Network infrastructure.

  − Provide connectivity within a community but isolation between communities.

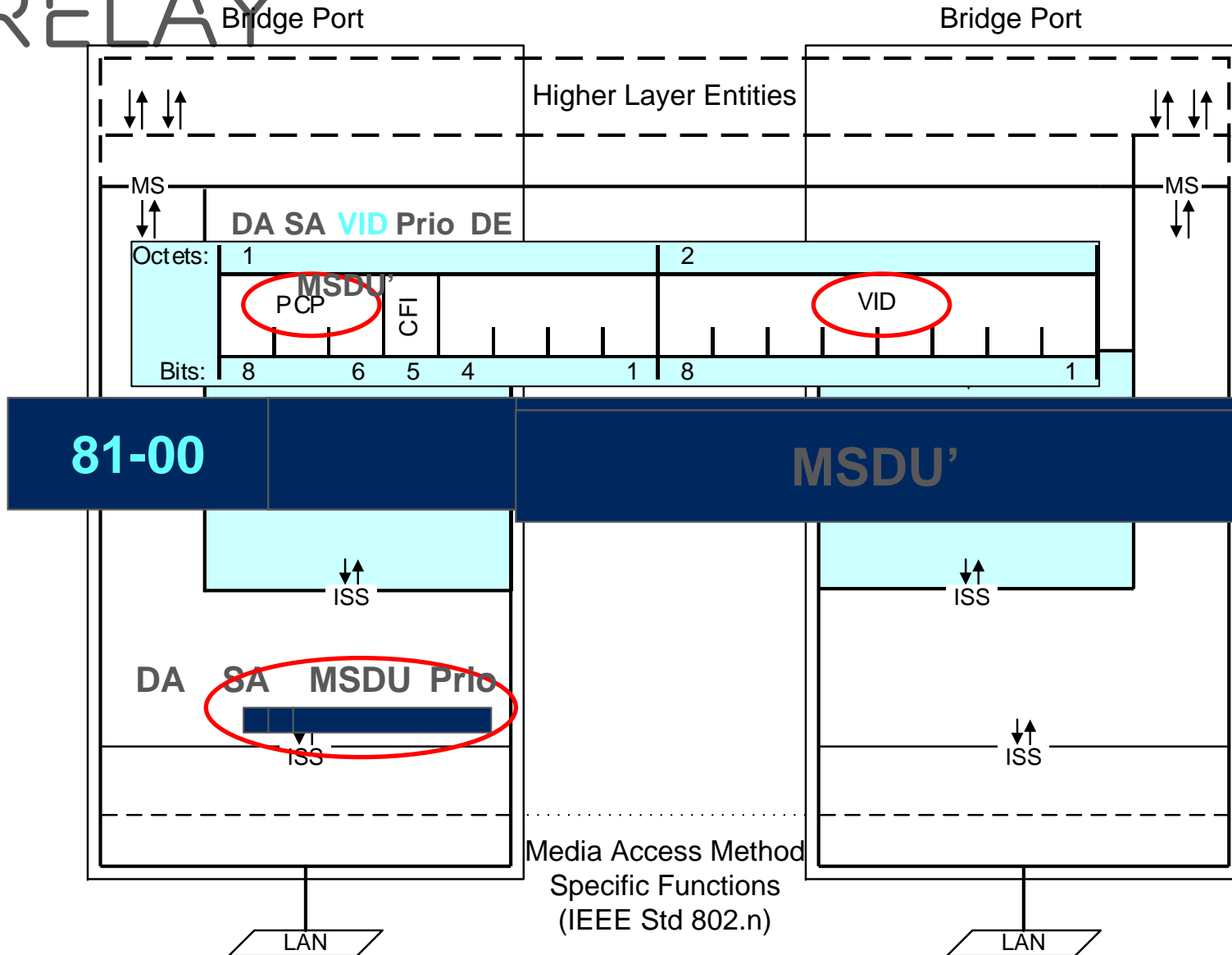 − Each packet carries a VLAN tag that identifies the community to which it belongs.
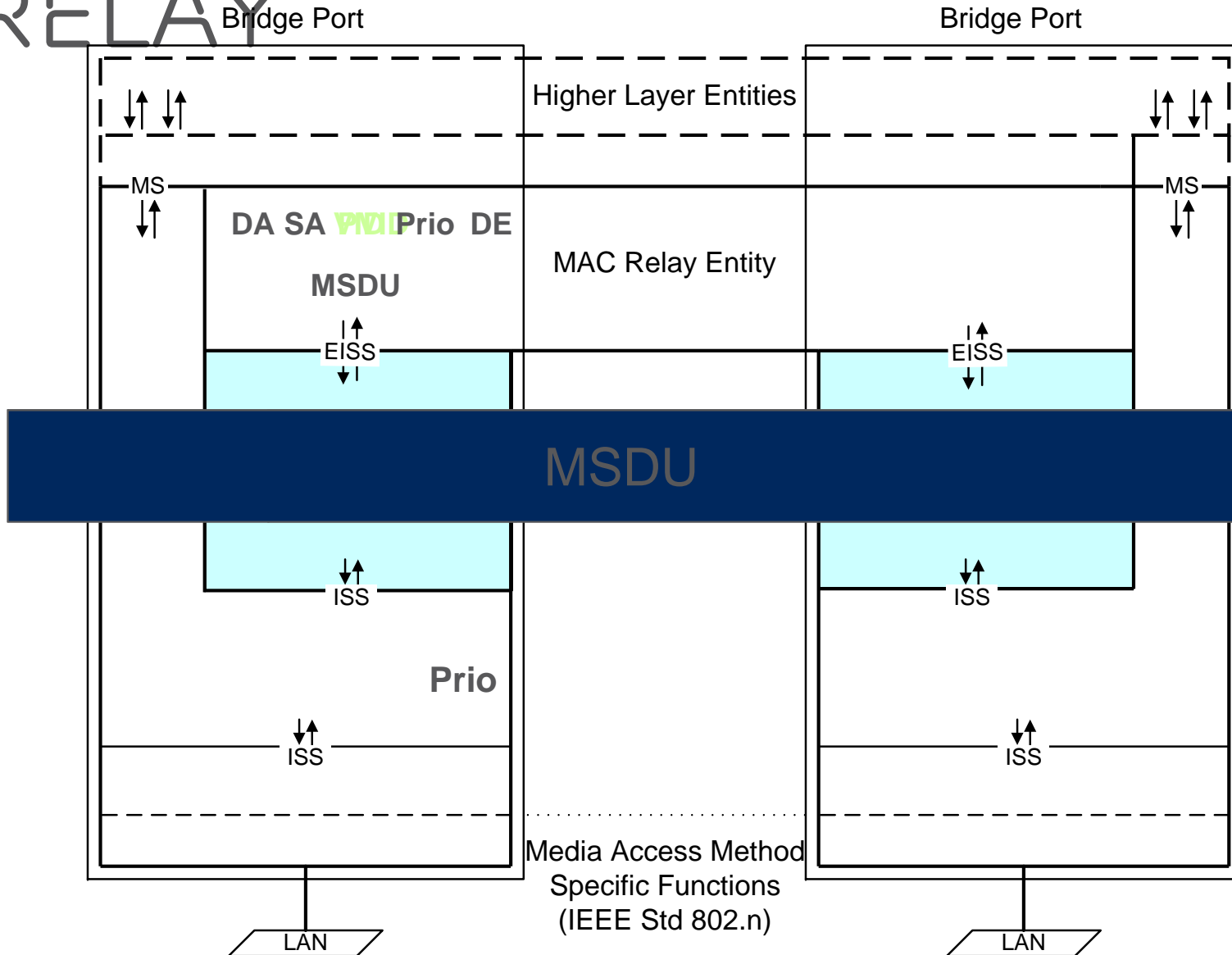
MAC SERVICE

802.1Q BRIDGE – VLAN BRIDGE

ENTERING THE MAC RELAY

ENTERING THE MAC RELAY

Bridge Port

Bridge Port

Higher Layer Entities

MS

MS

DA SA VID PID Prio DE

MAC Relay Entity

MSDU

EISS

EISS

MSDU

ISS

ISS

Prio

ISS

ISS

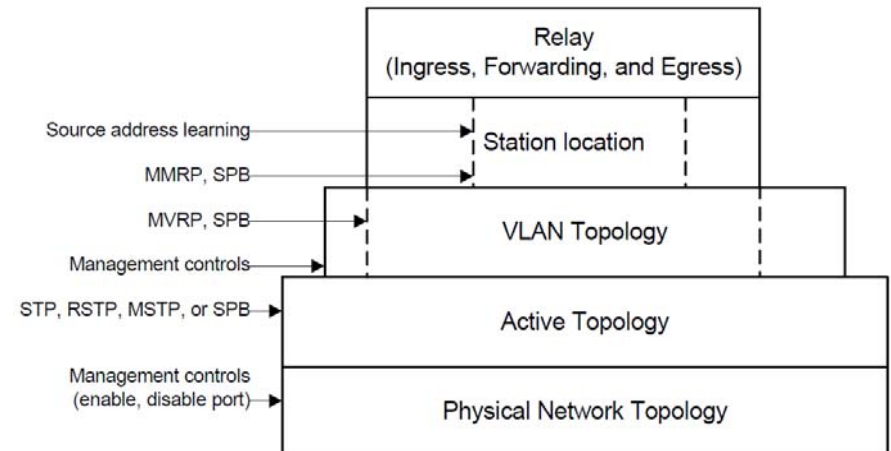Media Access Method
Specific Functions
(IEEE Std 802.n)

LAN

LAN

FORWARDING PROCESS
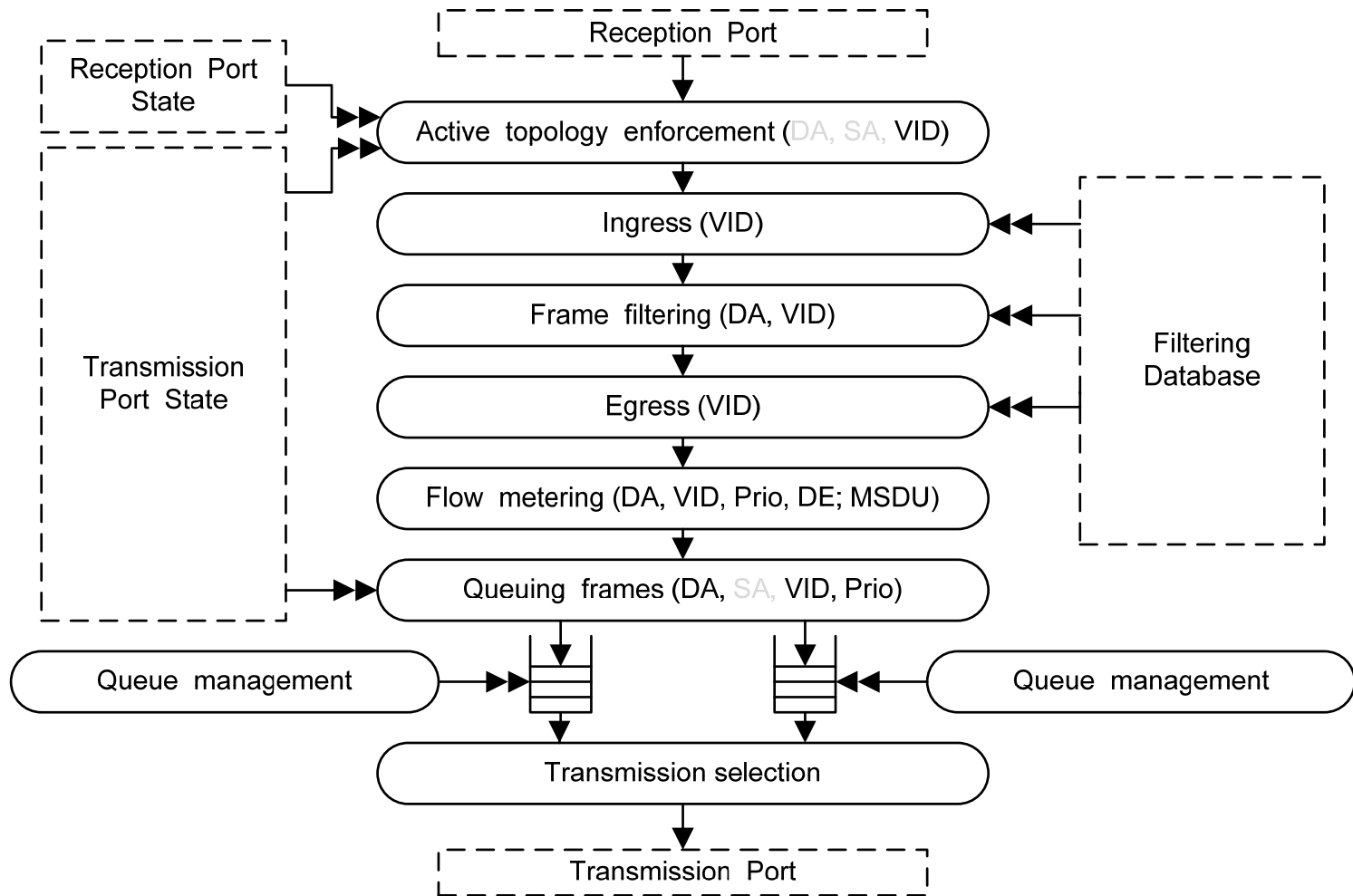
FORWARDING DECISIONS

VLAN Filtering

ENTERING THE MAC RELAY

Bridge Port

Bridge Port

Higher Layer Entities

MS

MS

DA SA VID Prio DE

MSDU

MAC Relay Entity

EISS

EISS

VLAN Tagging Functions

VLAN Tagging Functions
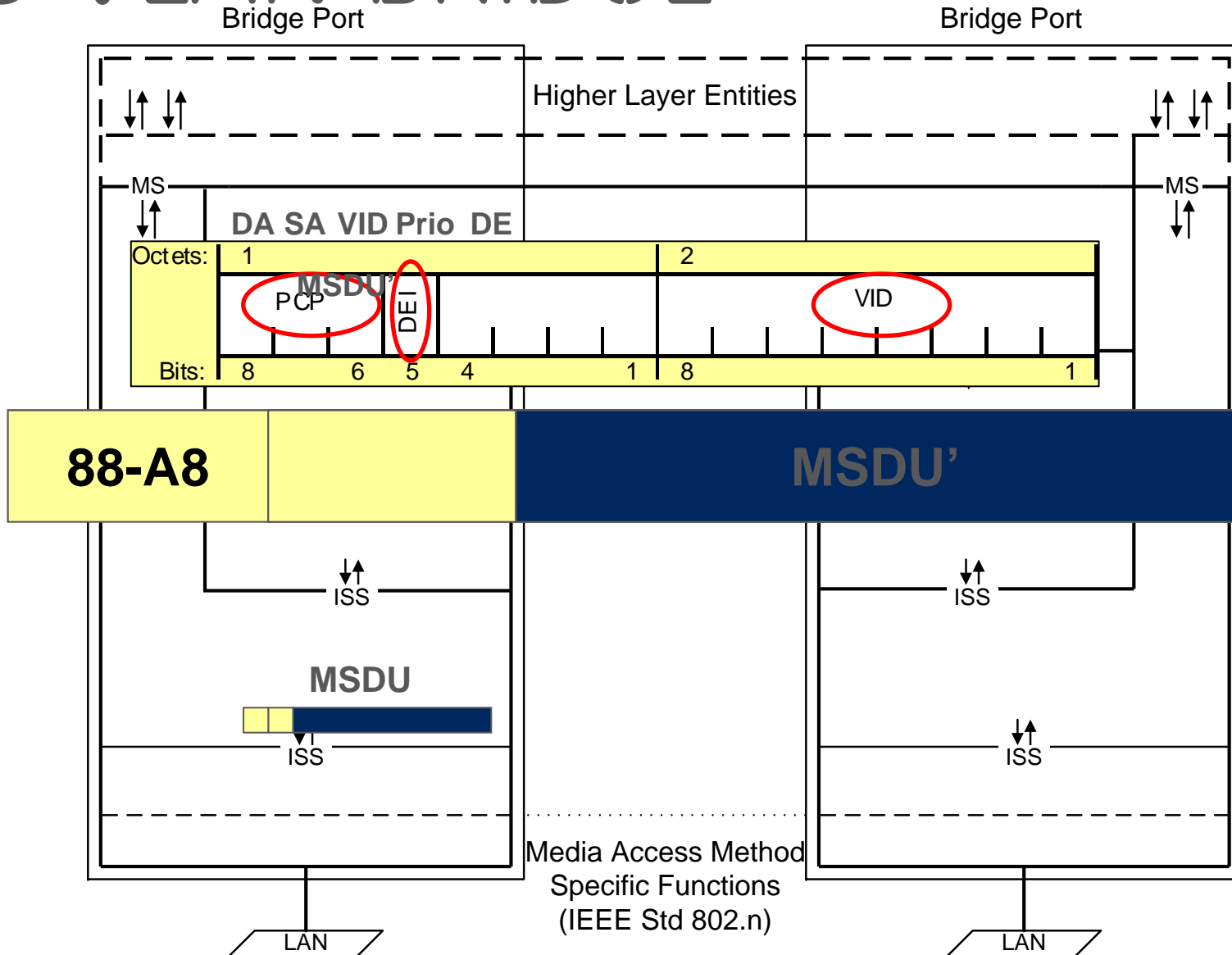
ISS

ISS

ISS

ISS

Media Access Method Specific Functions (IEEE Std 802.n)

LAN

LAN
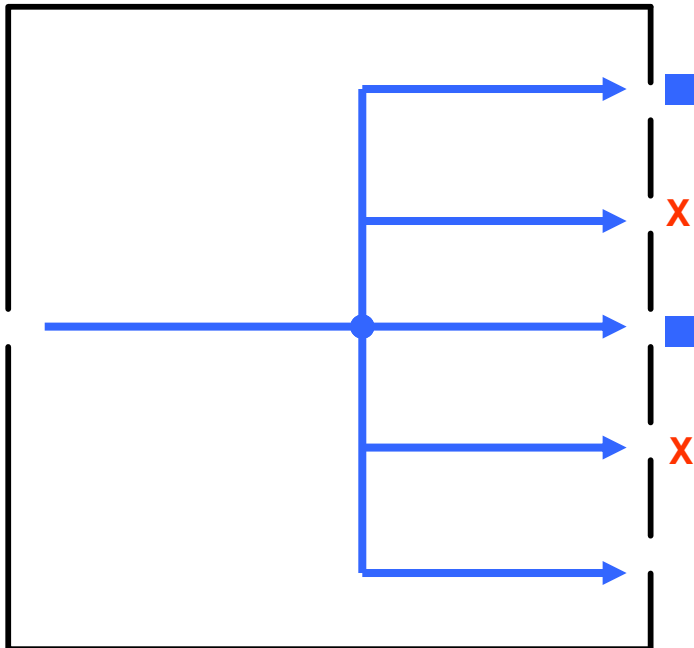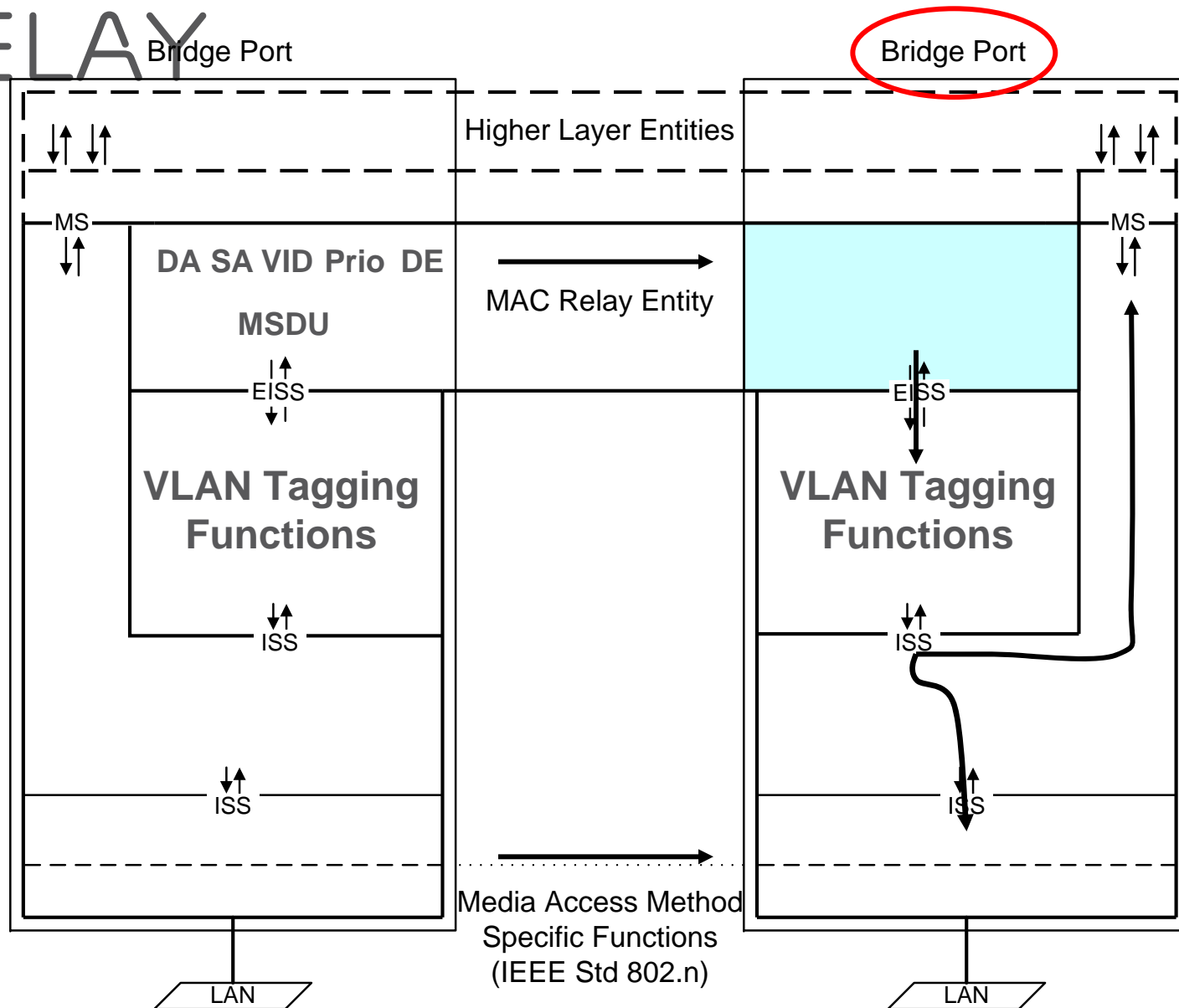
S-VLAN BRIDGE

BACKBONE EDGE COMPONENTS

› I-component:
  - Relay forwards/filters/learns customer addresses with S-VLAN identifiers.
    › Associations between customer addresses and backbone addresses stored in learned database.
  - Is an S-VLAN component with I-tagging functions in interface stack connecting to the Backbone Network (PIP)
    › I-tag includes 24 bit service instance identifier and encapsulated customer addresses.
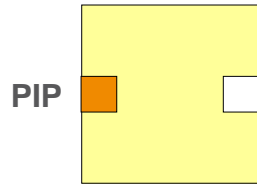   › MAC header containing backbone addresses added when I-tag is created.

› B-component:
  - Relay forwards/fliters/learns backbone addresses with B-VLAN identifiers
  - Is an S-VLAN component with I-tag specific functions in interface stack at edge of Backbone Network (CBP)

BACKBONE EDGE BRIDGE MODEL

I-component
I-BEB

PIP

B-component
B-BEB

CBP

I-component

VLAN-aware
MAC Relay Entity (Clause 8)

VIP-EISS	VIP-EISS	VIP-EISS
Support of the EISS (6.9)	Support of the EISS (6.9)	Support of the EISS (6.9)
VIP-ISS	VIP-ISS	VIP-ISS

Provider Instance Port
Functions
(6.10)

PIP-ISS

Support of the ISS
(6.7 or 6.14)

I-component

B-component

MAC Relay Entity (Clause 8)

EISS

Customer Backbone Port
Functions
(6.11)

ISS

Support of the ISS
(6.7 or 6.14)
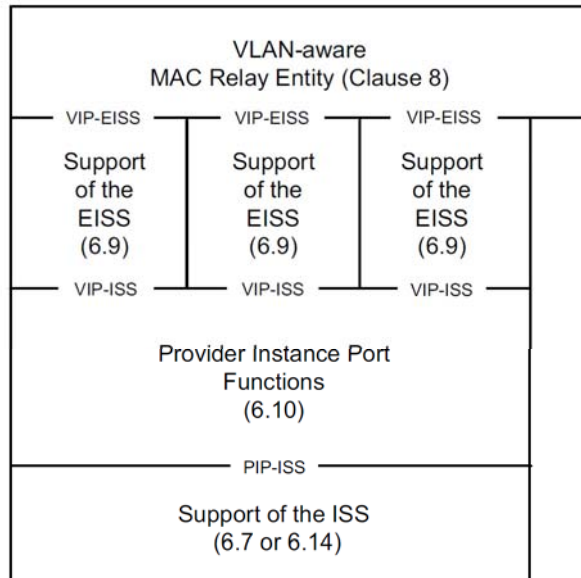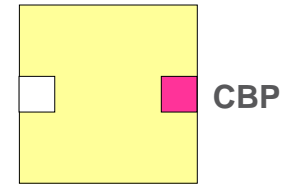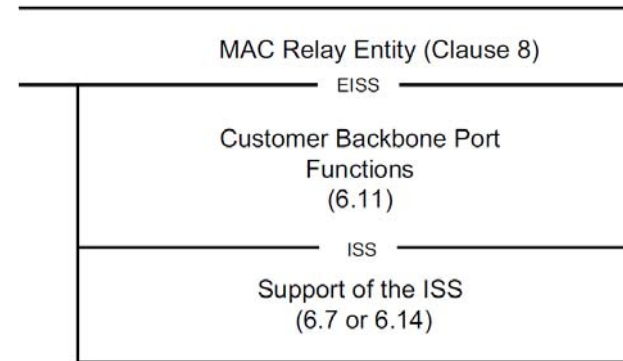
B-component

TPMR, T-COMPONENT

› A TPMR component is a VLAN-unaware Bridge component with exactly two Bridge Ports other than a Management Port.

- Supports only a subset of the functions of the Forwarding Process:
  › Frame filtering
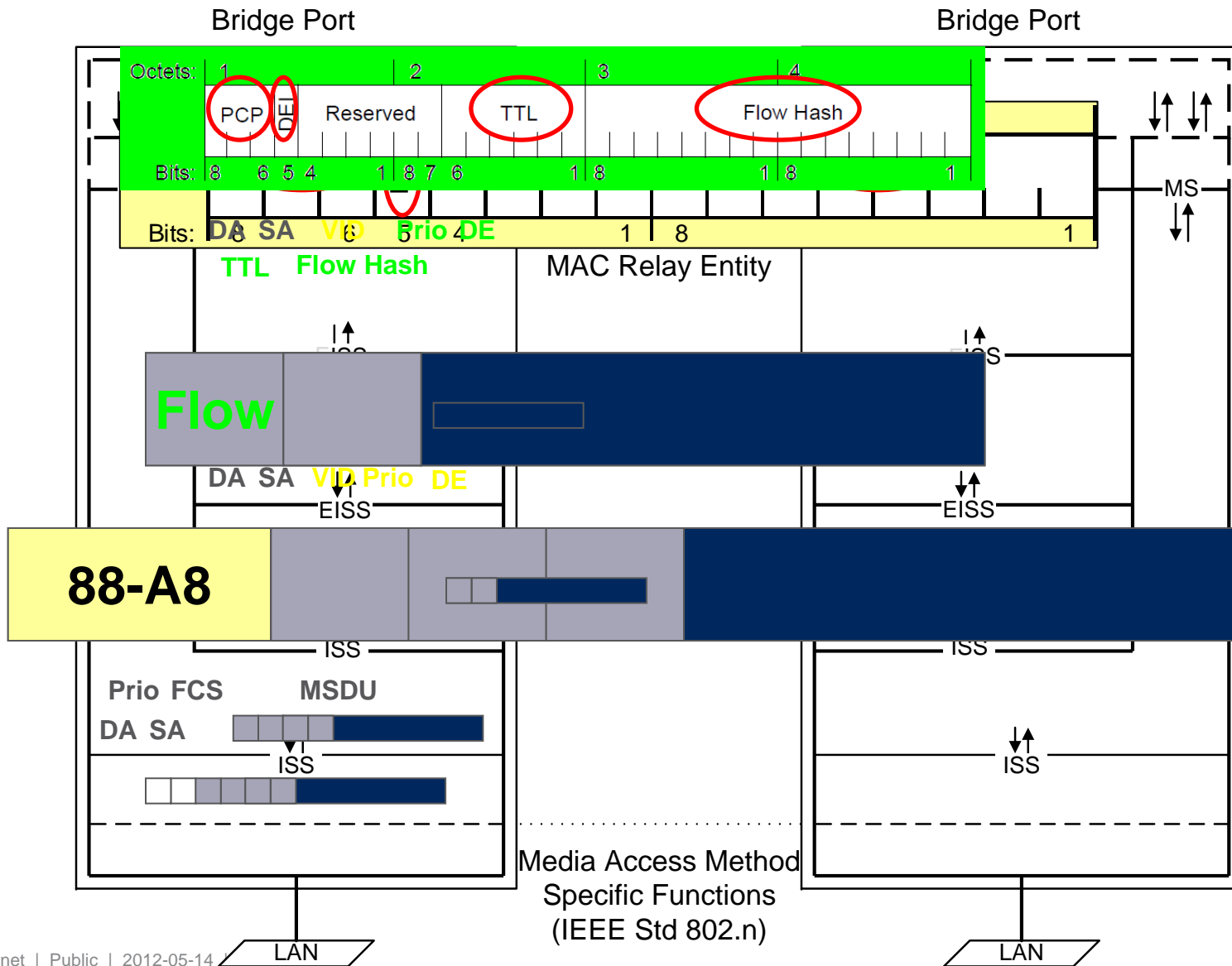 › Queuing frames
  › Transmission selection

› A T-component is a TPMR with having a PIP with a single VIP (Virtual Instance Port) as one of its externally accessible ports
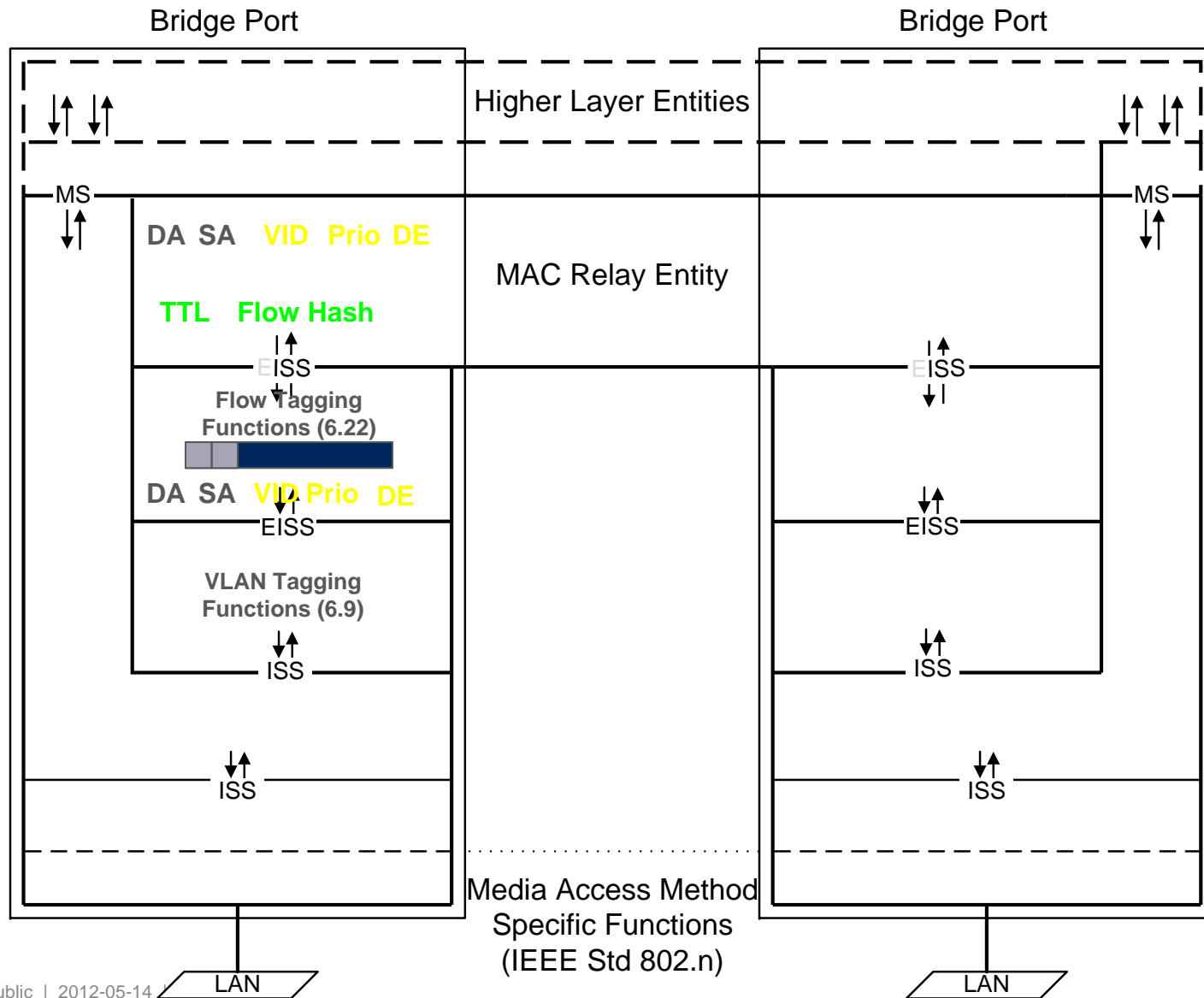
COMPONENT RESERVED ADDRESSES

Assignment	Value
Bridge Group Address, Nearest Customer Bridge group address	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	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
Metro Ethernet Forum ELMI protocol group address	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
Reserved for future standardization	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, Nearest Bridge group address	01-80-C2-00-00-0E
Reserved for future standardization	01-80-C2-00-00-0F

NEW BRIDGE (ECMP)

NEW BRIDGE (ECMP)

Bridge Port

Bridge Port

Higher Layer Entities

MS

MS

DA SA VID Prio DE

MAC Relay Entity

TTL   Flow Hash

EISS

EISS

Flow Tagging
Functions (6.22)

DA SA VID Prio DE

EISS

EISS

VLAN Tagging
Functions (6.9)

ISS

ISS

ISS

ISS

Media Access Method
Specific Functions
(IEEE Std 802.n)

LAN

LAN

FORWARDING PROCESS
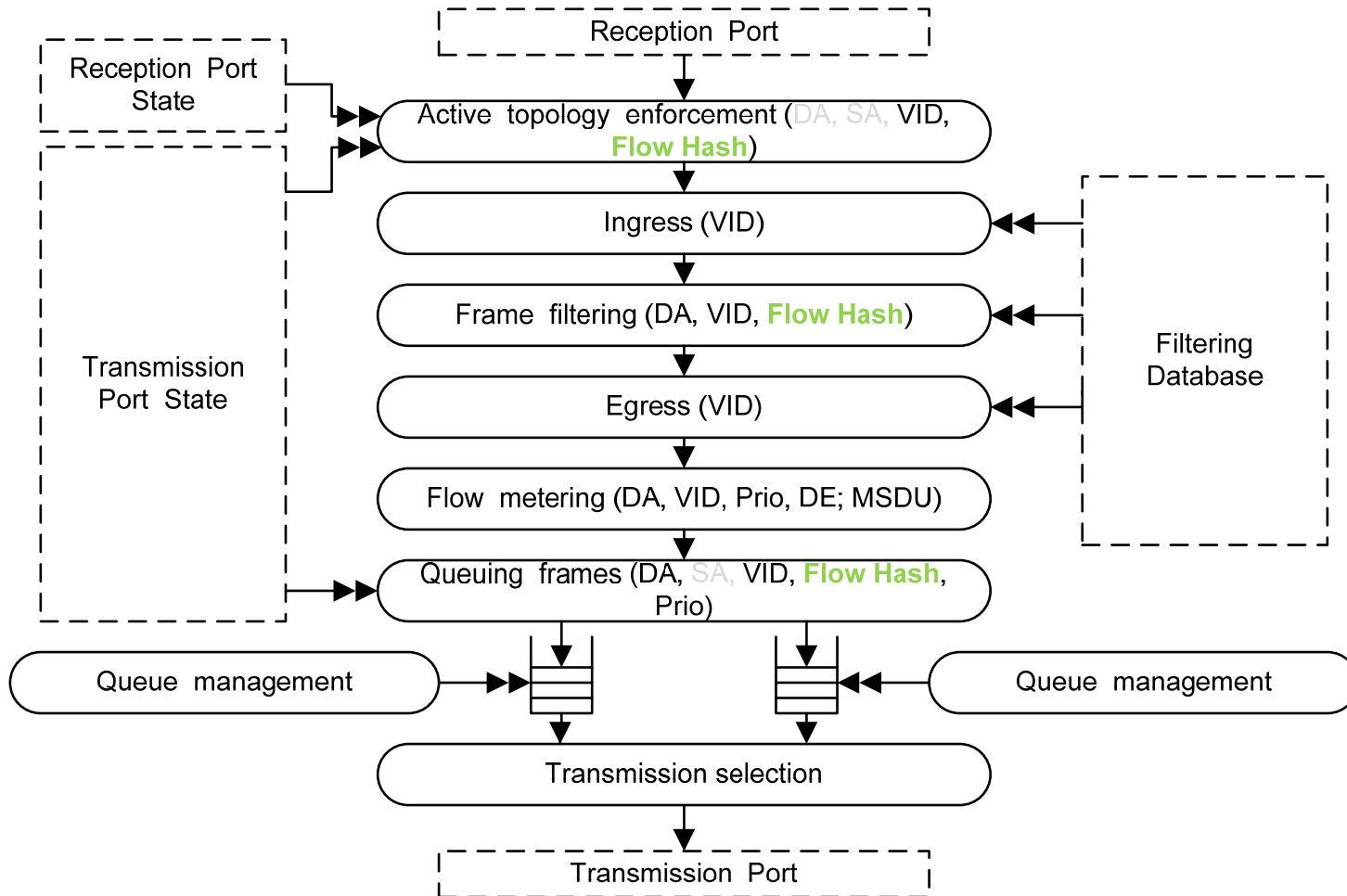
SUMMARY

Bridge type	Service parameters supporting MAC Relay	Support for tagging functions	Permanent filtering FDB entries	Specification
VLAN-unaware Bridge component	DA, SA, Priority	None	C-VLAN component Reserved	IEEE Std 802.1D-2004
TPMR component	DA, SA, Priority	None	TPMR component Reserved	IEEE Std 802.1D 2004, IEEE Std 802.1Q-2011, TPMR
T-Component	DA, SA, Priority	I-TAG	TPMR component Reserved	IEEE Std 802.1D 2004, IEEE Std 802.1Q-2011, T-Component
C-Component	DA, SA, Priority, **VID, DE**	C-VLAN Tag	C-VLAN component Reserved	IEEE Std 802.1Q-2011, C-Component
S-Component	DA, SA, Priority, **VID, DE**	S-VLAN Tag	S-VLAN component Reserved	IEEE Std 802.1Q-2011, S-Component
I-Component	DA, SA, Priority, **VID, DE**	S-VLAN Tag, I-TAG	S-VLAN component Reserved	IEEE Std 802.1Q-2011, I-Component
B-Component	DA, SA, Priority, **VID, DE**	S-VLAN Tag, I-TAG	S-VLAN component Reserved	IEEE Std 802.1Q-2011, B-Component
ECMP requirements	DA, SA, Priority, **VID, DE, TTL, Flow Hash**	S-VLAN Tag, F-TAG		

CONCLUSIONS

› As currently described, ECMP support would require fundamental changes to the forwarding capabilities of the current 802.1Q complaint systems as it introduces flow based forwarding on top of the current VLAN based forwarding.

› The implications of this type of change are exactly the same to the ones associated with the introduction of VLAN based forwarding on 802.1D bridges.