PBB-TE Basics

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Analysis of PBB-TE basics

- Assume PBB-TE maintains “self descriptiveness” of Ethernet
- Ignore in first step potential commonality with PBB
- Evaluate commonality between PBB-TE and PBB as second step

PBB-TE layers, labels and addresses

- Examples

PBB compatible B-LAN frame format

802.1ah extensions

- CBP, PNP
- EISS
- EISS Multiplex Entity
- Support of the EISS function

802.1ag extensions

PBB/PBB-TE frame formats

PBB compatibility questions

Layer Stack for “B-Service over B-VLAN or TE-Service”

A combined PBB/PBB-TE network contains a

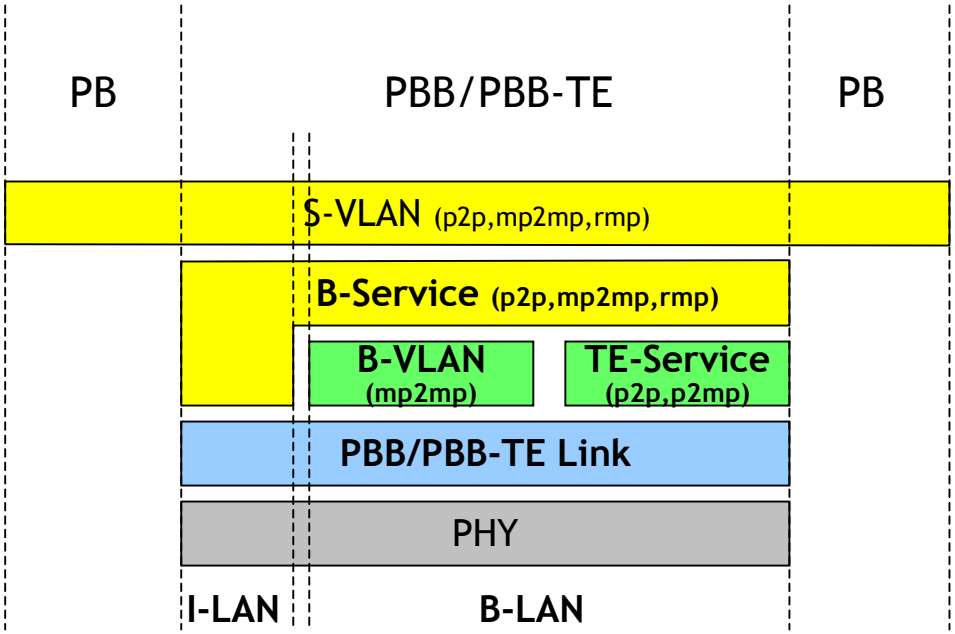
- PBB Backbone Service Instance layer (B-Service)
- PBB Backbone VLAN layer (B-VLAN) with mp2mp B-VLANs
- PBB-TE TE Service layer (TE-Service) with p2p traffic engineered tunnels

B-Service layer is a client layer of both the B-VLAN and TE-Service layers

B-Service instances may be carried over either a B-VLAN, or a TE-Service instance

An I-LAN interface supports one or more B-Service instances

A B-LAN interface supports zero or more B-VLAN instances and zero or more TE-Service instances

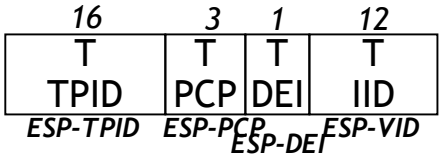


Labels for “B-Service over B-VLAN or TE-Service”

B-Service instances are identified within a B-VLAN or TE-Service instance by their I-SID

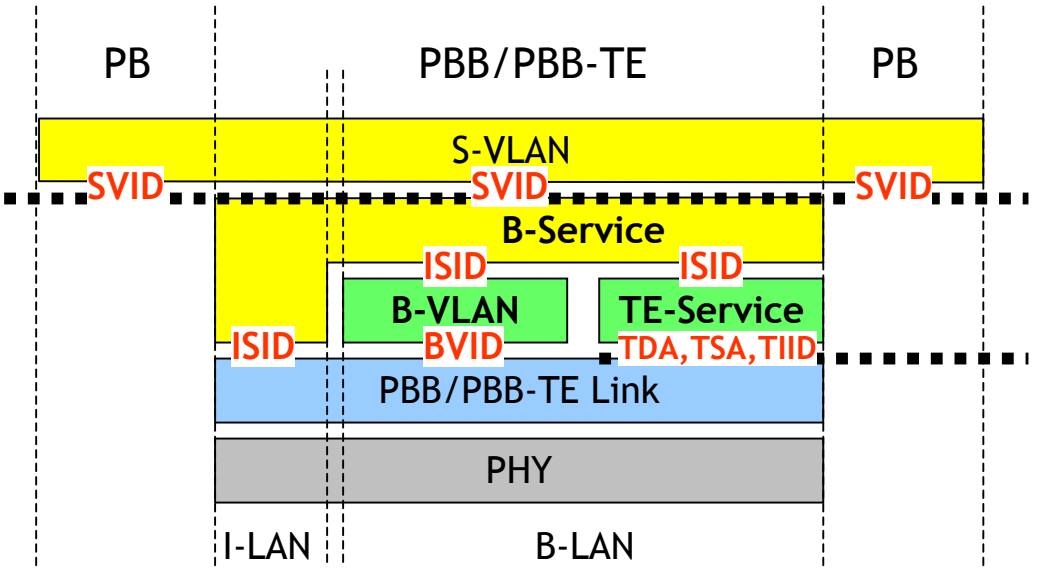
B-VLAN instances are identified within an 802.3 Link by their B-VID

TE-Service instances are identified within an 802.3 Link by their tuple <T-DA,T-SA,T-IID> (T-IID: TE-Service Instance Identifier)



- T-IID is part of a TE-Service Instance Tag (T-Tag):
- T-IID is a 12-bit identifier
- T-Tag also contains a 16-bit TE-Service Instance TPID (EtherType: TBD), a 3-bit Priority Code Point and a 1-bit Drop Eligible field
- T-DA/T-SA are TE-Service MAC (T-MAC) addresses which identify the TE-Service endpoints

Labels		
	PB	PBB/PBB-TE
S-VLAN	S-VID	S-VID or PVID
PBB B-Service	-	I-SID
PBB B-VLAN	-	B-VID
PBB-TE TE-Service	-	T-DA,T-SA,T-IID

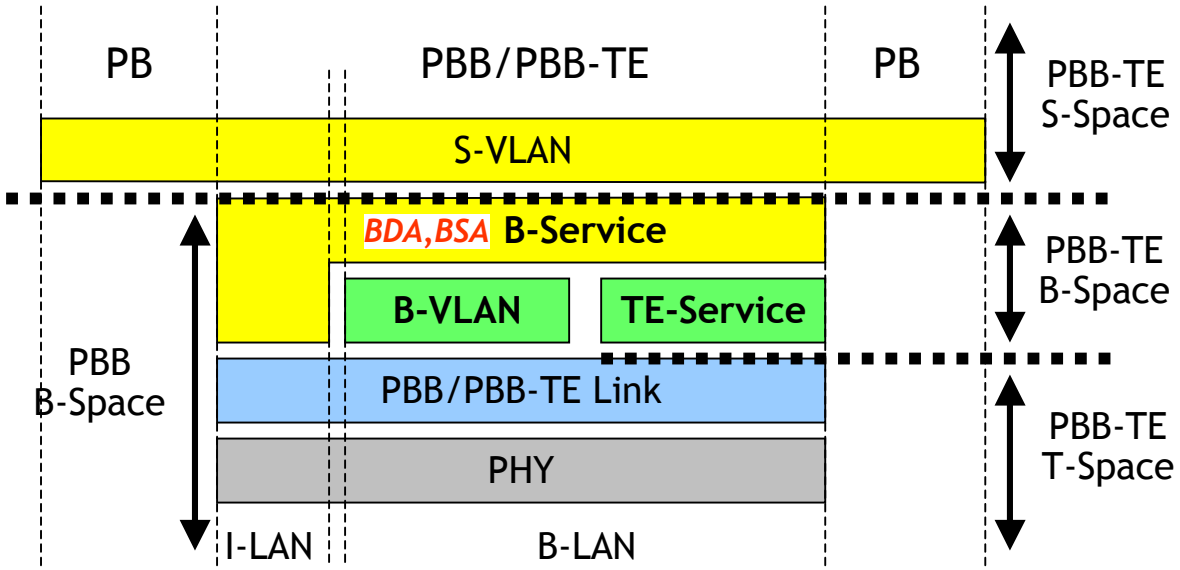


Addresses for “B-Service over B-VLAN or TE-Service”

B-MAC addresses (B-DA/B-SA) are inserted in the B-Service layer when creating the B-Service frame

B-MAC addresses identify the endpoints of a B-Service instance and are used to forward a B-Service frame to one or more of the endpoints of their B-Service instance

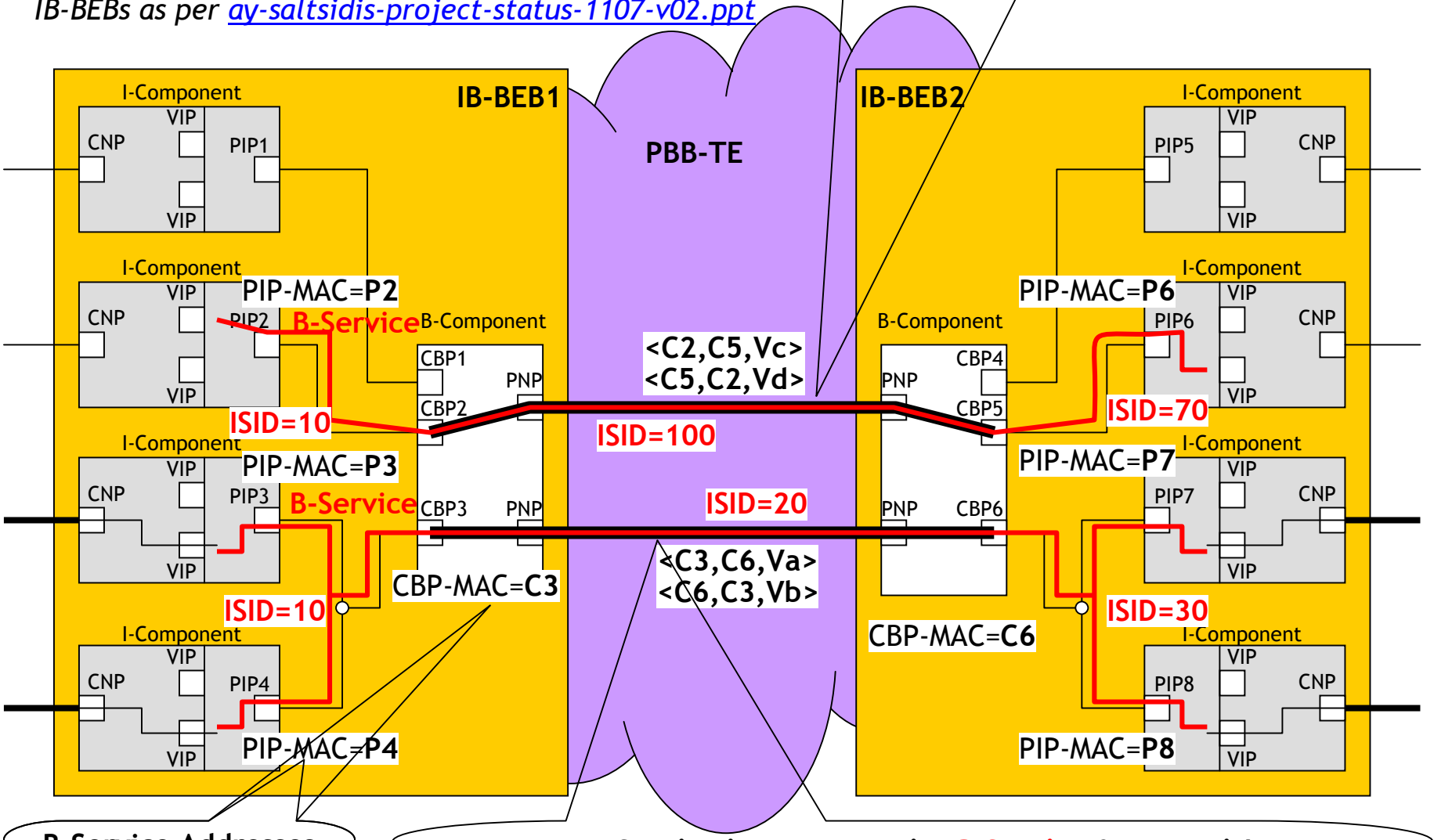
B-MAC addresses MUST be independent of the T-MAC addresses which identify the TE-Service instance endpoints



PBB-TE Network

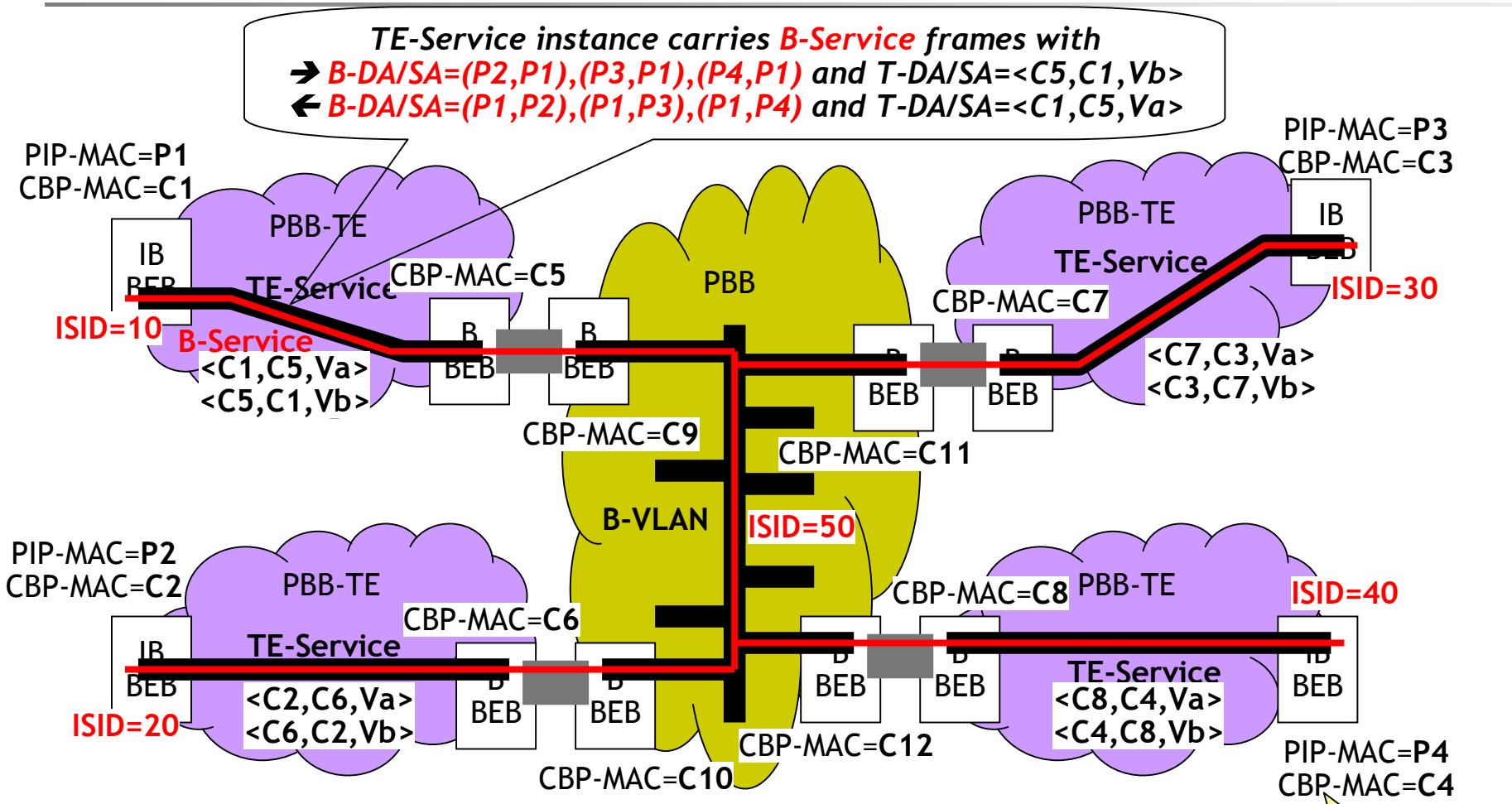
2- and *4-port Backbone Service Instances*

IB-BEBs as per [ay-saltsidis-project-status-1107-v02.ppt]



PBB-TE Aggregation Networks interconnected via PBB Core Network

4-port Backbone Service Instance

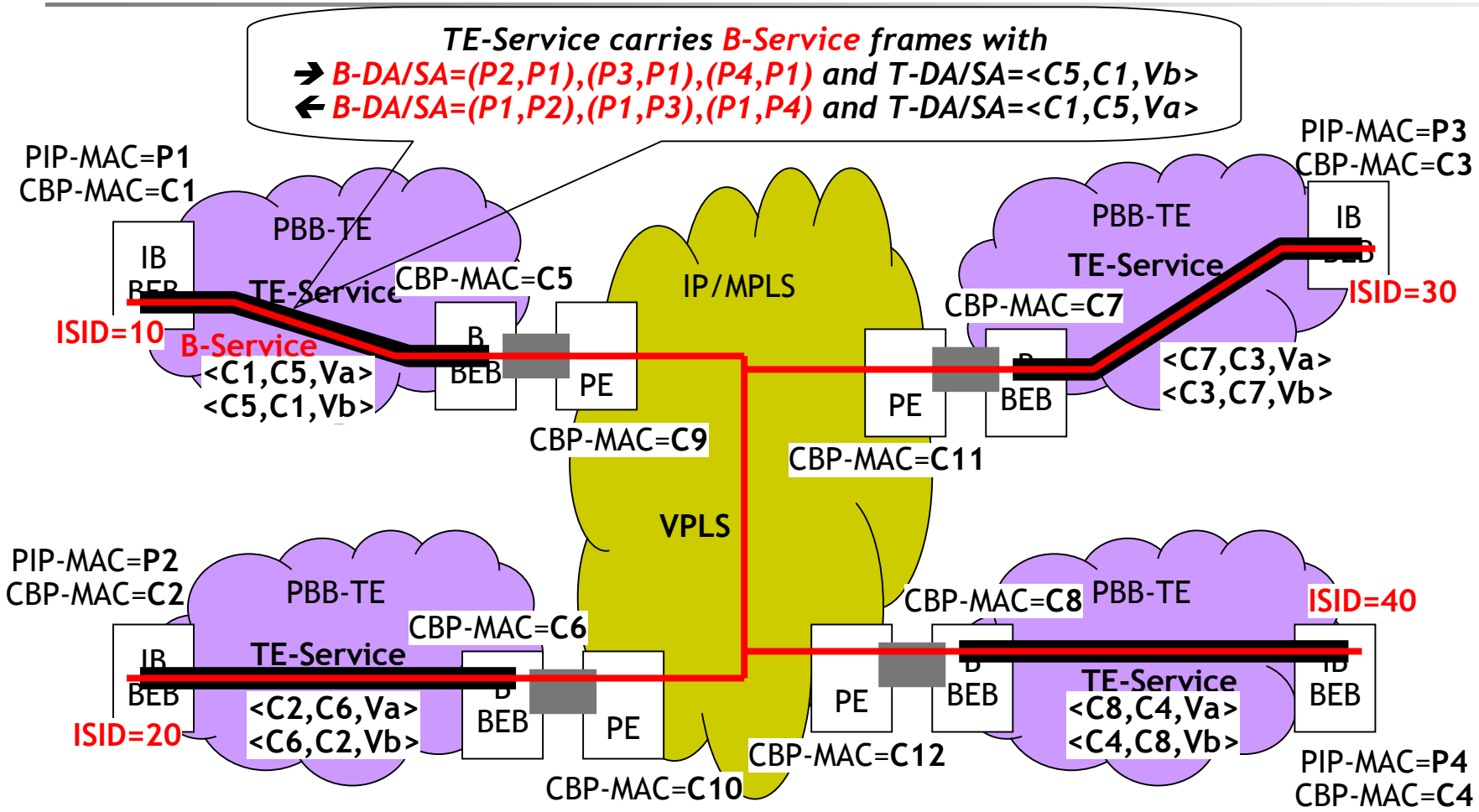


4-port Backbone Service Instance carried over
- TE-Service instance in metro/aggregation domains and
- B-VLAN in PBB core domain

B-Service Addresses must be independent of TE-Service addresses

PBB-TE Aggregation Networks interconnected via IP/MPLS Core Network

4-port Backbone Service Instance



4-port Backbone Service Instance carried over
- TE-Service instance in metro/aggregation domains and
- VPLS in IP/MPLS core domain

PBB B-LAN compatible frame format in PBB-TE

T-MAC Address and TYPE field Compression

For the case a PBB/PBB-TE network

- consists of just one PBB(-TE) domain and
- contains only IB-BEB and BCB nodes and
- B-Service instance is a point-to-point service and
- PIP and CBP belong to one “physical subsystem” and share one EUI-48 identifier (MAC address) and
- a PIP/CBP in IB-BEB #1 has MAC address #X and a PIP/CBP in IB-BEB#2 has MAC address #Y

Then a B-Service instance between these PIPs in IB-BEB #1 and #2 will have

- IB-BEB #1 to #2: B-SA=X, B-DA=Y, T-SA=X, T-DA=Y
- IB-BEB #2 to #1: B-SA=Y, B-DA=X, T-SA=Y, T-DA=X

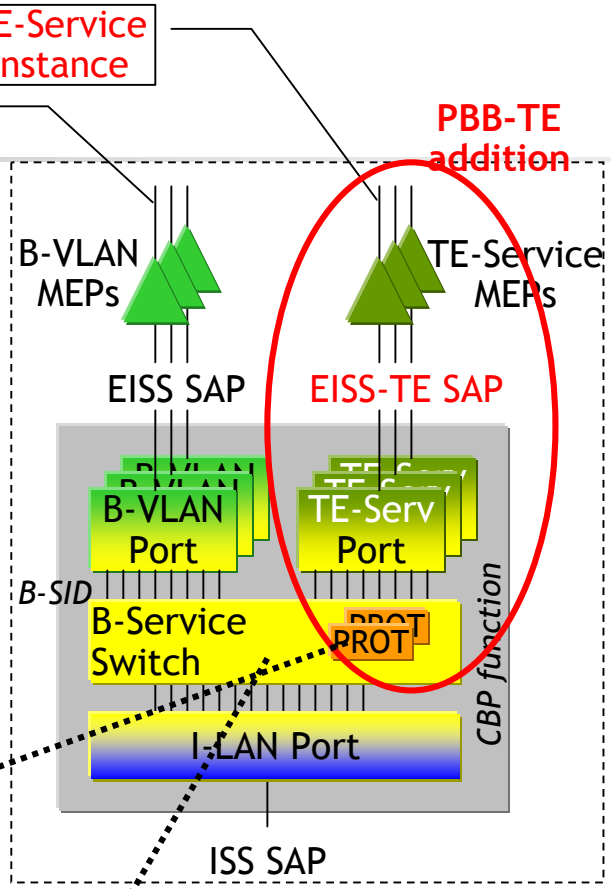
Because for this case T-SA=B-SA and T-DA=B-DA, it is not necessary to include both the B-MAC and T-MAC addresses in the B-LAN frame

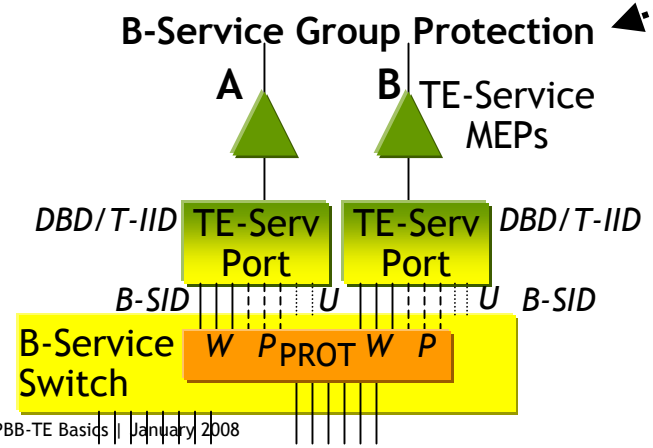
- T-MAC addresses can be omitted from the B-LAN frame
  - Also the TYPE field has to be omitted
- T-MAC addresses can be recovered at the receiver by inspecting the B-MAC address fields
  - Also the TYPE field has to be recovered

802.1ah extensions

The PBB-TE network described in those slides

- deploys the 802.1ah PIP
- deploys the 802.1ah CBP with the following extensions
  - introduction of B-Service Group protection switching
  - introduction of TE-Service endpoint (complementing B-VLAN endpoint)
  - introduction of TE-Service MEP (complementing B-VLAN MEP)
  - introduction of T-MAC header (T-DA,T-SA,TYPE)
    - T-SA is local CBP address, T-DA is derived from Default Backbone Destination field in the Backbone Service Instance Table





BACKBONE SERVICE INSTANCE TABLE

B-Service ⇔ B-VLAN

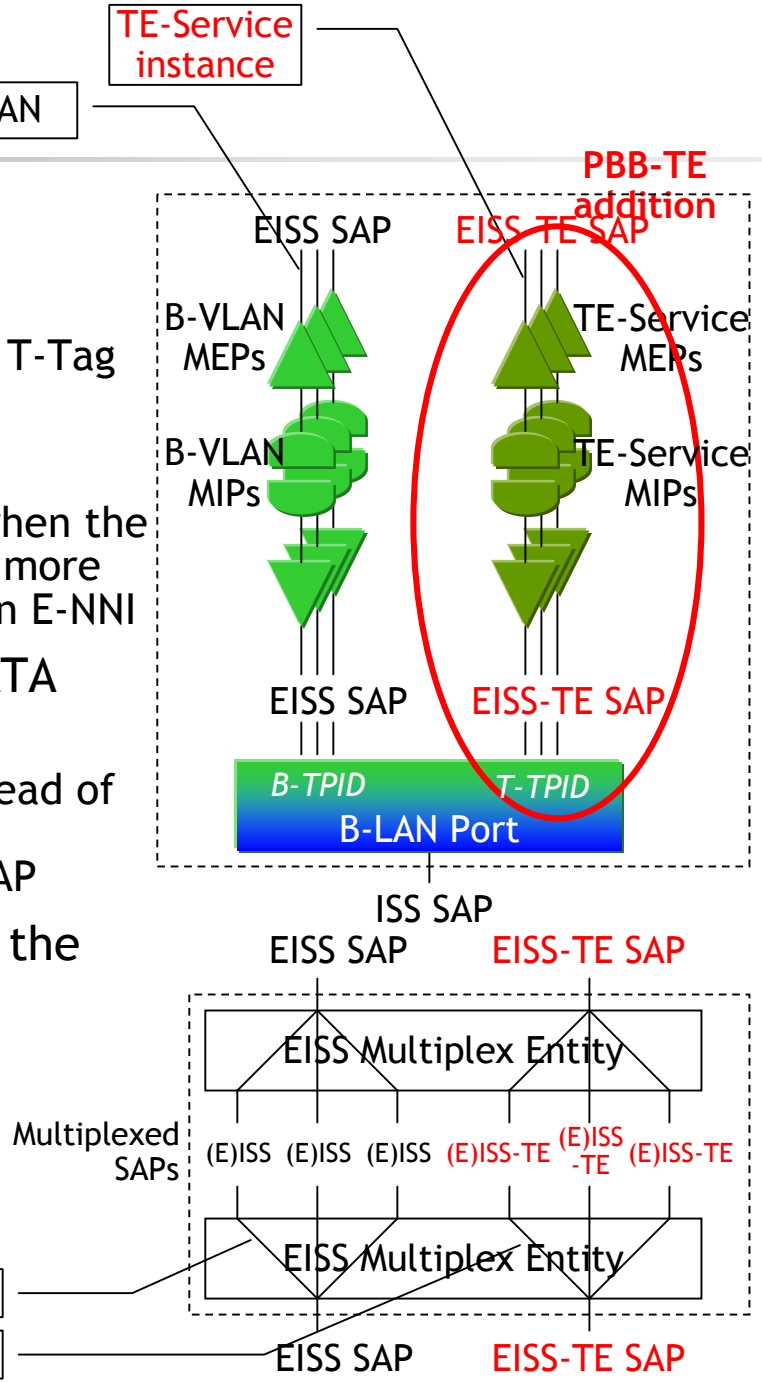
B-SID	[B-VID]	[L-SID]	[DBD]

B-Service ⇔ TE-Service

B-SID	DBD	[T-IID]	[L-SID]

802.1ah extensions (cont'd)

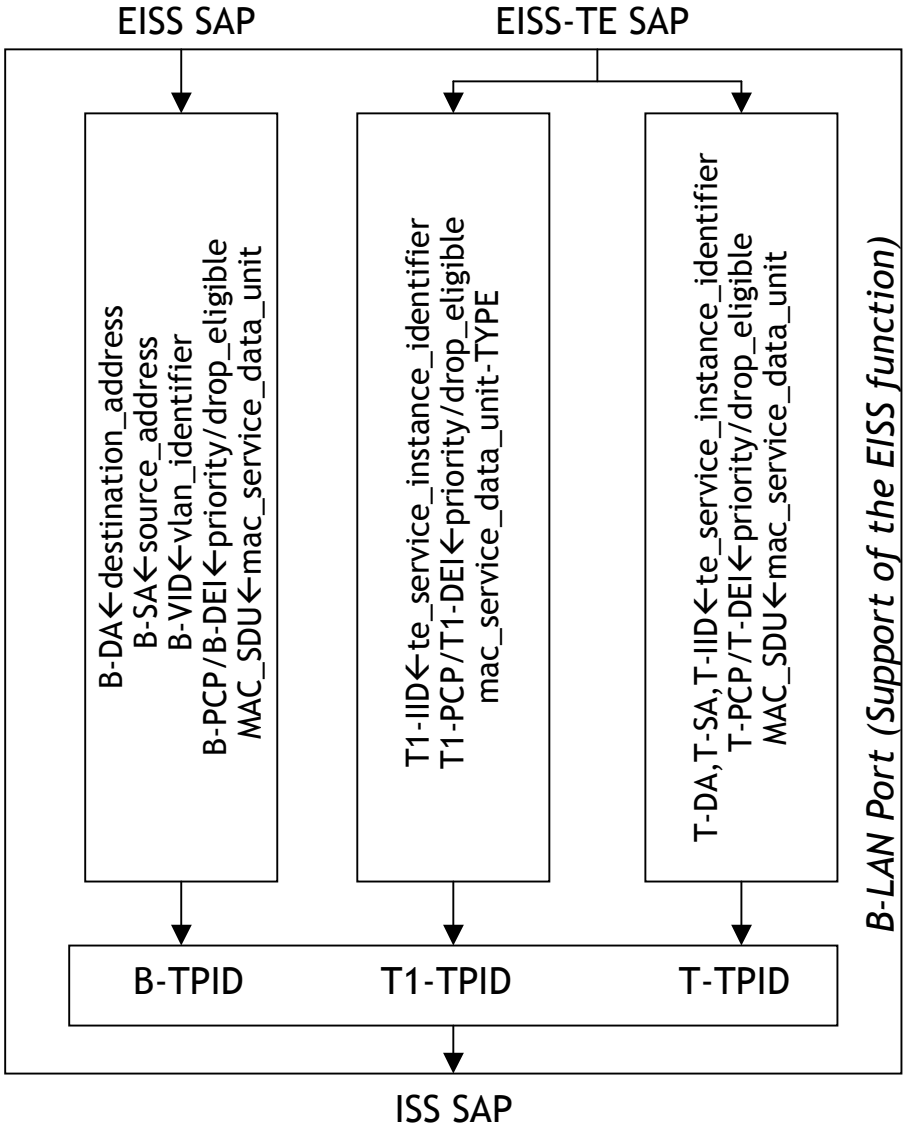
- deploys the 802.1ah PNP with the following extensions
  - complementing B-Tag insertion/extraction with T-Tag insertion/extraction
  - introduction of TE-Service MIP
  - TE-Service MEPs on the PNP are only required when the TE-Service instances are in future supported by more than one operator and the PNP will terminate an E-NNI
- deploys a new EISS-TE SAP and TE_EM_UNITDATA primitives which contain
  - a te_service_instance_identifier parameter instead of the vlan_identifier, destination_address and source_address parameter set within the EISS SAP
- deploys the 802.1ag EISS Multiplex Entity with the following extensions
  - EISS-TE SAP
  - Multiplexed (E)ISS-TE SAPs
  - Demultiplexing performed on basis of EISS-TE te_service_instance_identifier parameter



802.1ah extensions (cont'd)

Support of the B-VLAN/TE-Service EISS

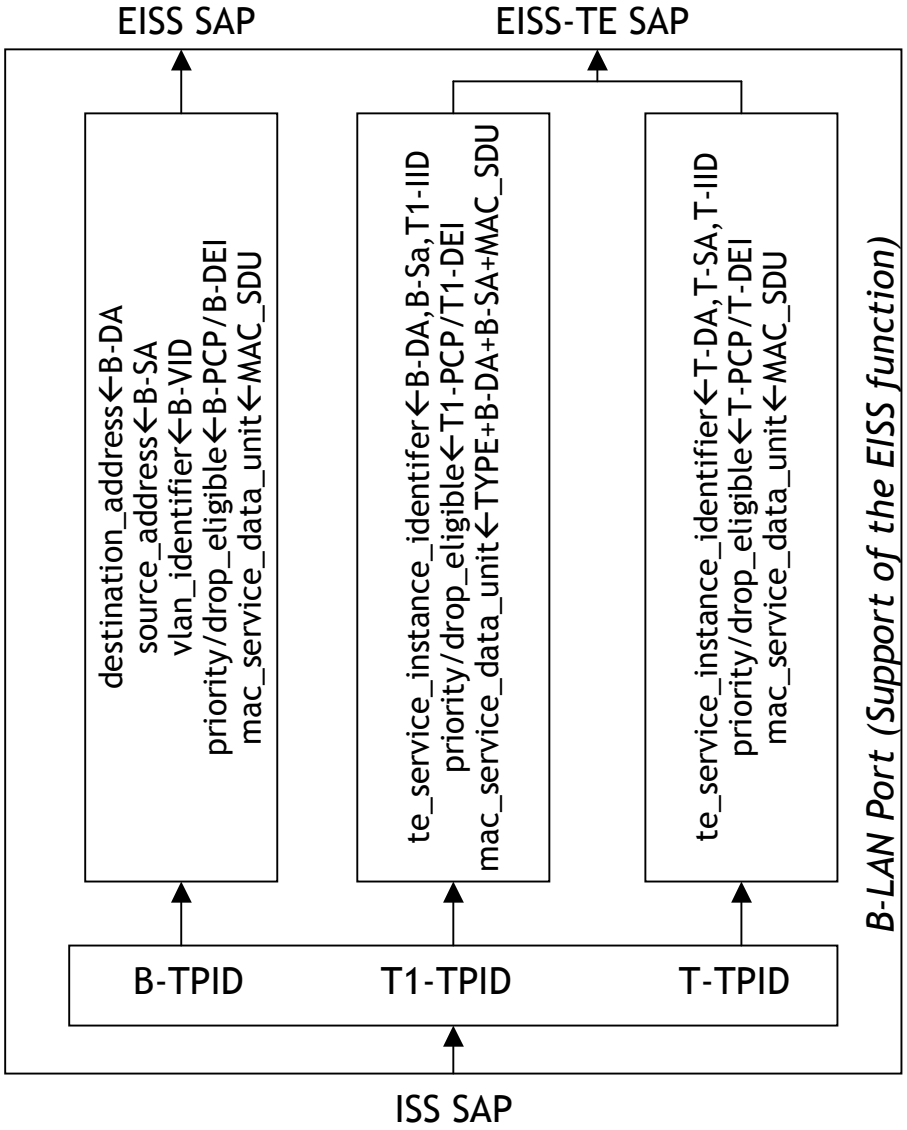
- Three branches
  - B-VLAN
  - Single domain TE-Service instance
  - Generic TE-Service instance
- Compress T-MAC address/type fields in single domain TE-Service instance case



802.1ah extensions (cont'd)

Support of the B-VLAN/TE-Service EISS

- Three branches
  - B-VLAN
  - Single domain TE-Service instance
  - Generic TE-Service instance
- Recover T-MAC address/type field information in single domain TE-Service instance case



802.1ag extensions

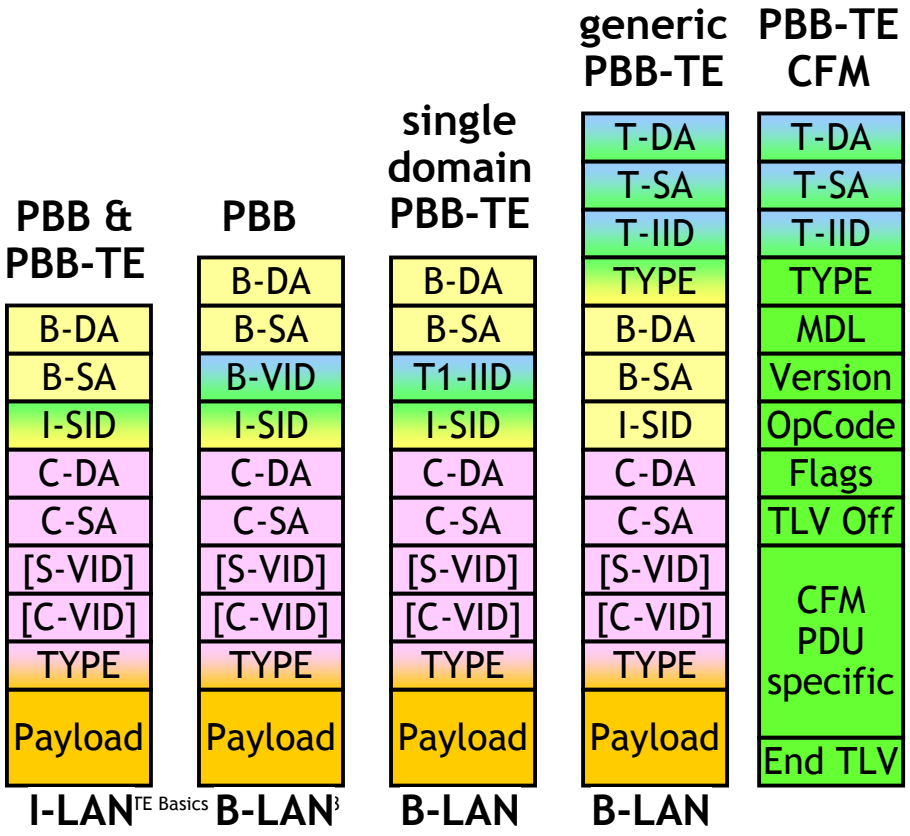
The PBB-TE network described in those slides

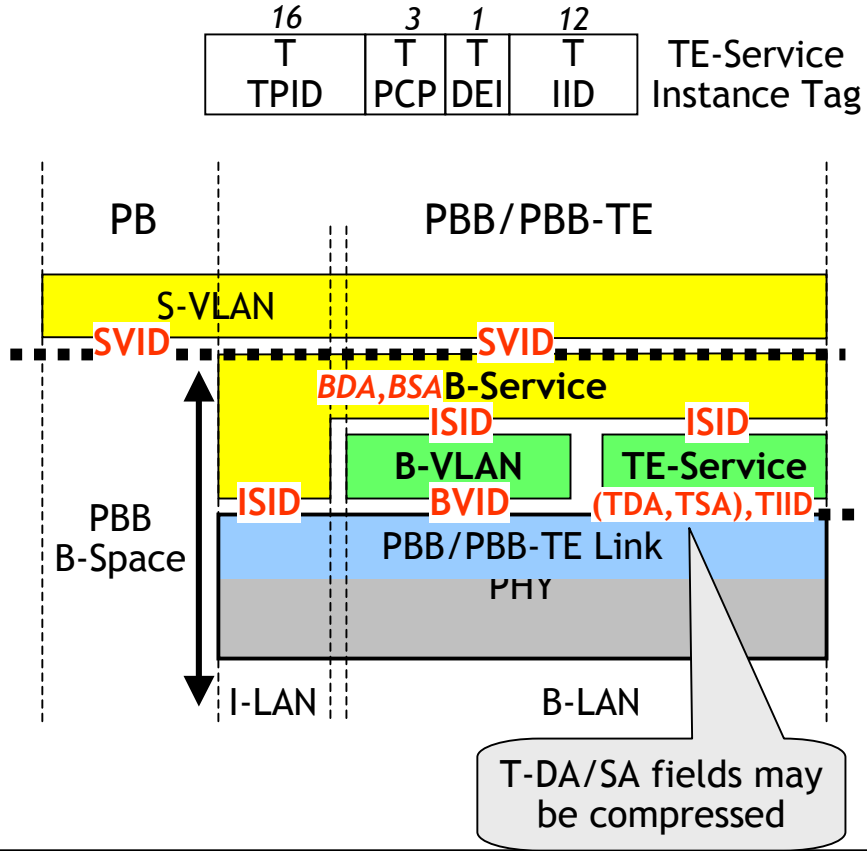
- deploys the 802.1ag MEP and MIP functions with the following modifications
  - identification of a MEP or MIP for data forwarding purposes by the te_service_instance_identifier
    - this identifier includes either two ESP identifiers (p2p), or n+1 ESP identifiers (p2mp)
    - primary ESP identifier for A-to-Z direction
    - primary ESP identifier for Z-to-A direction
  - removal of destination_address and source_address parameters within the MEP and MIP
    - those parameters are used to reach the MEP or MIP
  - removal of processes generating destination_address/source_address parameters
  - target MP (MEP or MIP) address for loopback message (LBM) carried inside LBM PDU
    - there is no need to carry the instance_identifier (aka esp-vid) of the return ESP in the LBM
  - destination MEP address for loopback reply (LBR) carried inside LBR PDU
    - required for the case of point-to-multipoint loopback test from a leaf

PBB/PBB-TE Frame Formats

Addresses and Identifiers only depicted

- PBB/PBB-TE I-LAN frame format
- PBB B-LAN frame format
- single domain PBB-TE frame format
  - T-MAC-Address-and-TYPE-field compression format
- generic PBB-TE B-LAN frame format





PBB Compatibility Questions

Can the PBB-TE T-Tag and T1-Tag functions be provided by the PBB B-Tag?

- Compliance with self descriptiveness of Ethernet frames

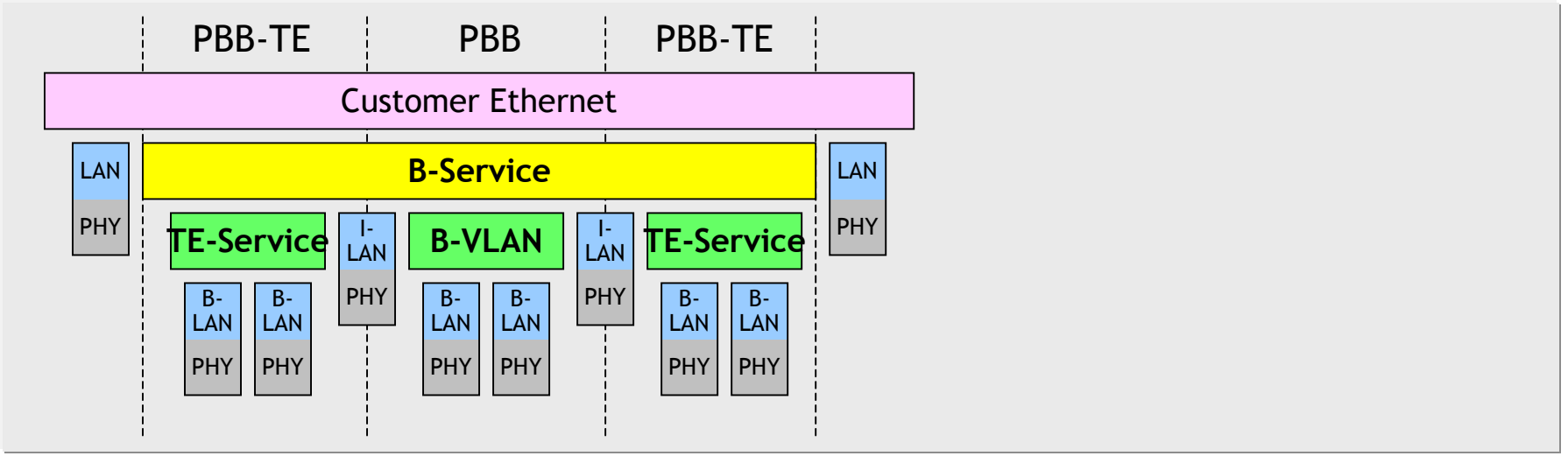
Is the benefit of the “T-MAC Address/Type field compressed PBB-TE B-LAN frame format” higher than the additional complexity introduced by it?

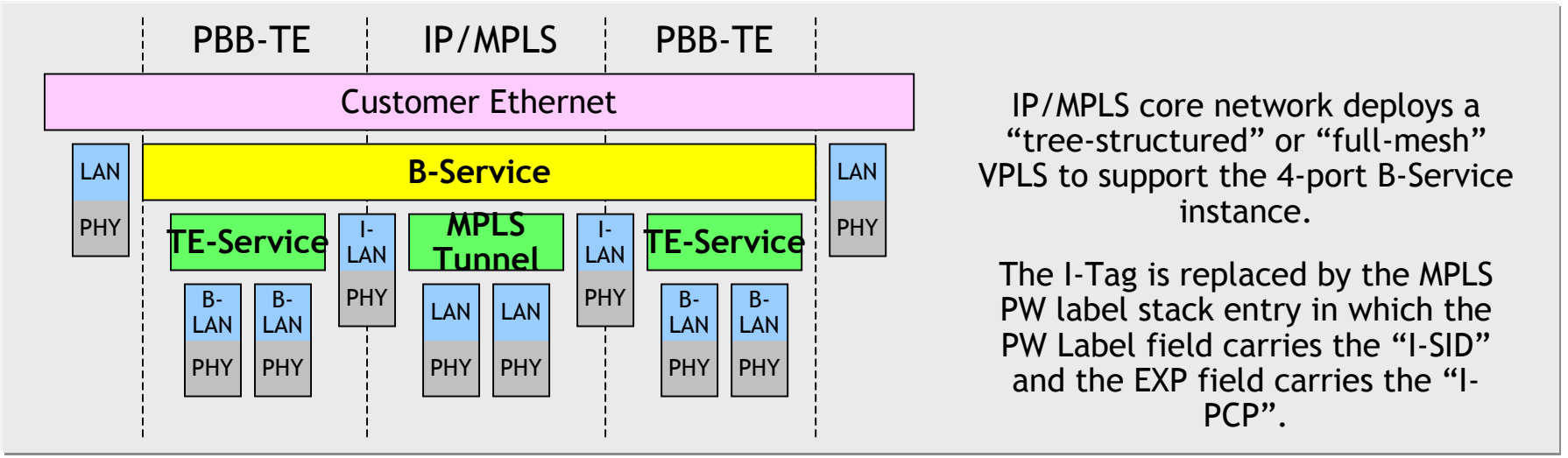
- Importance of 14 byte saving

Can te_service_instance_identifier parameter be replaced by the set of destination_address, source_address and vlan_identifier parameters?

Backup

Layer Stacks for PBB-TE Aggregation Networks interconnected via PBB or IP/MPLS Core Networks

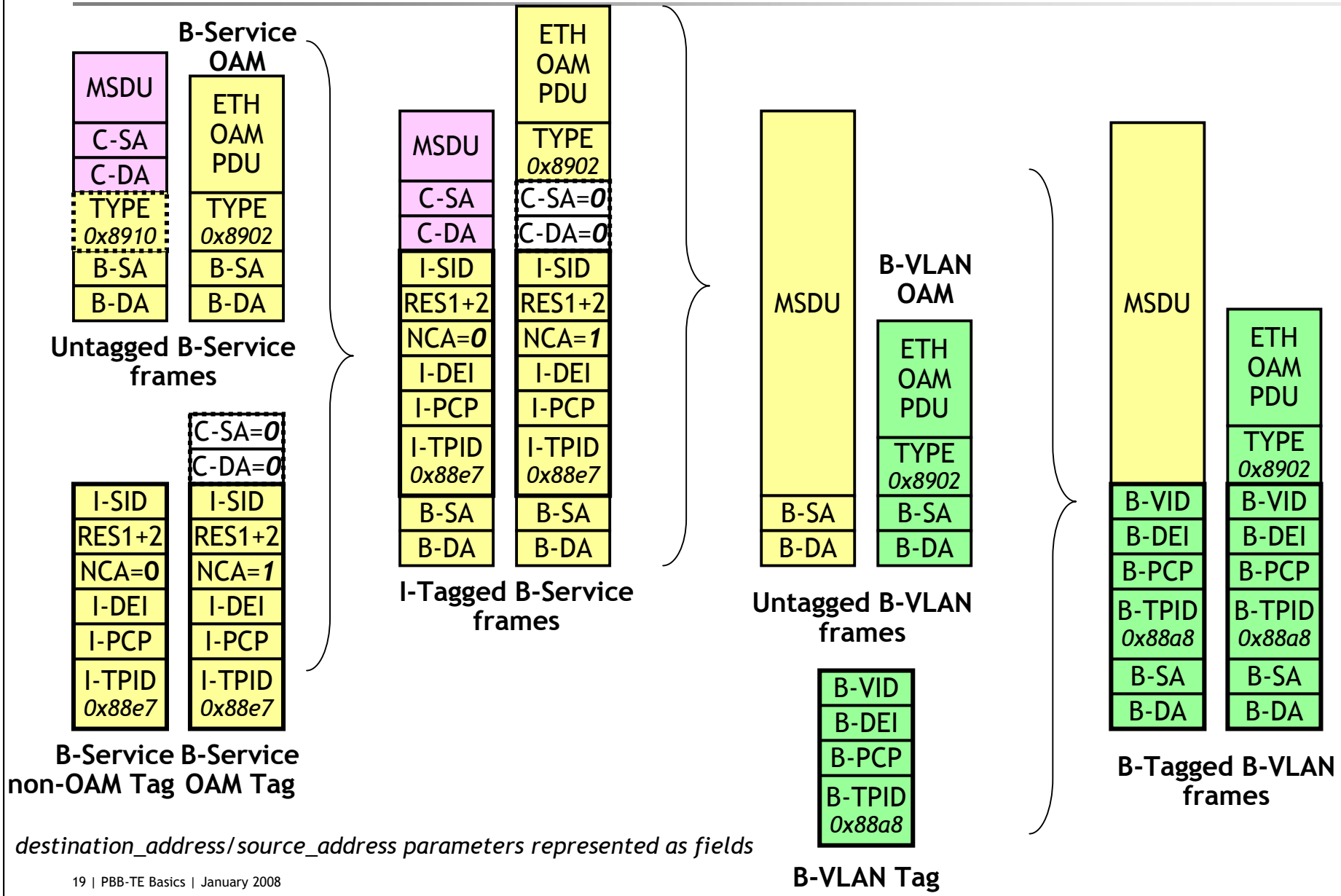




IP/MPLS core network deploys a "tree-structured" or "full-mesh" VPLS to support the 4-port B-Service instance.

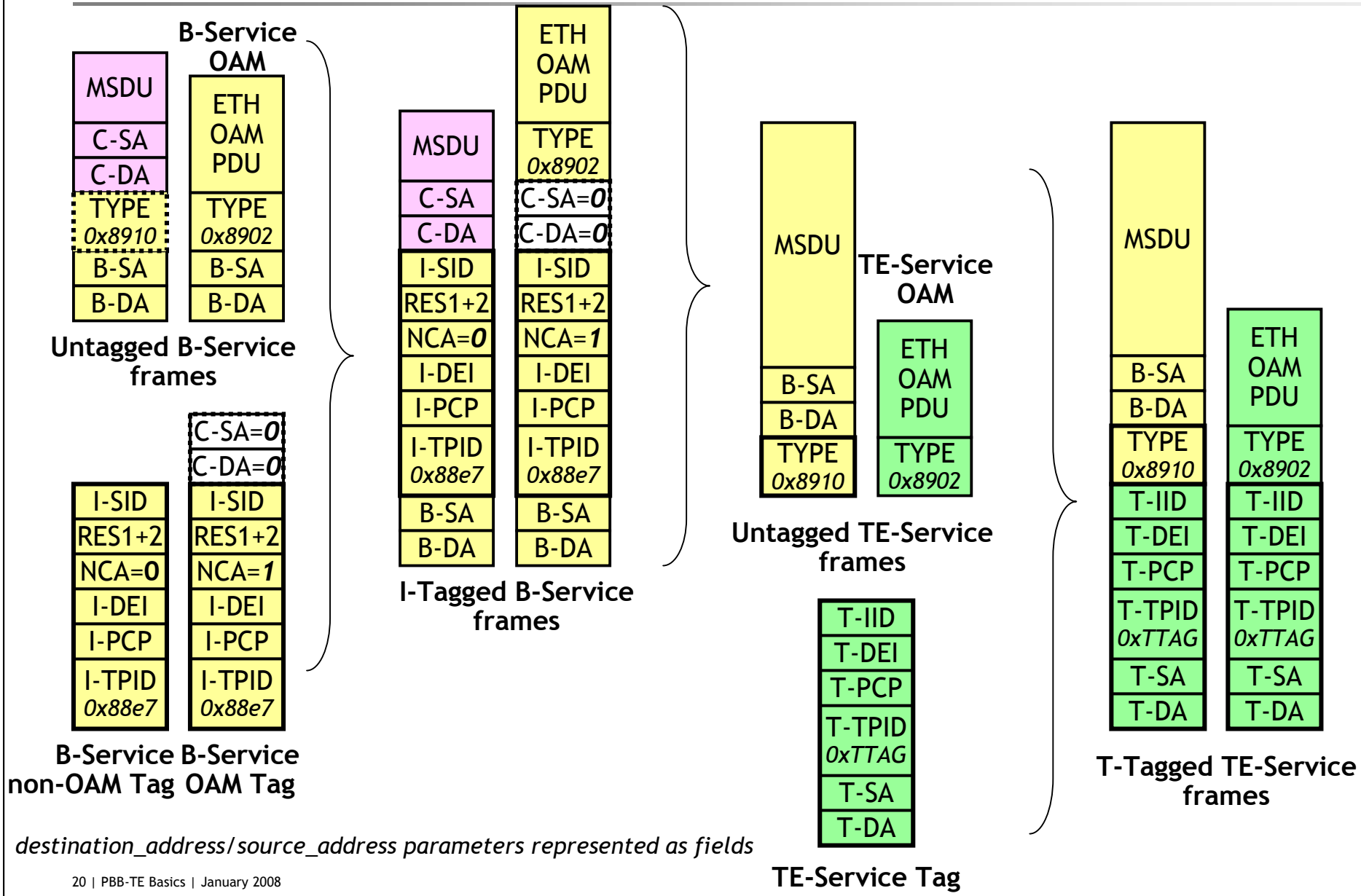
The I-Tag is replaced by the MPLS PW label stack entry in which the PW Label field carries the "I-SID" and the EXP field carries the "I-PCP".

Frames for “B-Service over B-VLAN”



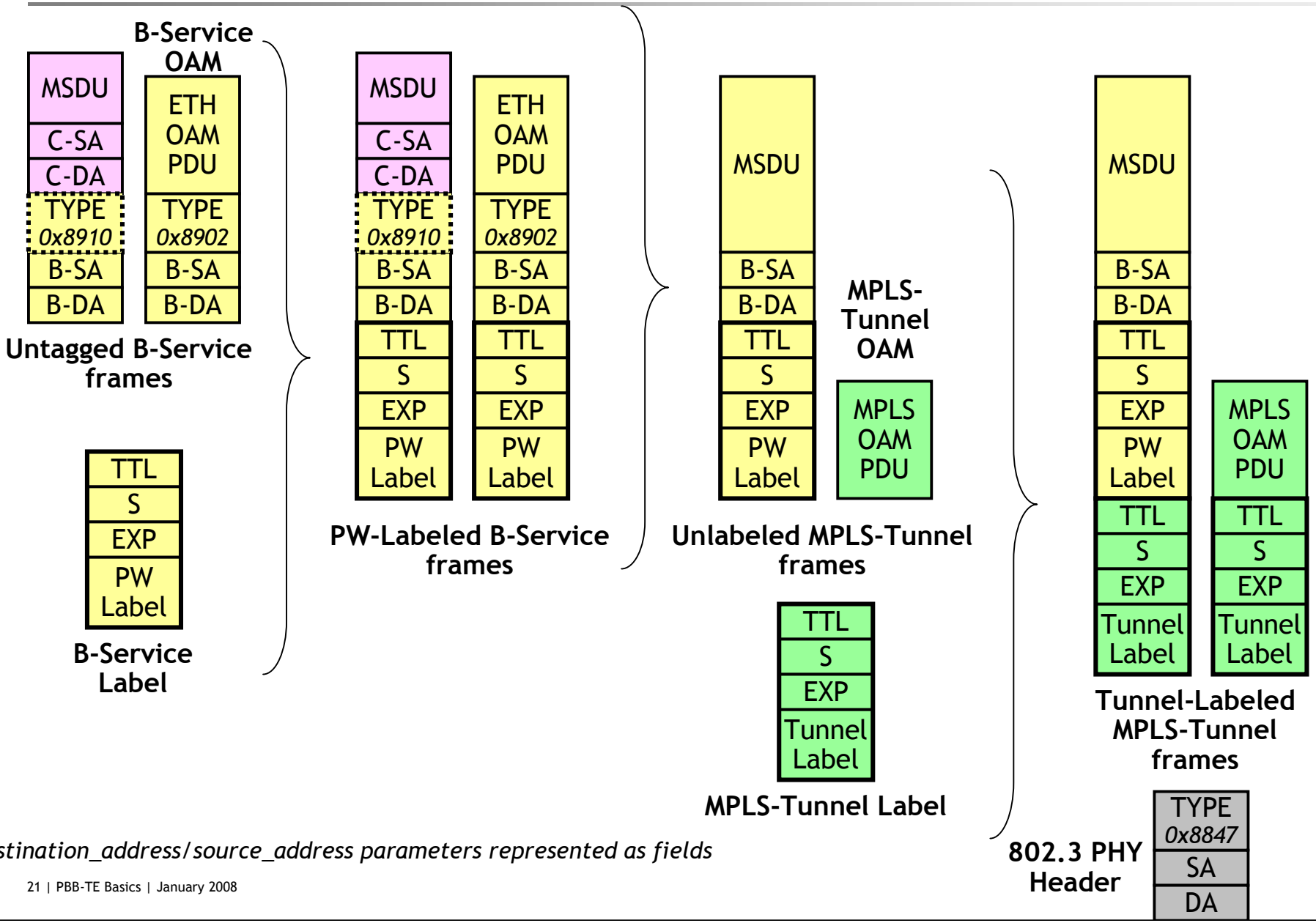
destination_address/source_address parameters represented as fields

Frames for “B-Service over TE-Service”



destination_address/source_address parameters represented as fields

Frames for “B-Service over MPS-Tunnel”



destination_address/source_address parameters represented as fields