

CFM in PBB-TE

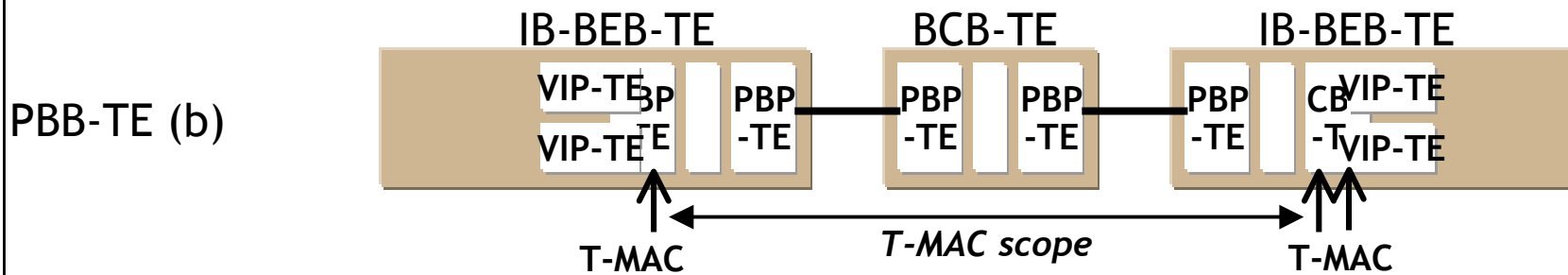
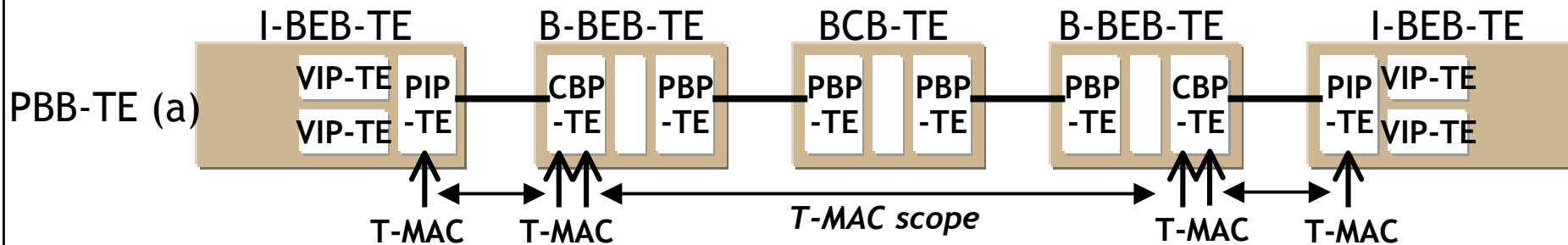
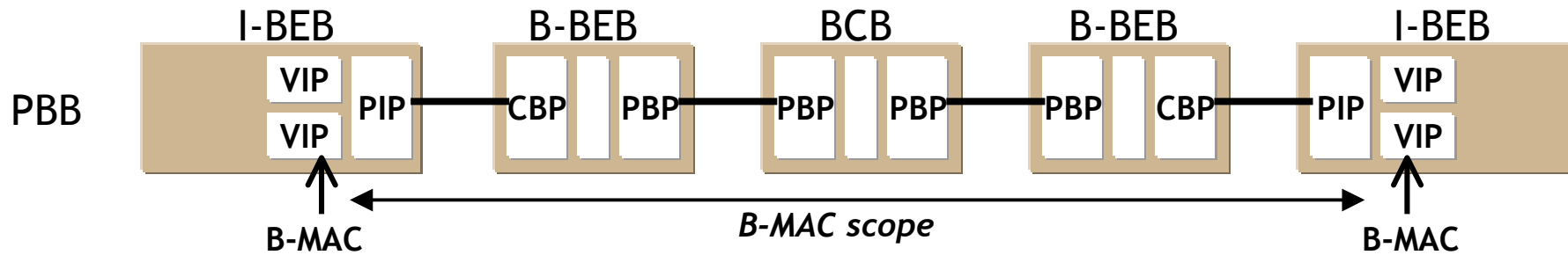
Maarten Vissers
March 2007

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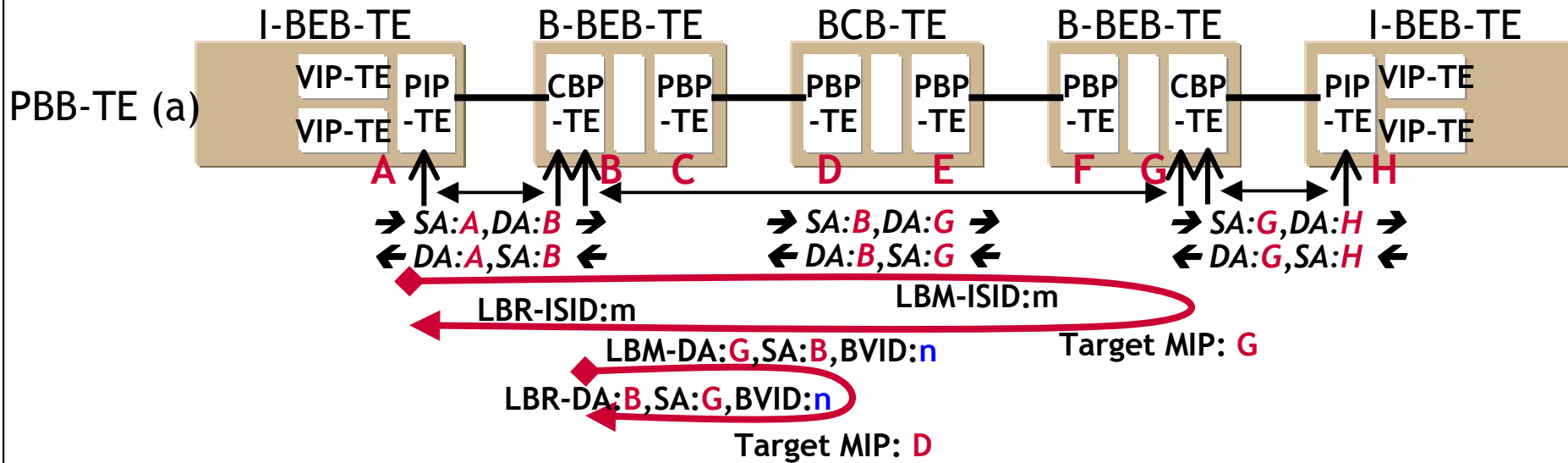
MAC address scope in PBB and PBB-TE



PBB-TE CFM extensions and modifications

- ❑ Inclusion of frame loss measurement fields in the CCM (as per Y.1731 and G.8021)
- ❑ Addition of on-demand LMM/LMR OAM PDUs (based on Y.1731 and G.8021)
- ❑ Addition of on-demand DMM/DMR OAM PDUs (based on Y.1731 and G.8021)
- ❑ Addition of APS OAM PDU (based on Y.1731, G.8021 and G.8031)
- ❑ Addition of AIS OAM PDU (based on Y.1731 and G.8021)
 - Upgrade Provider Backbone Ports (PBP) to support the generation of PBB-TE AIS on a per PBB-TE trunk instance
 - PBP ports in B-BEB and BCB nodes must be able to store the PBB-TE trunk instance identifying triple <B-VID,T-DA,T-SA> for every active PBB-TE trunk instance passing through the PBP
- ❑ Modify the LBM/LBR OAM PDU frame format defined in 802.1ag/Y.1731 to support loopback in PBB-TE MIPs
 - T-DA fields in B-LAN frames can not be used to carry the PBB-TE trunk MIP address
 - There is no DA field present in PBB-TE service instance to carry PBB-TE service MIP address
 - Additional Target MEP/MIP address field to be added into LBM OAM PDU frame
- ❑ Modify the “EISS Multiplex Entity” function operation such that every triple <vlan_identifier,destination_address,source_address> is assigned to some “multiplexed SAP” associated with PBB-TE trunk instances

PBB-TE LBM frame (PBB-TE Service and Trunk Instances)

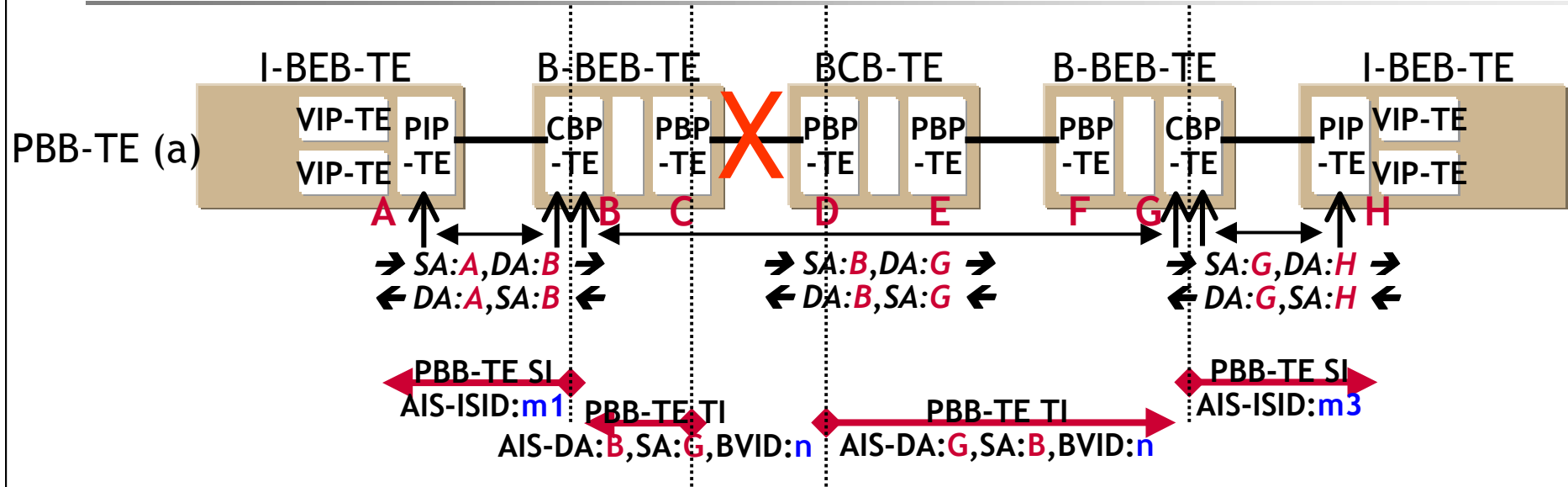


0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
TYPE (CFM)																MDL			Version				OpCode								
Flags								TLV Offset								Transaction ID/Sequence Number															
Transaction ID/Sequence Number																Target MEP/MIP MAC address															
Target MEP/MIP MAC address																															
Source MEP MAC address																															
Source MEP MAC address																optional TLVs start here															
End TLV																															

Additional source identifier field

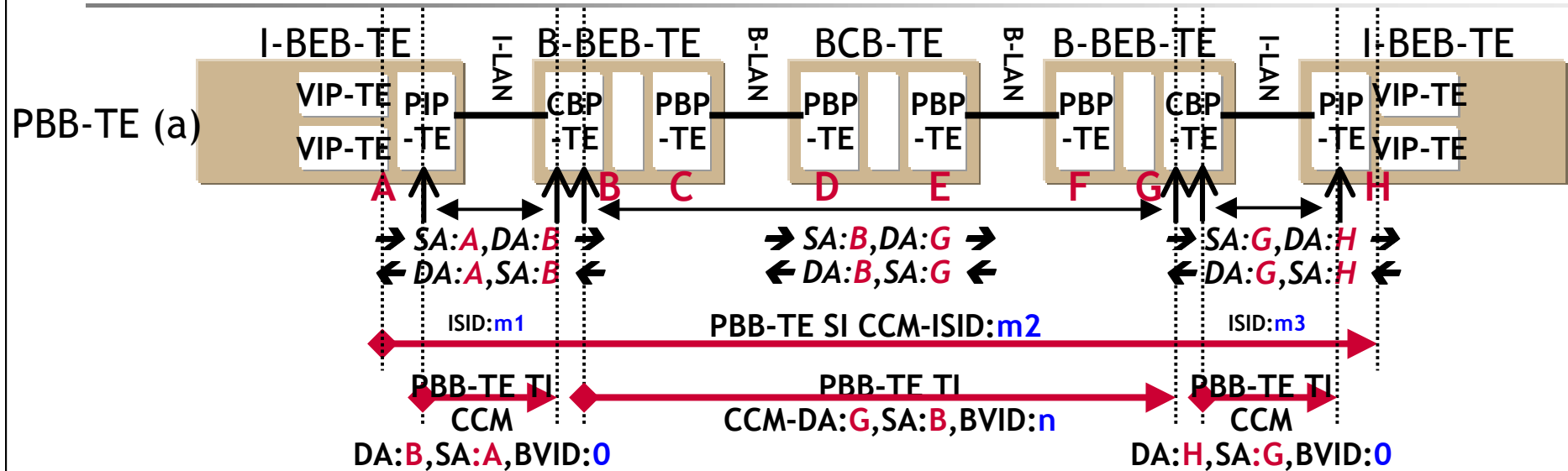
Additional MIP (or MEP) identifier field

AIS frame (PBB-TE Service and Trunk Instances)



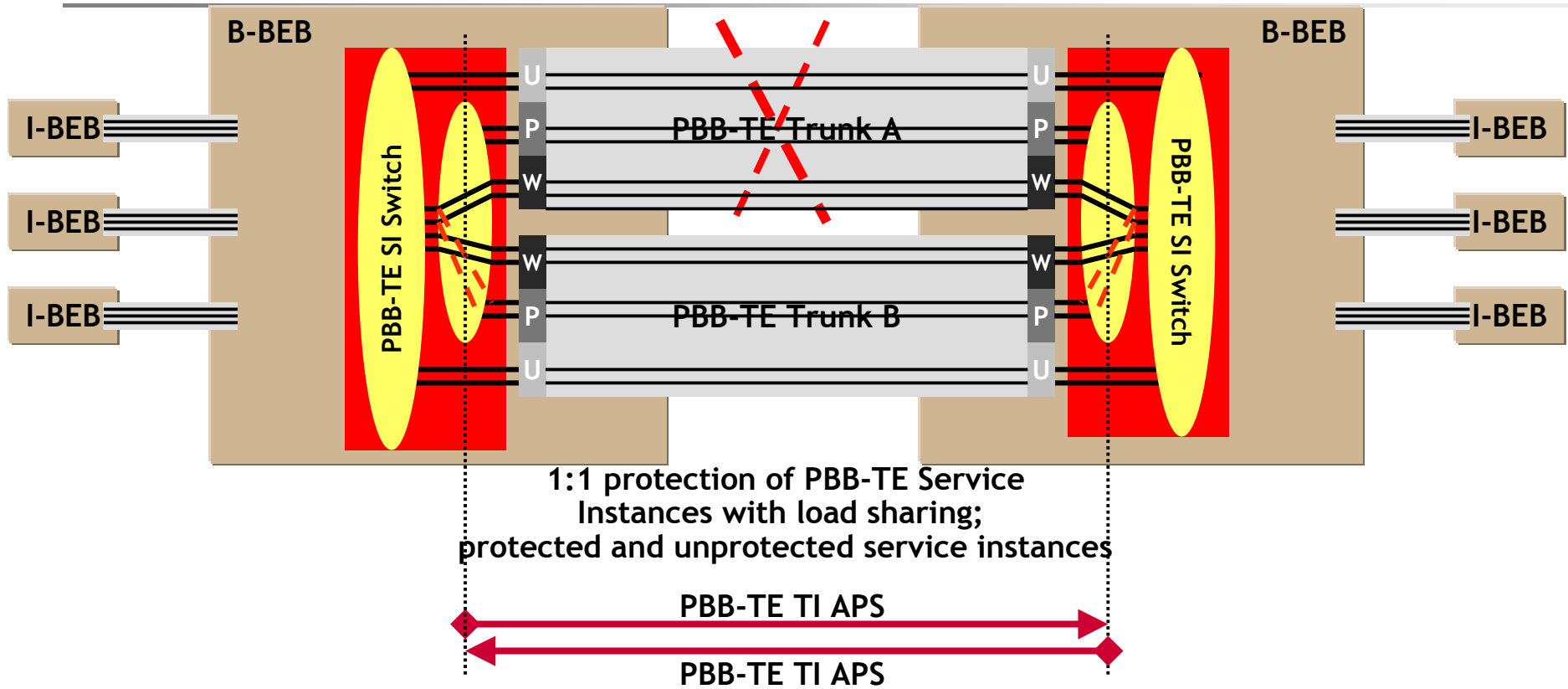
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TYPE (CFM)																MDL			Version			OpCode (AIS)									
Flags								TLV Offset								End TLV															

CCM frame with frame loss measurement fields



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
TYPE (CFM)																MDL			Version				OpCode (CCM)								
Flags								TLV Offset								Sequence Number															
Sequence Number																MEP ID															
MAID (48 octets)																															
TxFCf																															
RxFCb																															
TxFCb																															
Reserved																															
End TLV																															

APS frame



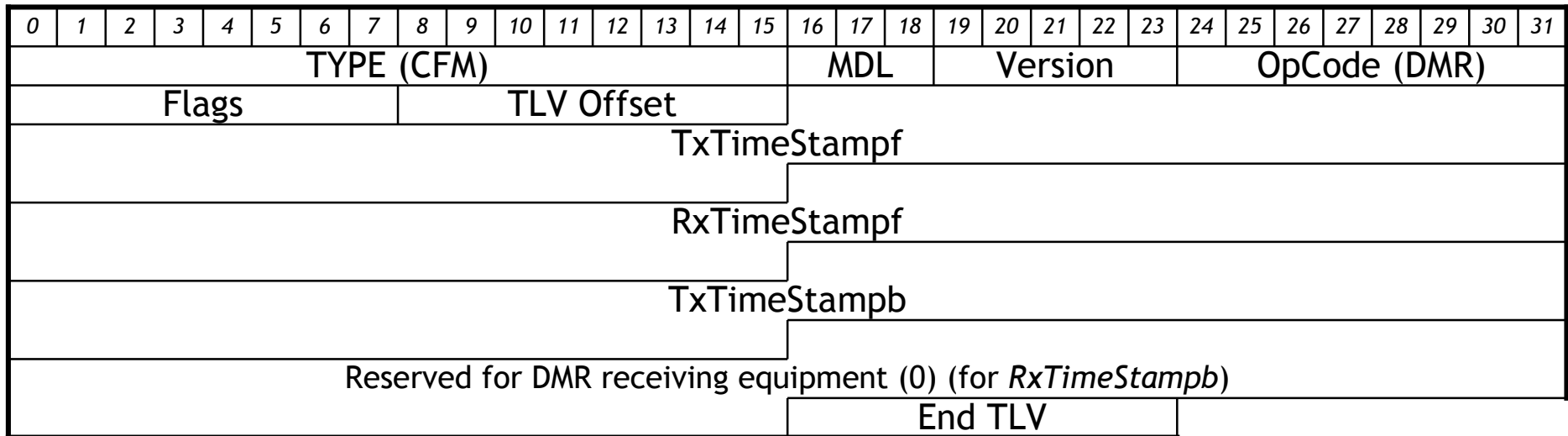
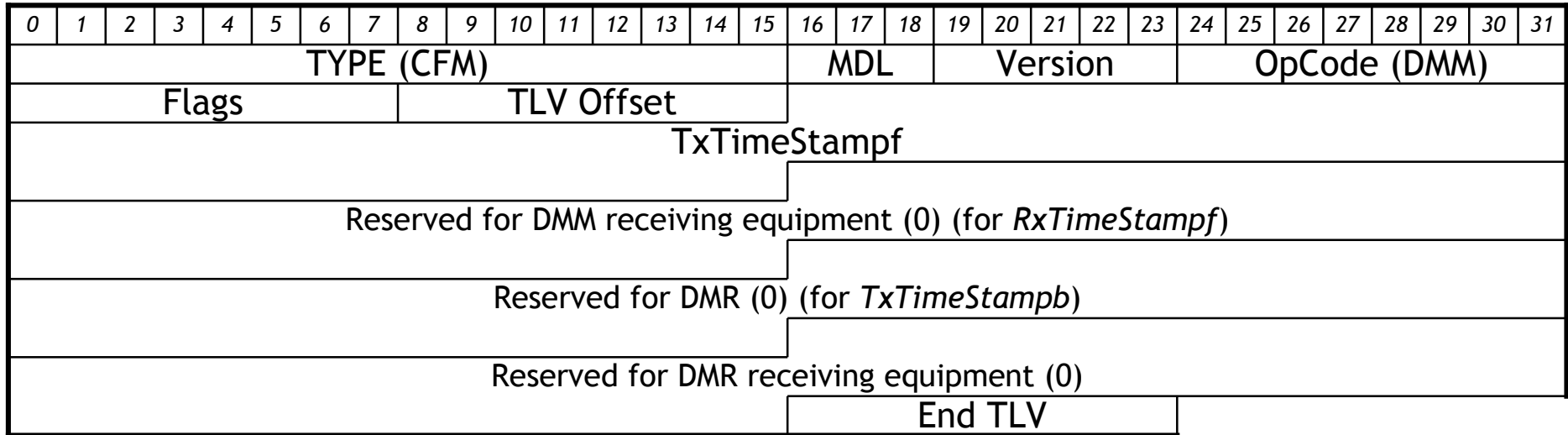
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
TYPE (CFM)																MDL			Version			OpCode (APS)									
Flags					TLV Offset						Request/State			Protection Type			Requested Signal														
Bridged Signal					Reserved (0)						End TLV																				

LMM and LMR frames

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
TYPE (CFM)																MDL			Version				OpCode (LMM)								
Flags								TLV Offset								TxFCf															
TxFCf																Reserved for RxFCb in LMR															
Reserved for RxFCb in LMR																Reserved for TxFCb in LMR															
Reserved for TxFCb in LMR																End TLV															

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
TYPE (CFM)																MDL			Version				OpCode (LMR)								
Flags								TLV Offset								TxFCf															
TxFCf																RxFCb															
RxFCb																TxFCb															
TxFCb																End TLV															

DMM and DMR frames



PBB-TE Trunk Instance EISS Multiplex Entity

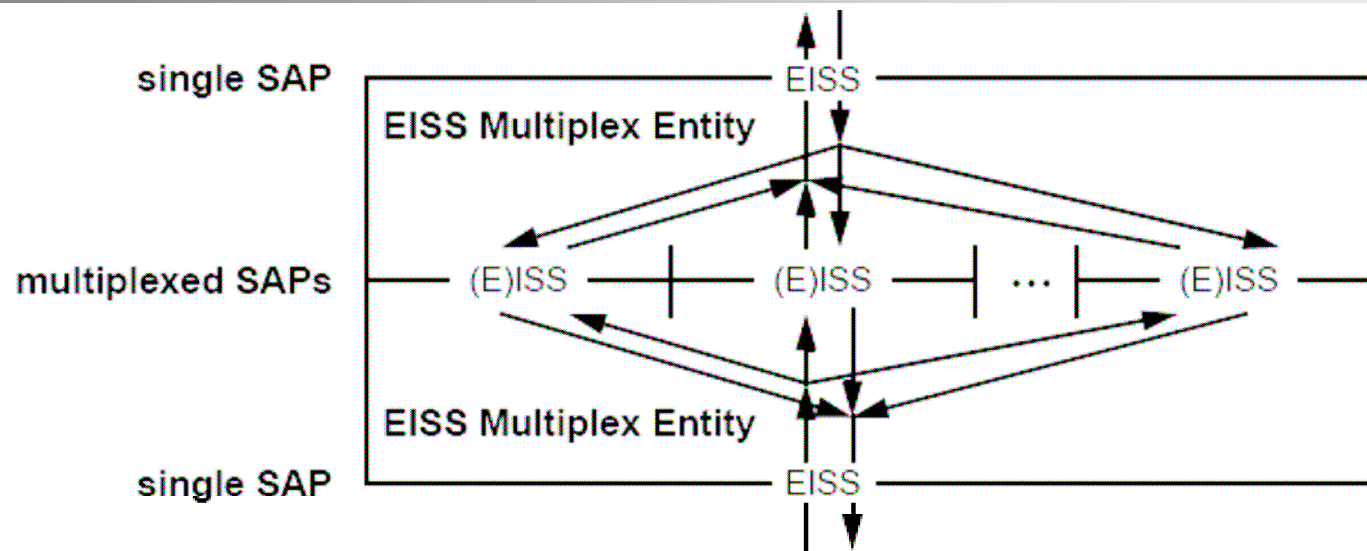


Figure 6-3—Two back-to-back EISS Multiplex Entities

<vlan_identifier,destination_address,source_address> triple

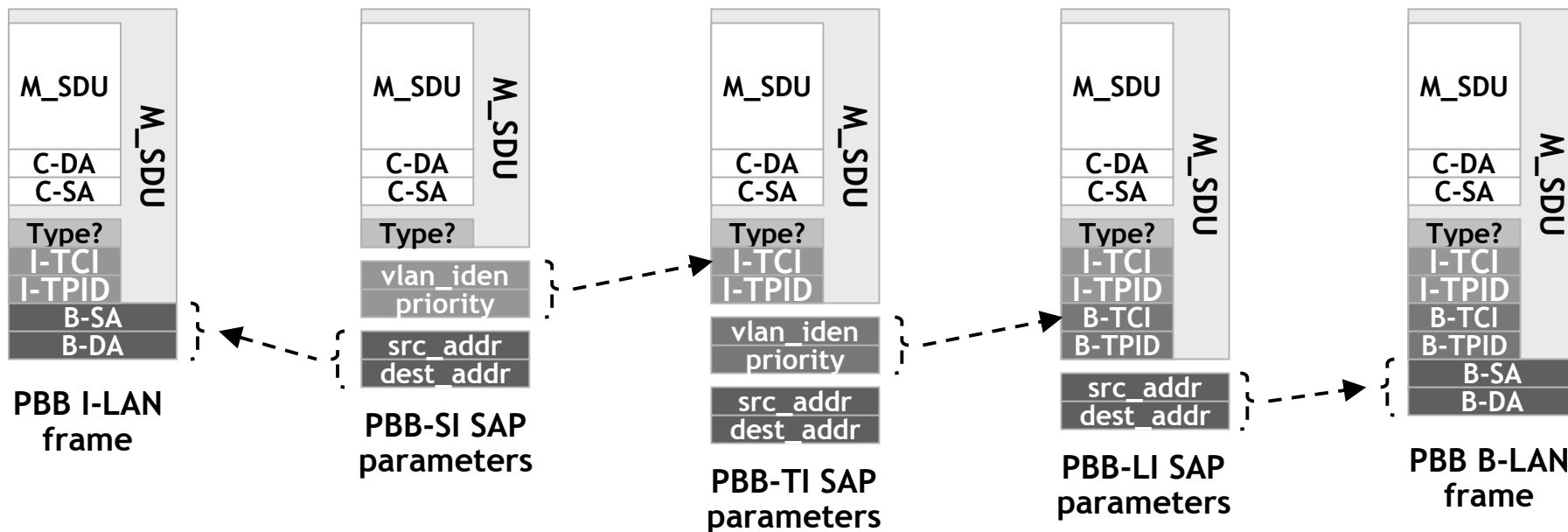
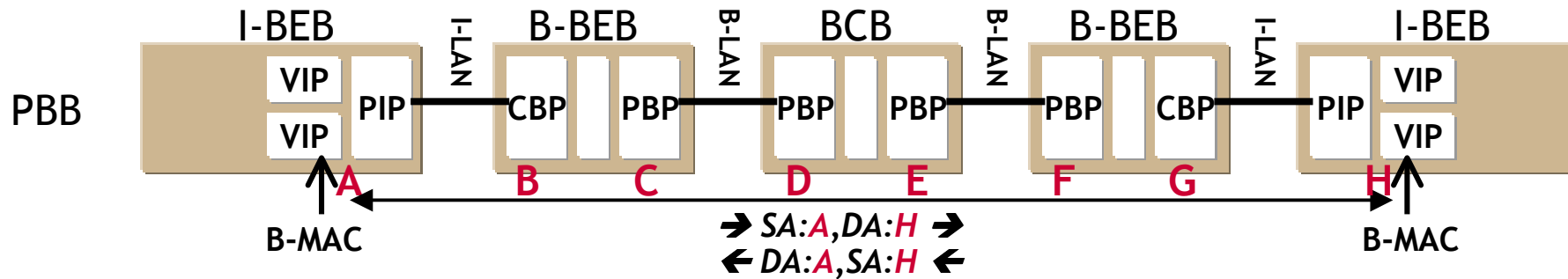
An EISS Multiplex Entity has one EISS SAP, and a number of multiplexed SAPs, each either an ISS SAP or an EISS SAP. Each multiplexed ISS SAP is assigned to a single vlan_identifier value. Each multiplexed EISS SAP is assigned to one or more vlan_identifier values. Every vlan_identifier is assigned to some multiplexed SAP. Upon receiving a Request or Indication from its single EISS SAP, the EISS Multiplex Entity uses the vlan_identifier and canonical_format_indicator to select the corresponding one of its multiplexed SAPs to present the Request or Indication. Similarly, any Request or Indication received from a multiplexed SAP is presented to the single EISS SAP; the vlan_identifier and canonical_format_indicator parameters presented on the single EISS SAP are the ones associated with the multiplexed ISS SAP, or the ones obtained from the multiplexed EISS SAP.

PBB-TE interoperability with PBB and T-MPLS

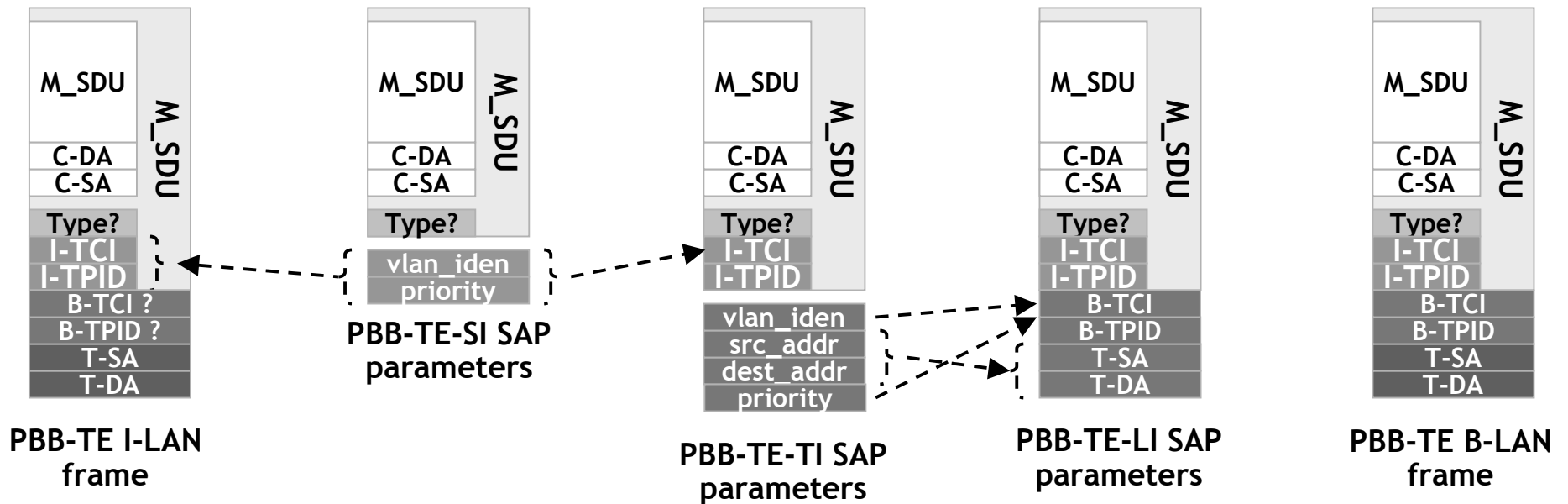
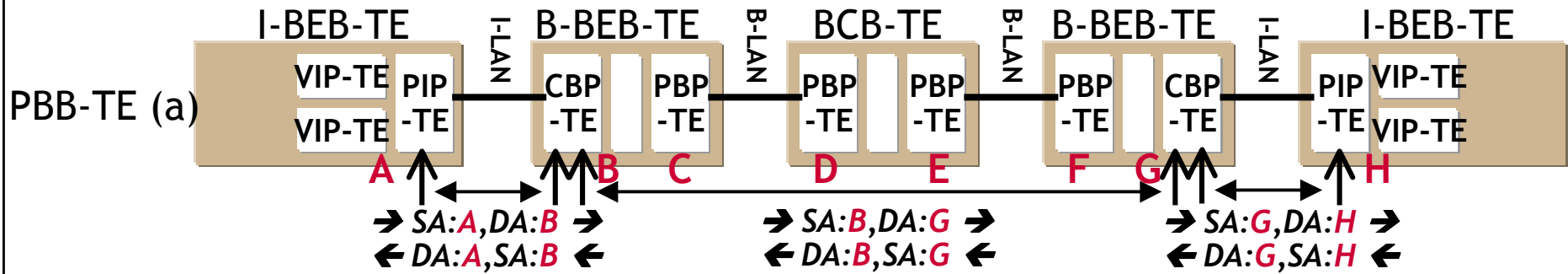
- ❑ Operators are minimizing the number of layers in their networks
 - packet transport network can be build with one service instance and one trunk instance layer
- ❑ PBB-TE nodes will be added in a network containing already PBB and T-MPLS nodes/networks
- ❑ T-MPLS is able to peer with PBB via stateless “service interworking”
 - keeping number of layers in the network unchanged (no proliferation of layers)
 - creating hybrid “T-MPLS PW ⇔ PBB Service Instance” connections (p2p, p2mp)
 - continuing PBB Service Instances (mp2mp, rooted mp) in T-MPLS
 - PBB Service Instance identified by PW label in T-MPLS network (instead of I-Tag)
- ❑ PBB-TE should not introduce additional layers in the network
 - keeping number of layers in the network unchanged (no proliferation of layers)
- ❑ PBB-TE should be able to peer with PBB and T-MPLS via “service interworking”
 - creating hybrid “T-MPLS PW ⇔ PBB-TE Service Instance” connections (p2p)
 - creating hybrid “PBB Service Instance ⇔ PBB-TE Service Instance” connections (p2p)
 - PBB-TE OAM should be common look and feel with PBB OAM and T-MPLS OAM

Additional material

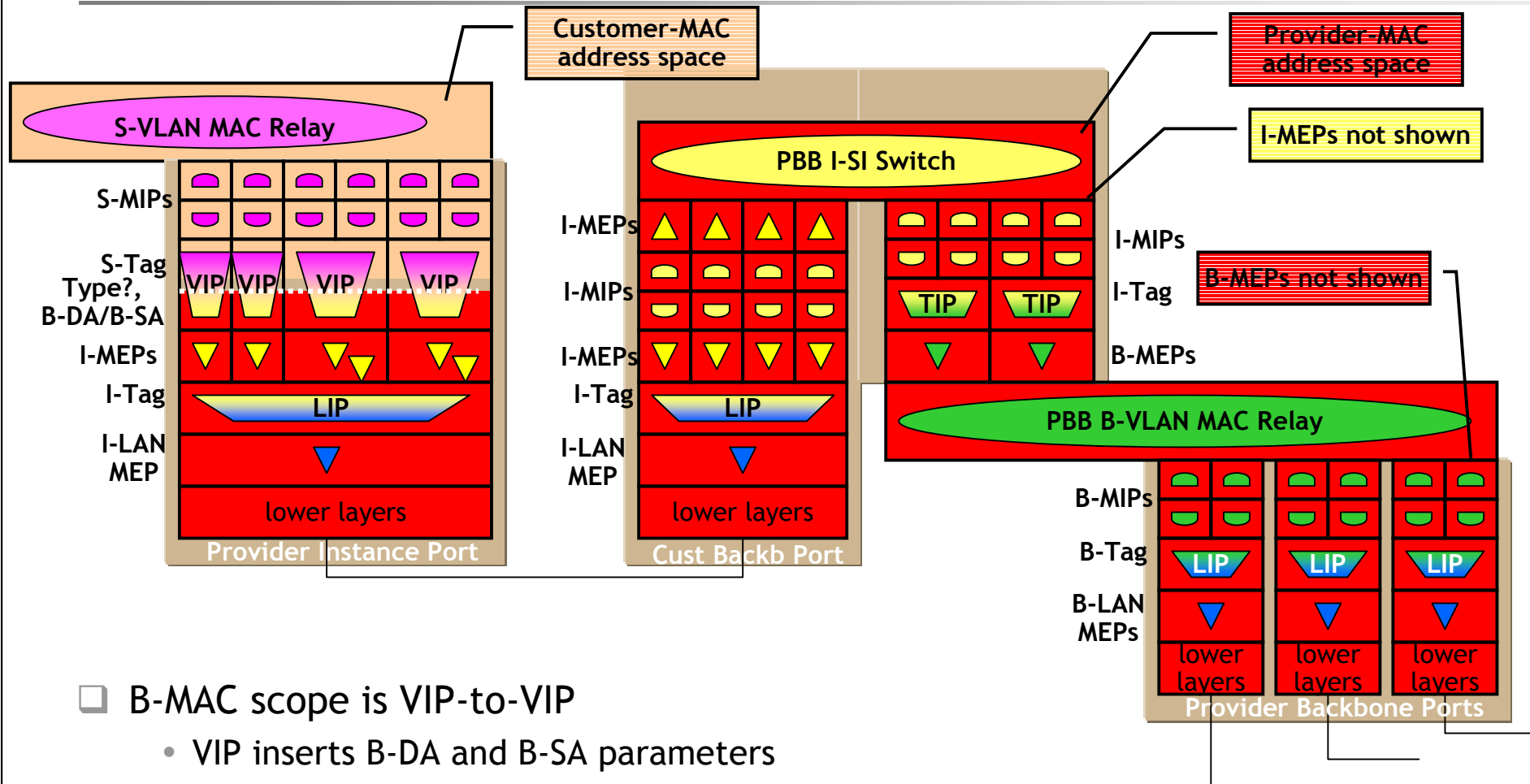
PBB SAP frames and parameters



PBB-TE (a) SAP frames and parameters

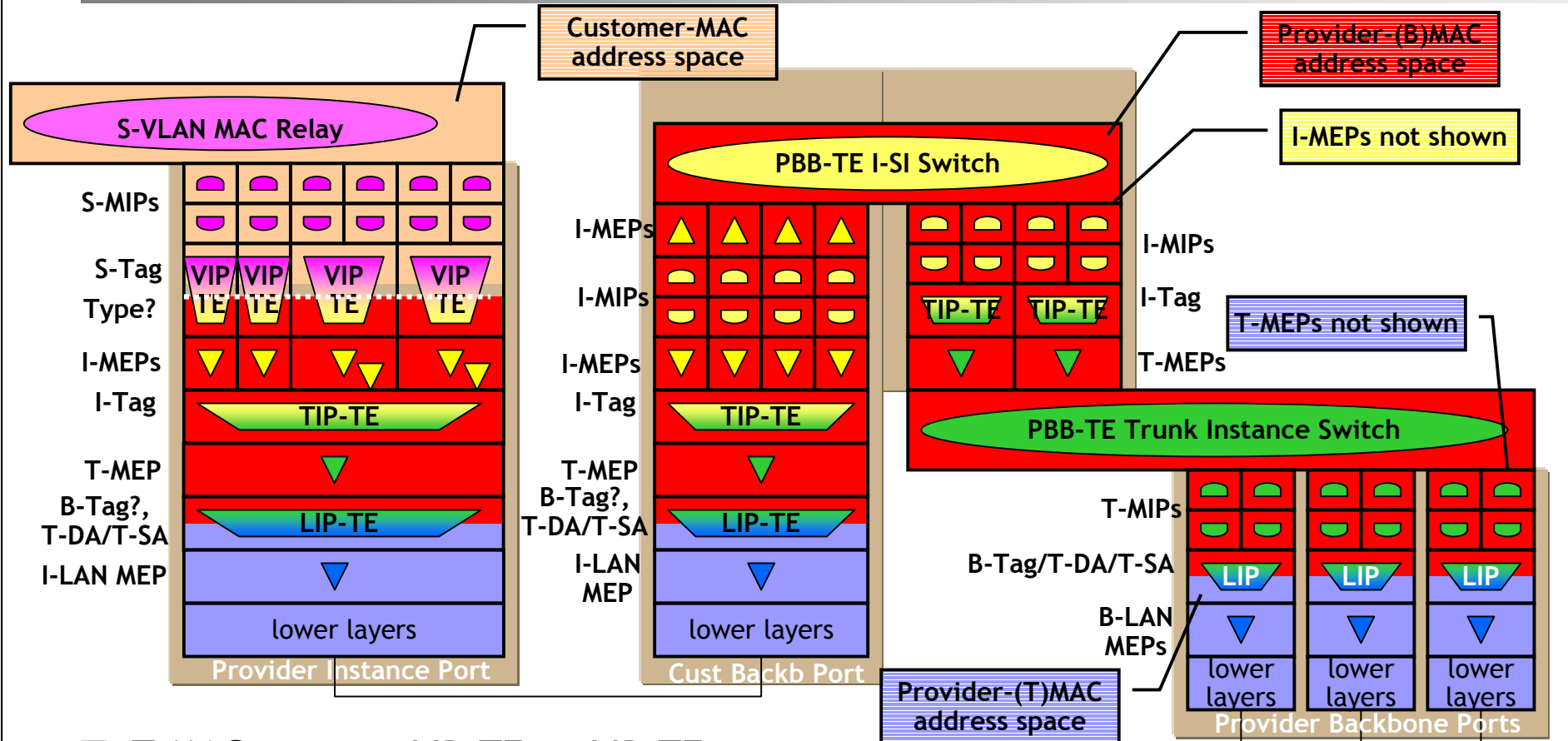


802.1ah PBB PIP, CBP and PBP on I- and B-Components



- ❑ B-MAC scope is VIP-to-VIP
 - VIP inserts B-DA and B-SA parameters

PBB-TE PIP, CBP and PBP on I- and B-Components



- ❑ T-MAC scope is LIP-TE-to-LIP-TE
 - connection_identifier scope is TIP-TE-to-TIP-TE
 - connection_identifier represents <B-VID,T-DA,T-SA> triple
- ❑ B-VID/T-DA/T-SA translation not supported
 - keeps T-DA/T-SA values fixed between two TIP-TE functions

VIP: Virtual Instance Port
 TIP: Trunk Instance Port
 LIP: Link Instance Port

ITU-T Recommendations free downloads

- ❑ General: <http://www.itu.int/rec/T-REC/e>
- ❑ G-series: <http://www.itu.int/rec/T-REC-G/en>
 - G.8010: <http://www.itu.int/rec/T-REC-G/recommendation.asp?lang=en&parent=T-REC-G.8010>
 - G.8012: <http://www.itu.int/rec/T-REC-G/recommendation.asp?lang=en&parent=T-REC-G.8012>
 - G.8021: <http://www.itu.int/rec/T-REC-G/recommendation.asp?lang=en&parent=T-REC-G.8021>
 - G.8031: <http://www.itu.int/rec/T-REC-G/recommendation.asp?lang=en&parent=T-REC-G.8031>
 - G.8021 amendment (OAM processing): under development
 - G.8032: under development
 - G.eot-mgmt: under development
- ❑ Y-series: <http://www.itu.int/rec/T-REC-Y/en>
 - Y.1730: <http://www.itu.int/rec/T-REC-Y.1730/en>
 - Y.1731: <http://www.itu.int/rec/T-REC-Y.1731/en>