PBB-TE ESP
1:1 Protection Switching

David W. Martin
Nortel Networks
v03

IEEE 802.1
September 4-7, 2007
Stockholm

Agenda

- Recap From July Plenary
- Simple PBB-TE ESP 1:1 Protection
- Mapping To PBB-TE CBP Model

Recap From July Plenary

- **Two protection switching presentations:**
  - **ay-martin-protection-0707**
    - **general overview of 1:1 protection and G.8031**
  - **ay-zehavit-scope-and-protection-0707**
    - **1:1 protection using CCMs with RDI flag**
- **Discussion items:**
  - **Are both directions of a protected ESP co-routed?**
  - **Is protection uni-directional or bi-directional?**
  - **Is revertive or non-revertive mode used?**
  - **Should the G.8031 1:1 APS protocol be leveraged?**
  - **Are operator requests supported?**

Recap From July Plenary

- In general there appeared to be support for a simple single phase 1:1 protection approach
- The following slides pursue that direction

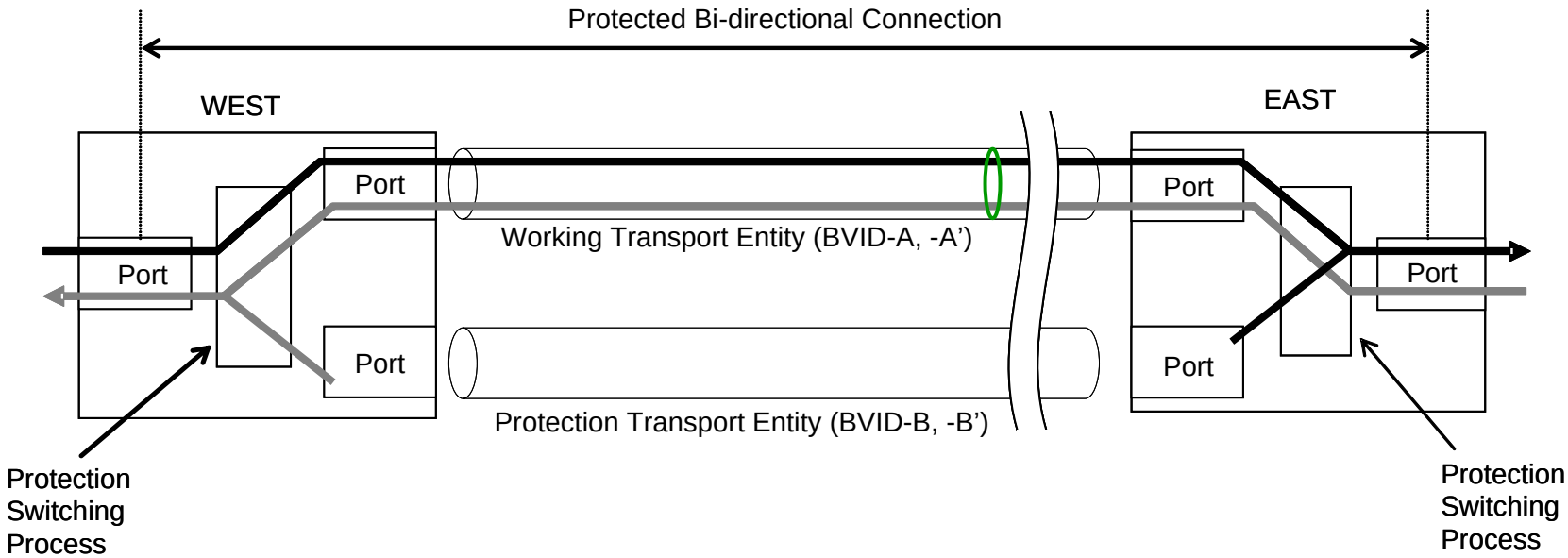
Simple PBB-TE ESP 1:1 Protection

- Requirements assumptions
- Switching example walkthrough
  - Normal state
  - Transition during fault
  - Protected state
- Checklist

Requirements Assumptions

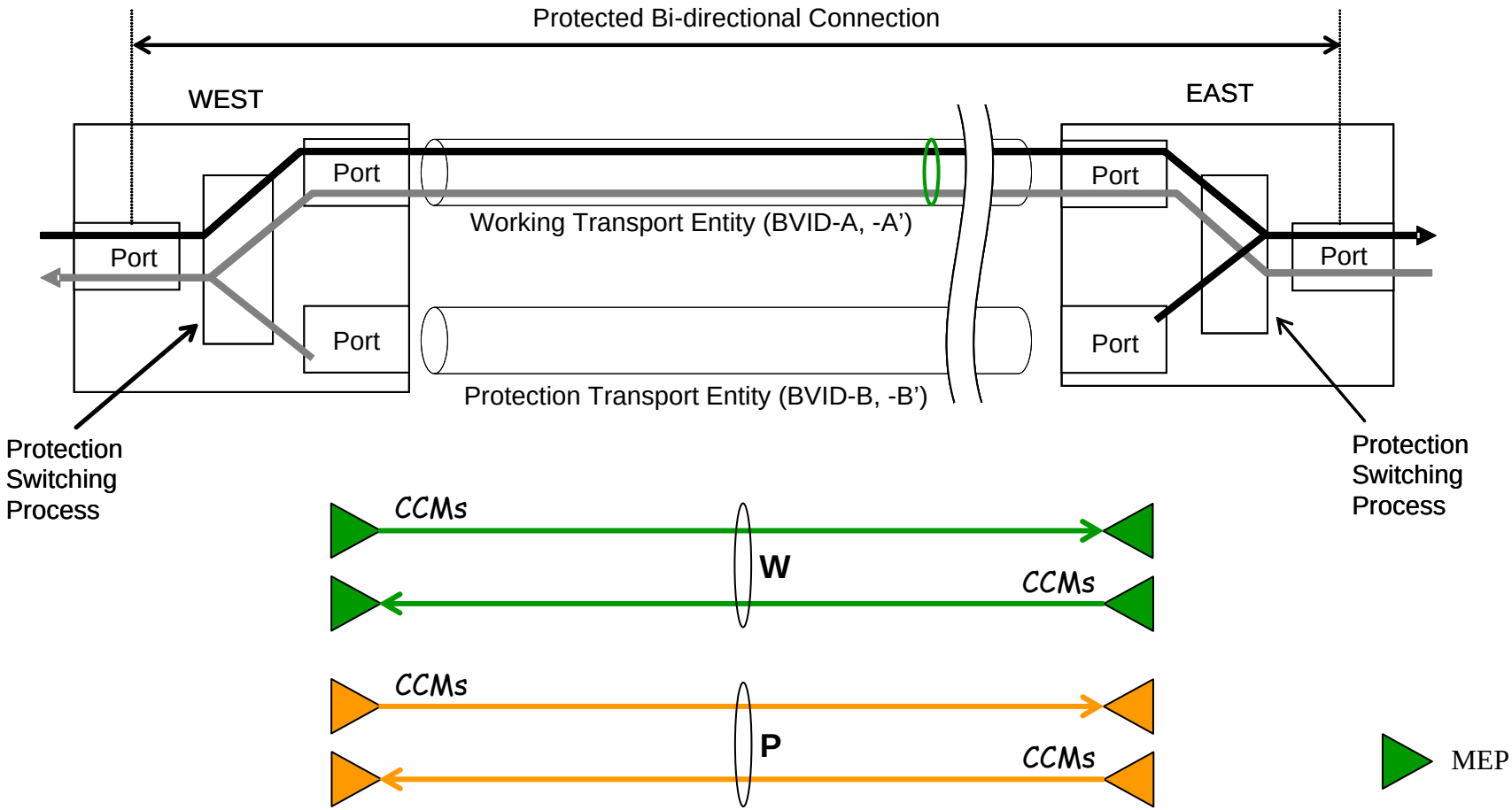
- The protected domain extent is CBP-CBP
- A uni-directional ESP is identified by <DA, SA, B-VID>
- A trunk is a pair of uni-directional ESPs
- Bi-directional switching
  - Helps avoid operations errors
- Revertive or Non-revertive mode
  - Operational preference
- Lightweight APS protocol
  - Operator requests are handled by Management action rather than via protection signalling

1:1 Bi-Directional Mode: Normal

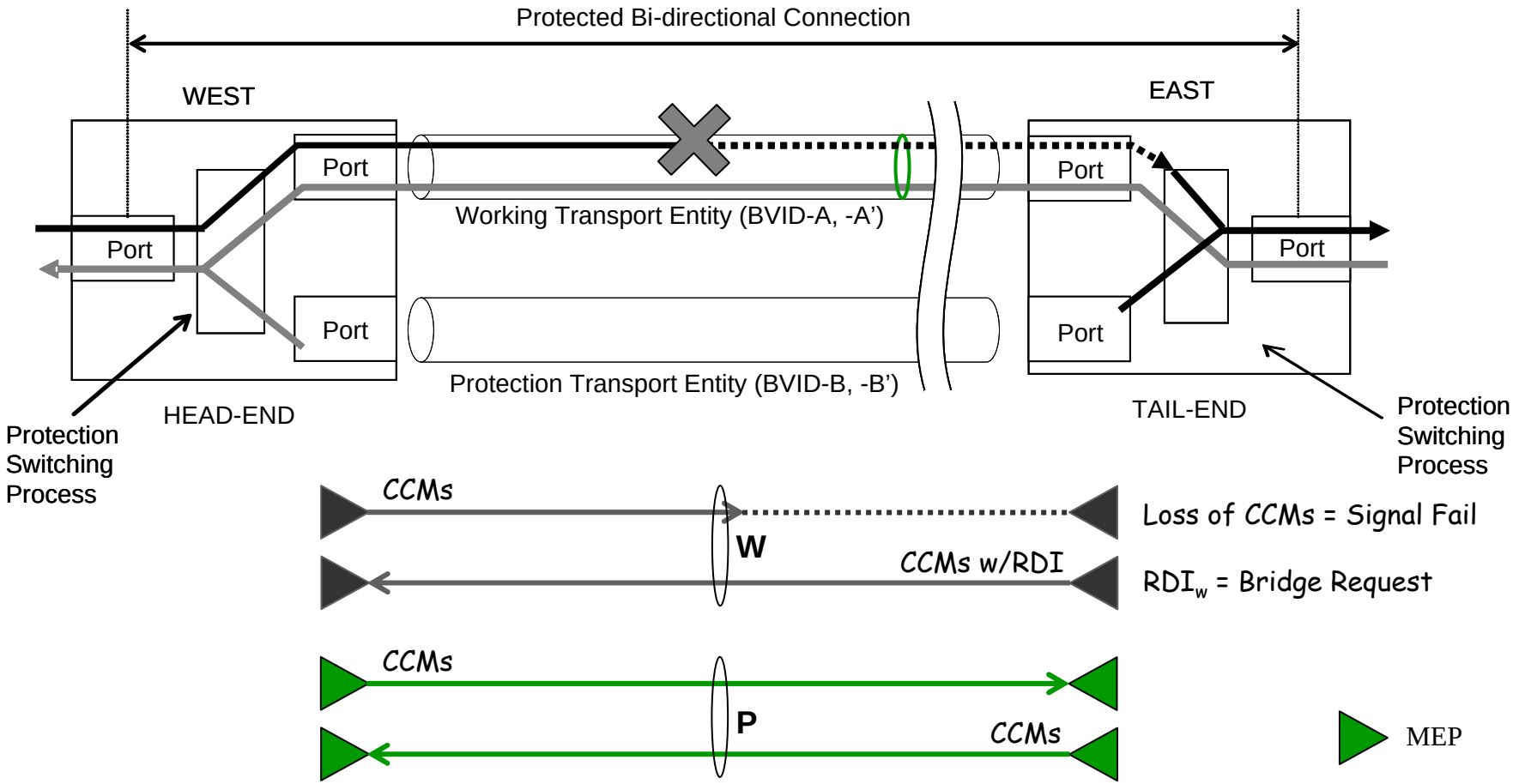


- **Note the use of a Merging Selector, where frames from both W and P are received (refer to G.870 c3.2.97.2)**

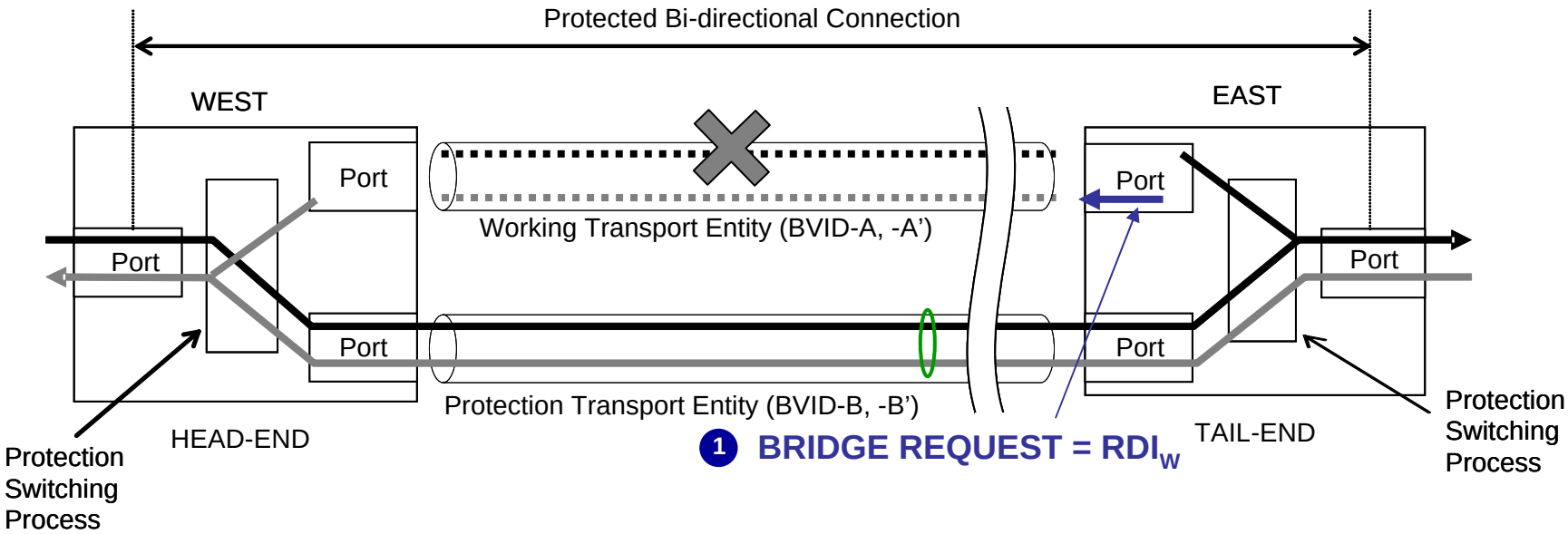
1:1 Bi-Directional Mode: Normal



Simplified Single Phase Protection

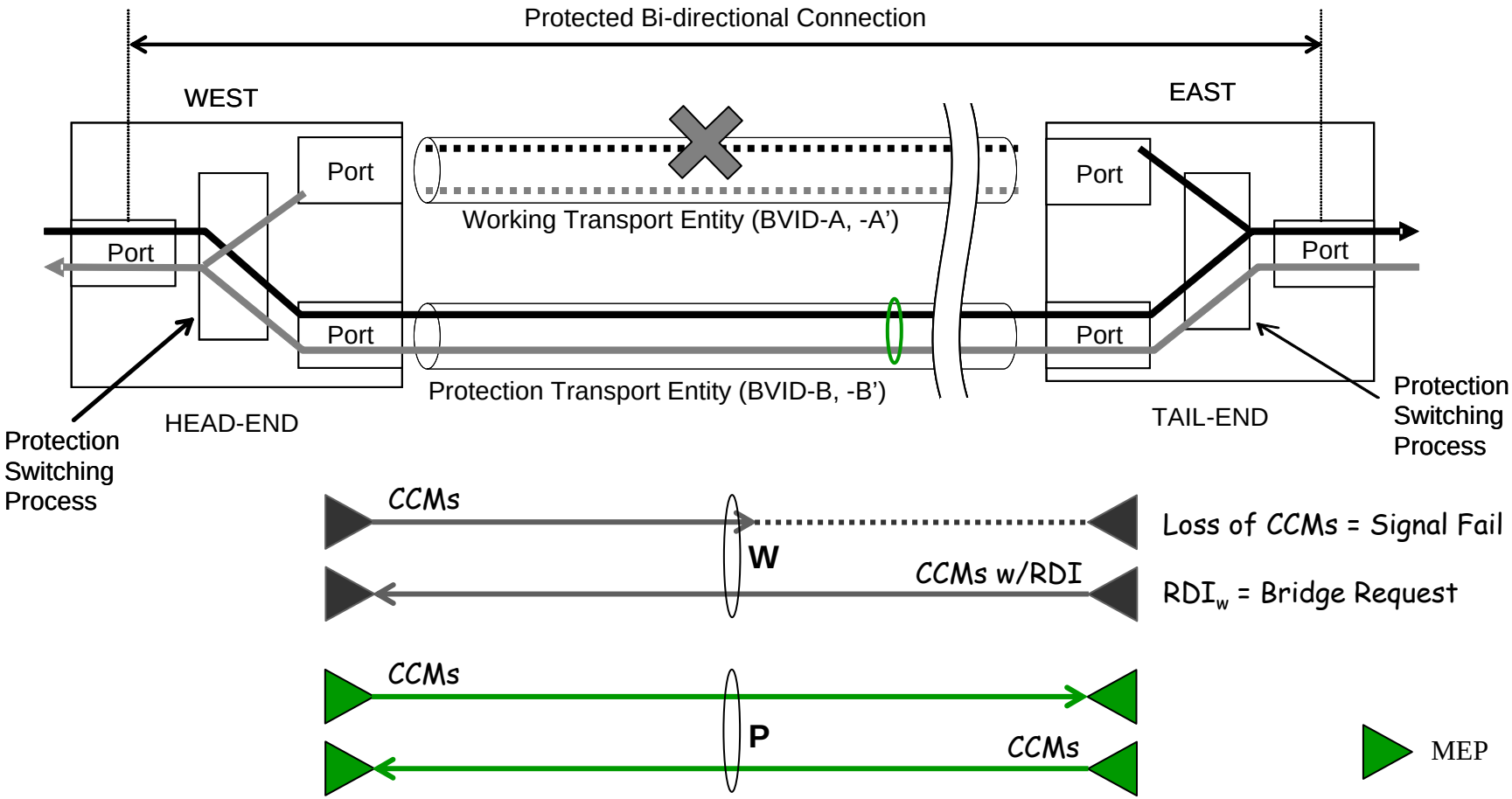


Simplified Single Phase Protection



- **Tail-end signals Bridge Request to head-end and operates its Selector Bridge (where frames are only transmitted on P - refer to G.870 c3.2.11.3).**
- **Head-end operates its Selector Bridge upon reception of Bridge Request**

1:1 Bi-Directional Mode: Protected



Protection Checklist

- Have the basic elements of a protection scheme been addressed?
  - ☑ Triggers (detect time): Loss of CCMs
  - ☑ Bridge mechanism: Selector bridge
  - ☑ Selector mechanism: Merging selector
  - ☑ Protection phases (completion time): Single
  - ☐ Signalling: RDI flag
- Is the signalling complete?
- Cross-check against a fully featured list…

Signalling Info Checklist

Request/State	~~1111~~	~~Lockout of Protection (LO)~~	~~Priority~~	→ N/A (operator requests via Mgmt)
	1110	Signal Fail for Protection (SF-P)	highest	→ RDI flag in CCMs on P
	~~1101~~	~~Forced Switch (FS)~~		→ N/A (operator requests via Mgmt)
	1011	Signal Fail for Working (SF)		→ RDI flag in CCMs on W
	~~1001~~	~~Signal Degrade (SD) (Note 1)~~		→ N/A
	~~0111~~	~~Manual Switch (MS)~~		→ N/A (operator requests via Mgmt)
	0101	Wait to Restore (WTR)		→ Could use local (hidden) timer
	~~0100~~	~~Exercise (EXER)~~		→ N/A (operator requests via Mgmt)
	~~0010~~	~~Reverse Request (RR)~~		→ N/A (always bi-directional mode)
	0001	Do Not Revert (DNR)		→ Could use infinite WTR value
	0000	No Request (NR)	lowest	→ Absence of RDI flag in CCMs
	Others	Reserved for future international standardization		
NOTE 1 – SD is for further study.				

From Table 11-1 / G.8031

- **An internal Wait-to-Restore timer can be used to decouple the CFM behaviour (i.e., CCM, RDI exchanges) from the protection processing / actions**

Signalling Info Checklist

Protection Type	A	0	No APS Channel
		1	APS Channel
	B	0	1+1 (Permanent Bridge)
		1	1:1 (no Permanent Bridge)
	D	0	Unidirectional switching
		1	Bidirectional switching
	R	0	Non-revertive operation
		1	Revertive operation

Fixed parameters
No need to signal

Requested Signal	0	Null Signal
	1	Normal Traffic Signal
	2-255	(Reserved for future use)

Single W channel
Inherently indicated by MEP

Bridged Signal	0	Null Signal
	1	Normal Traffic Signal
	2-255	(Reserved for future use)

Single W channel
Indicated by B-VID

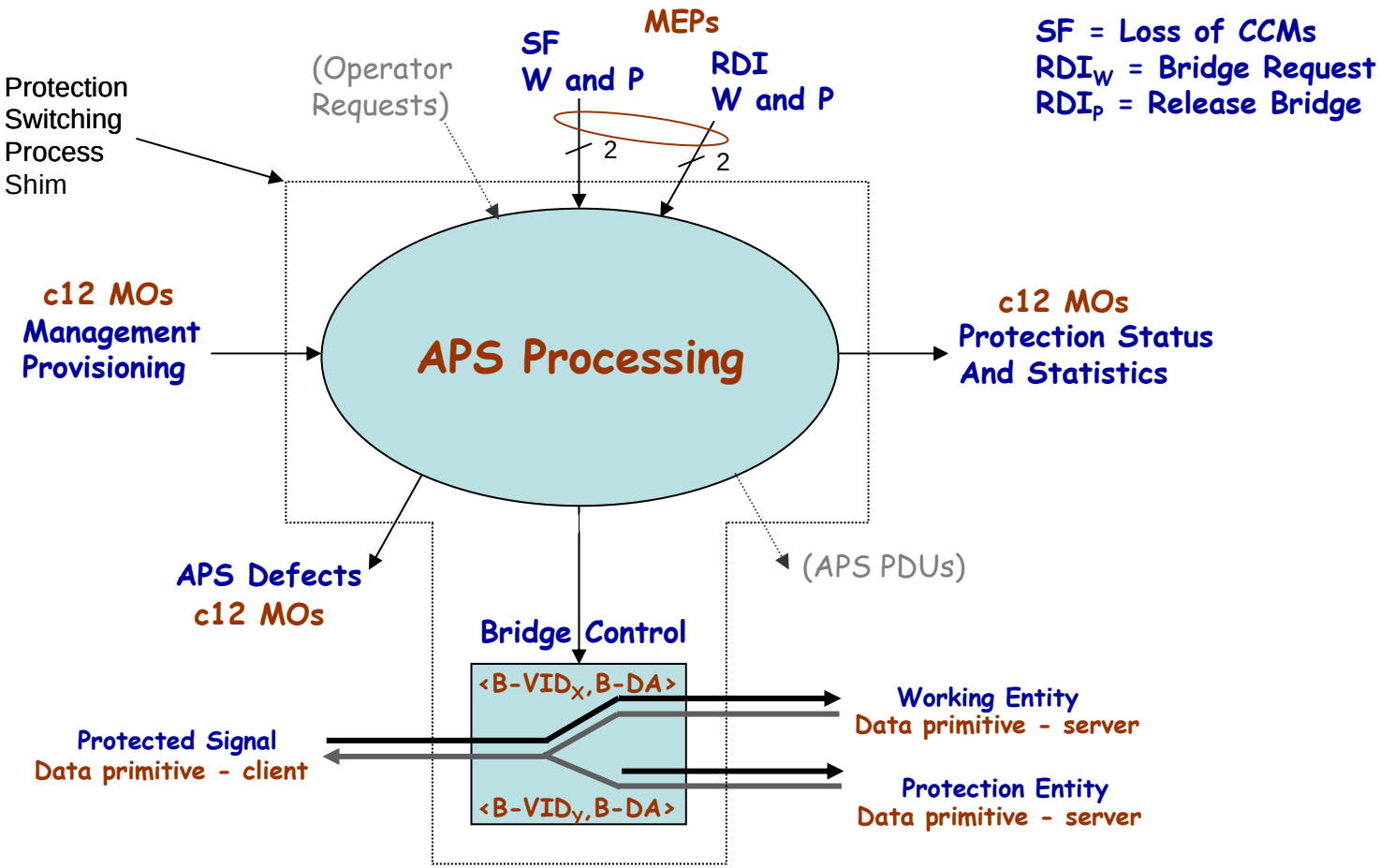
Protection Checklist

- **Have the basic elements of a protection scheme been addressed?**
  - **Triggers: Loss of CCMs**
  - **Bridge mechanism: Selector bridge**
  - **Selector mechanism: Merging selector**
  - **Protection phases: Single**
  - **Signalling: RDI flag**
- **Yes**

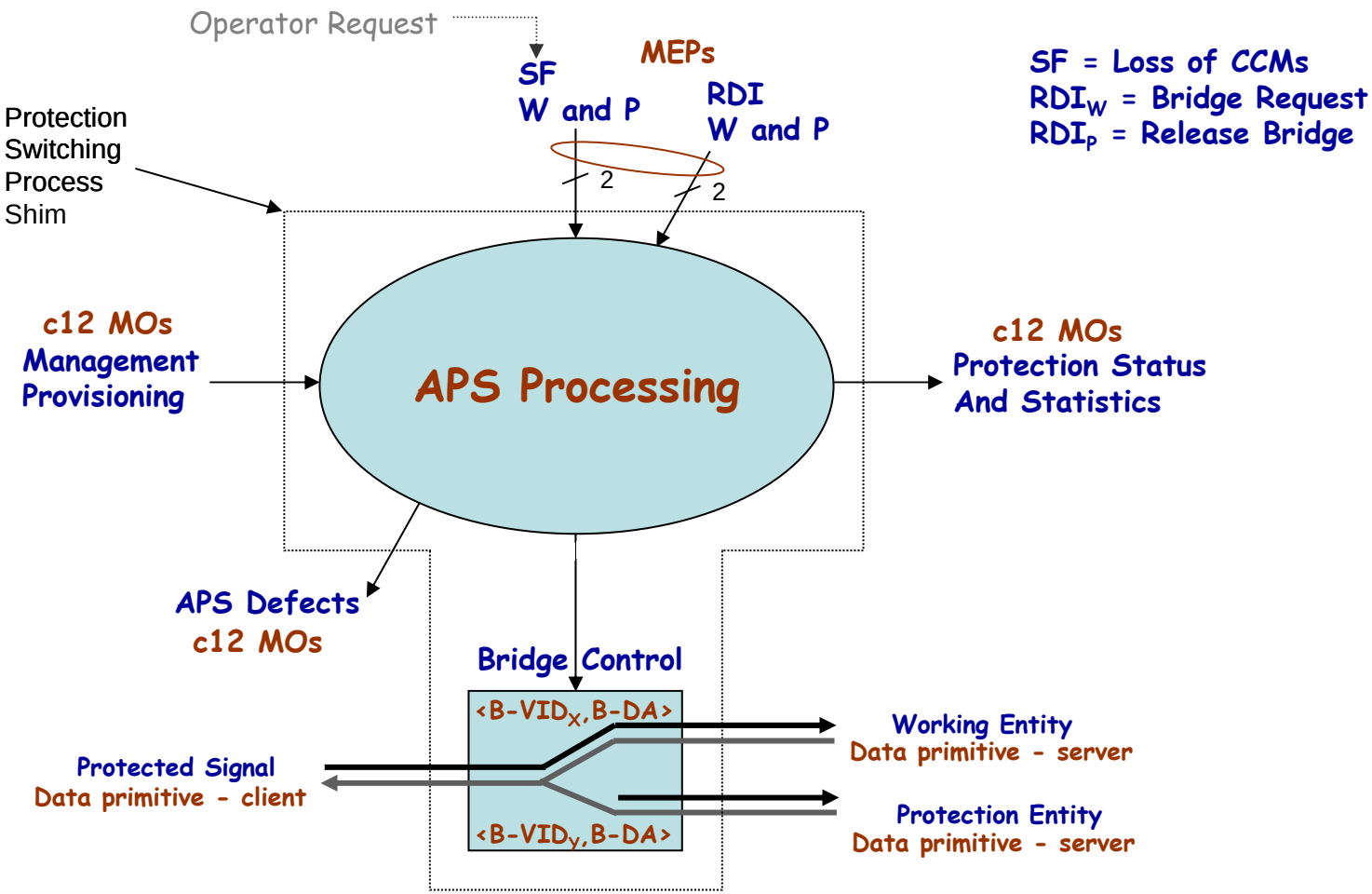
Agenda

- Recap From July Plenary
- Simple PBB-TE ESP 1:1 Protection
- **Mapping To PBB-TE CBP Model**

APS Model and I/O

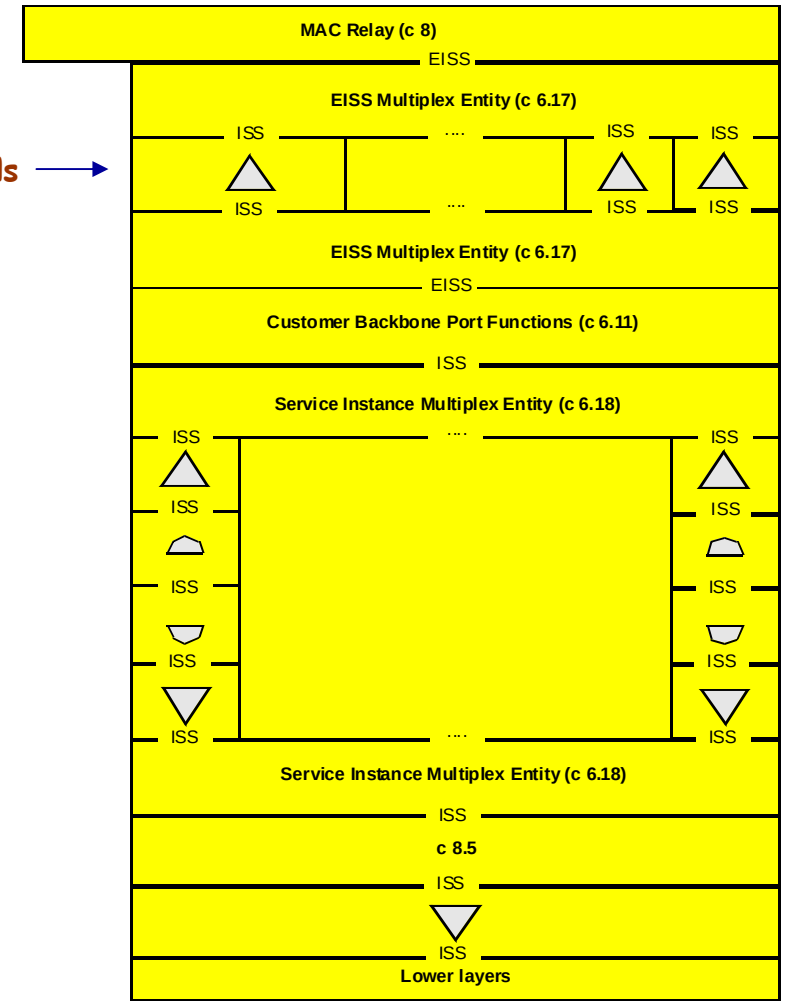


APS Model and I/O



PBB CBP Model

MEPs for B-VLANs →

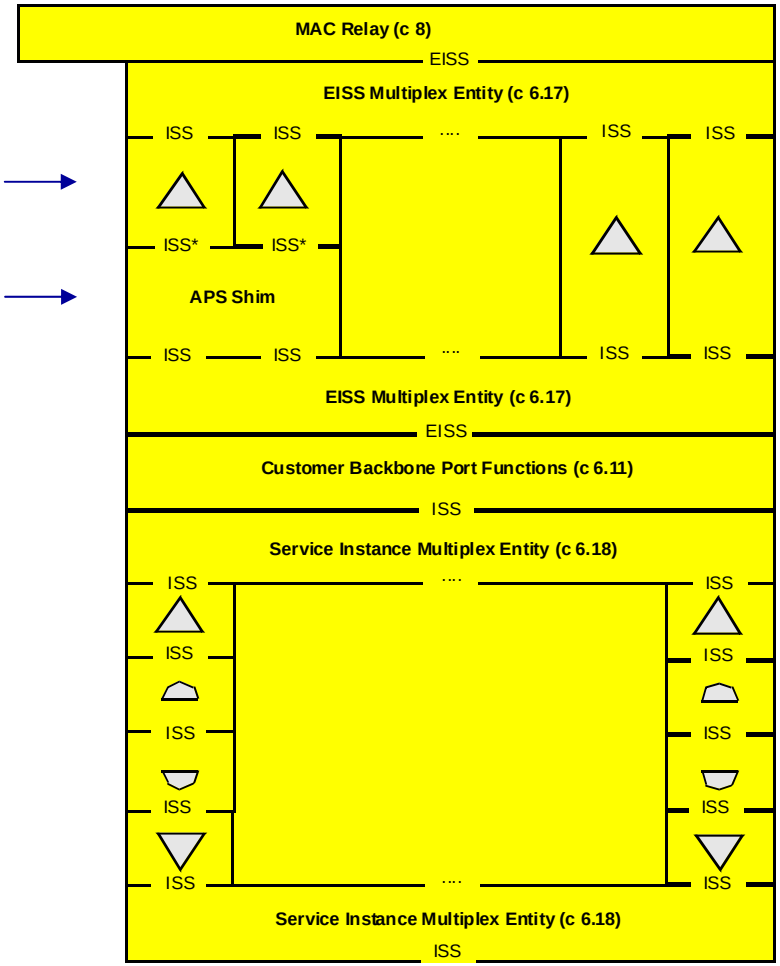


From Figure 26-2
P802.1ah/D3.7

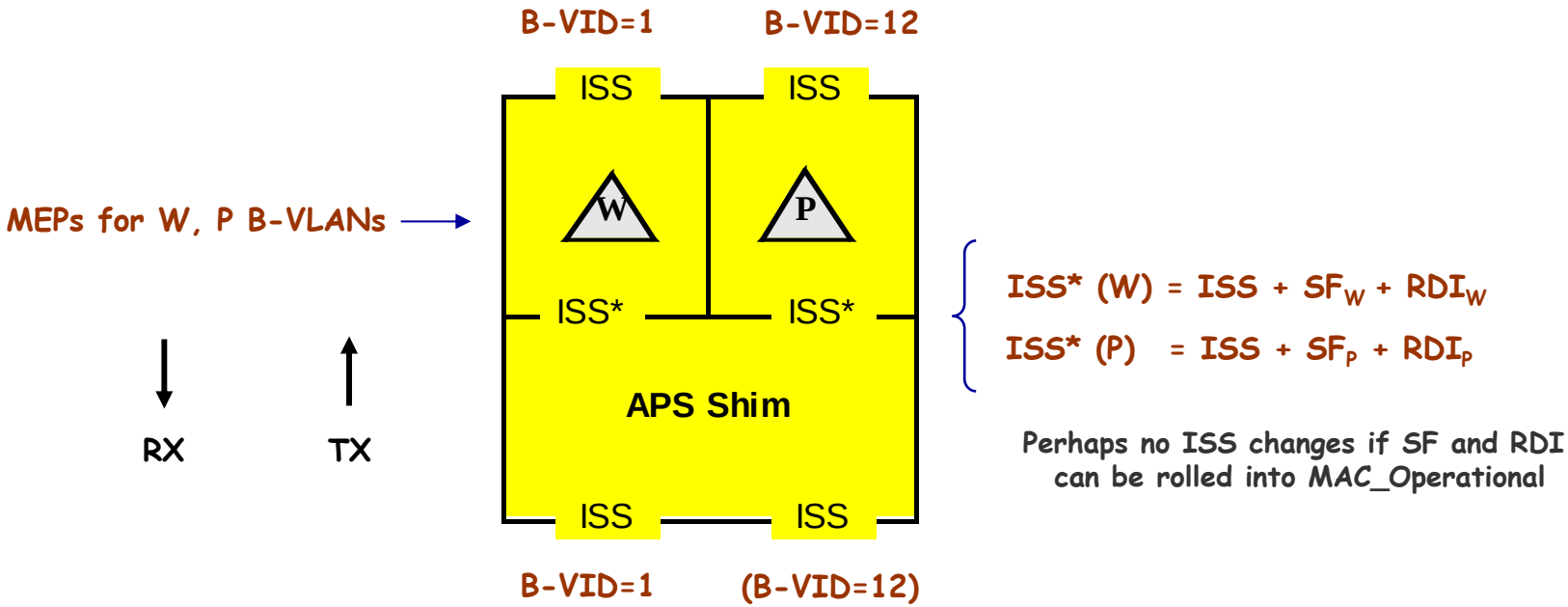
Possible PBB-TE CBP Model

MEPs for W, P B-VLANs →

Goal is to not require changes to c6.17 or the ISS →



Possible PBB-TE CBP Model (cont'd)



- TX Direction: APS Shim steers data frames with BVID=1 over either W (BVID=1) or P, replacing frame BVIDs (1) with BVID=12
- RX Direction: APS Shim combines data frames from W and P, replacing P frame BVIDs (12) with BVID=1

References

- **P802.1Qay/D0.0, May 22, 2007**
- **G.870, *Terms and Definitions for Optical Transport Networks*, June 2004**