PBB-TE Trunk
1:1 Protection Switching
Operator Requests

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v02

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Agenda

- Agreements (tentative) To Date
- Recap of Proposals for Signalling Operator Requests
- Proposals Comparison

Agreements (tentative) To Date

- **Operator requirements**
  - **1:1 bi-directional, revertive/non-revertive, no ET, LoP/MSW**

    (ay-mcguire-linear-121-protsw-0709-v1.pdf)
- **Terminology**
  - **ESP, trunk, trunk group**

    (ay-alon-protection-switching-0907-v01.pdf)
- **Protected entity**
  - **Trunk: CBP-to-CBP <B-DA, B-SA, B-VID$_x$, B-VID$_y$>**
- **Automatic protection triggers**
  - **Loss of CCMs → Signal Fail (SF)**

ET = Extra Traffic
LoP = Lockout of Protection
MSW = Manual Switch

Agreements (tentative) To Date (cont'd)

- **Head / Tail-end coordination for fault triggered automatic switching**
  - **CCM w/RDI flag**

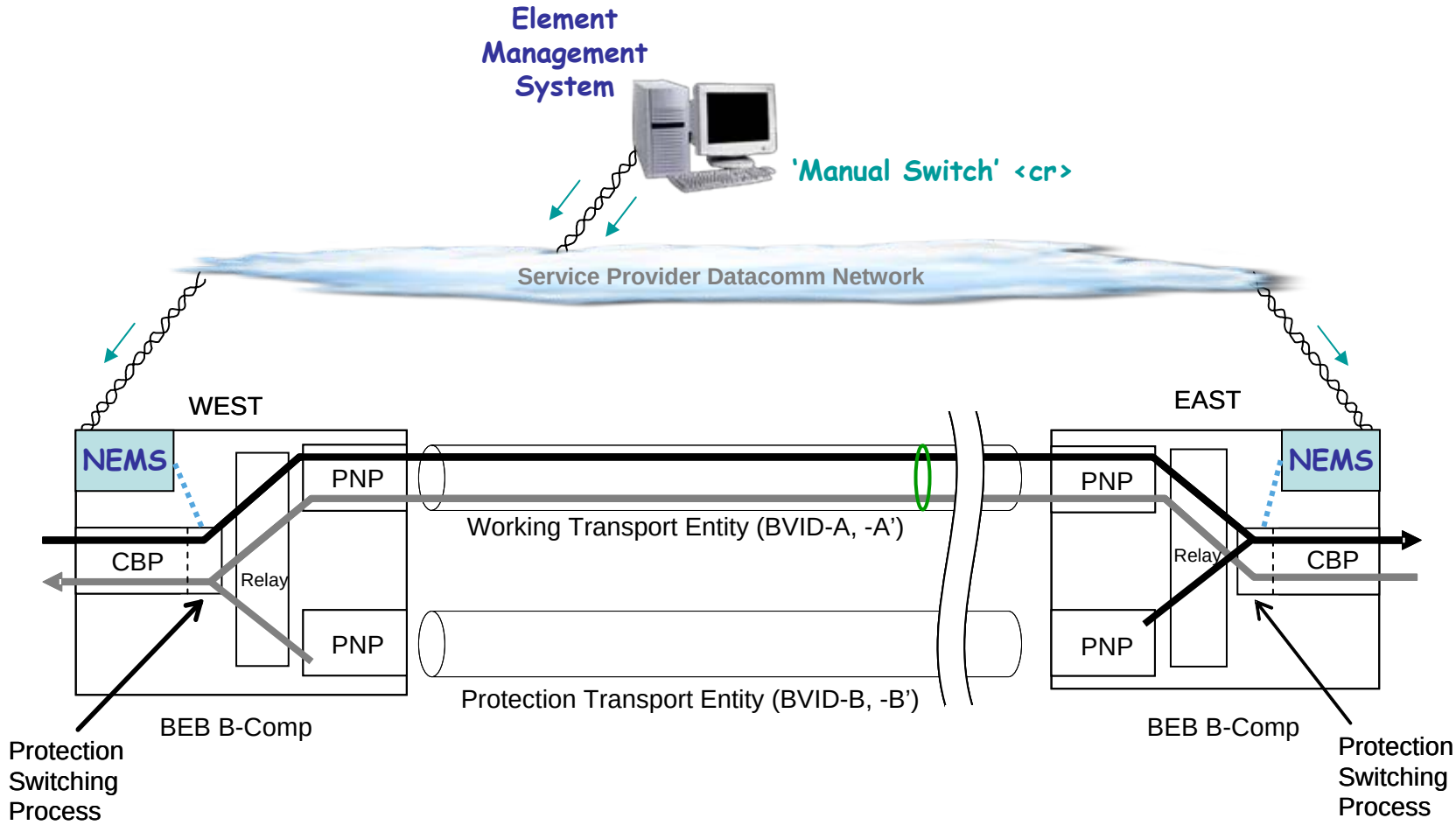
Of course this is only 'tentatively agreed' until balloted

What's Left?

- **Handling of operator requests (LoP, MSW), several options have been proposed:**
  1) **Management request sent to both BEBs**
     (ay-martin-protection-0907-v03.pdf)
  2) **Add TLV info to the CCMs exchanged between BEBs**
     (ay-alon-protection-switching-0907-v01.pdf)
  3) **Leverage the signalling protocol defined in G.8031**
     (ITU-T Q9/15 liaison)

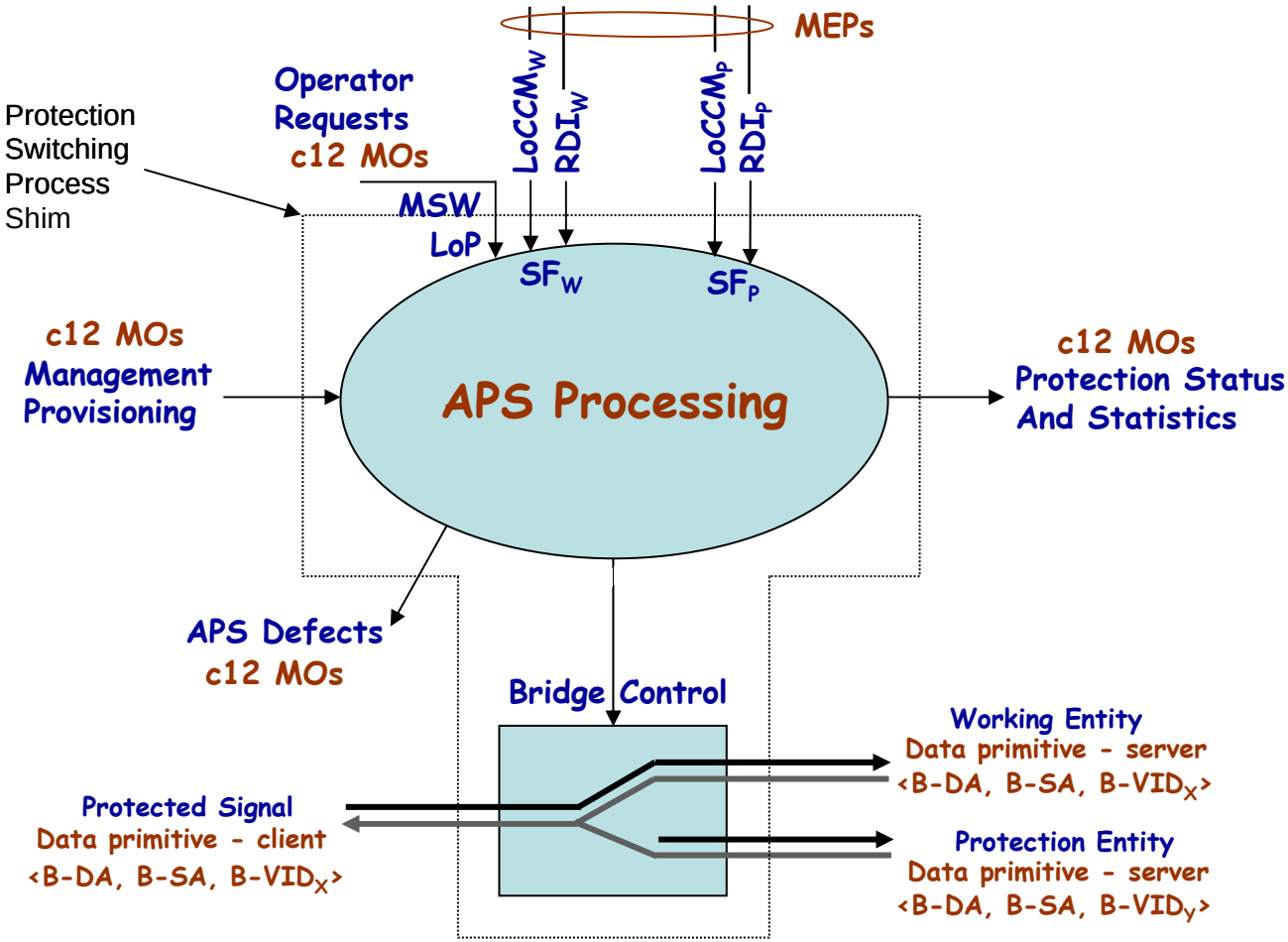
LoP = Lockout of Protection
MSW = Manual Switch

1) Mgmt: Operator Request MSW

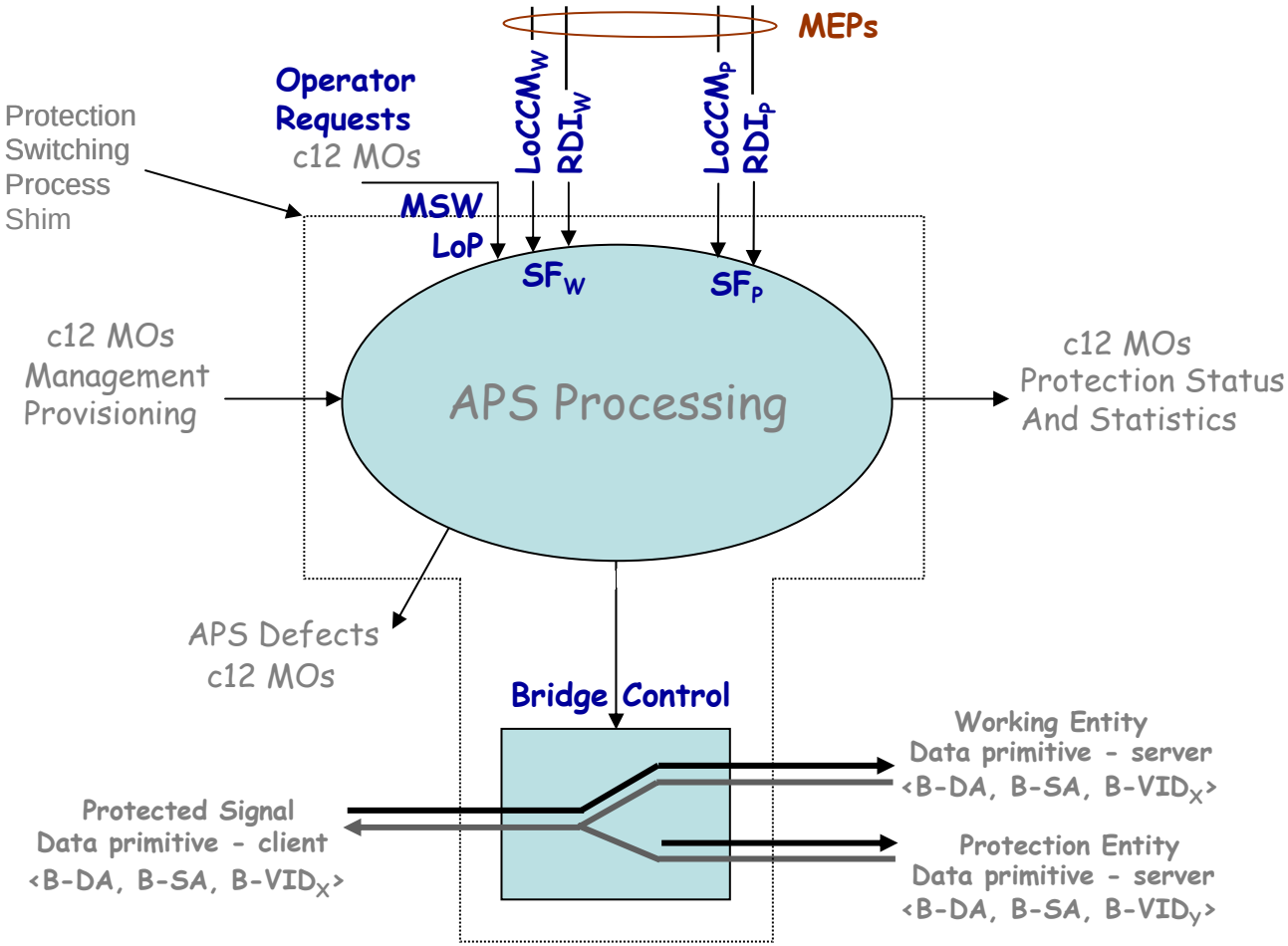


NEMS = Network Element Management System

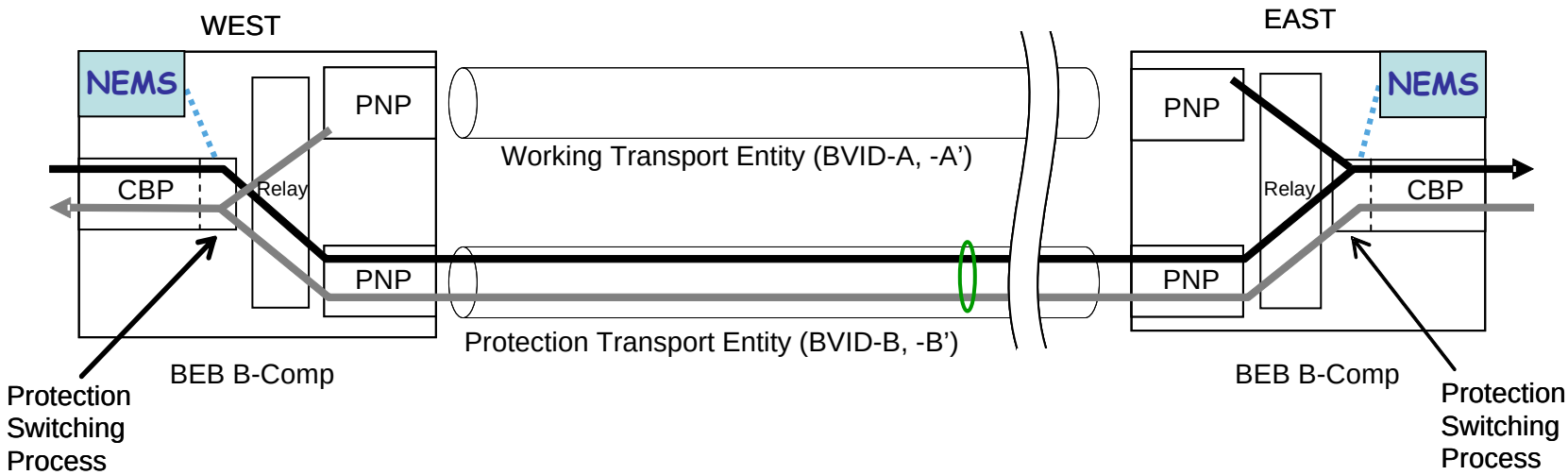
1) Mgmt: APS Model

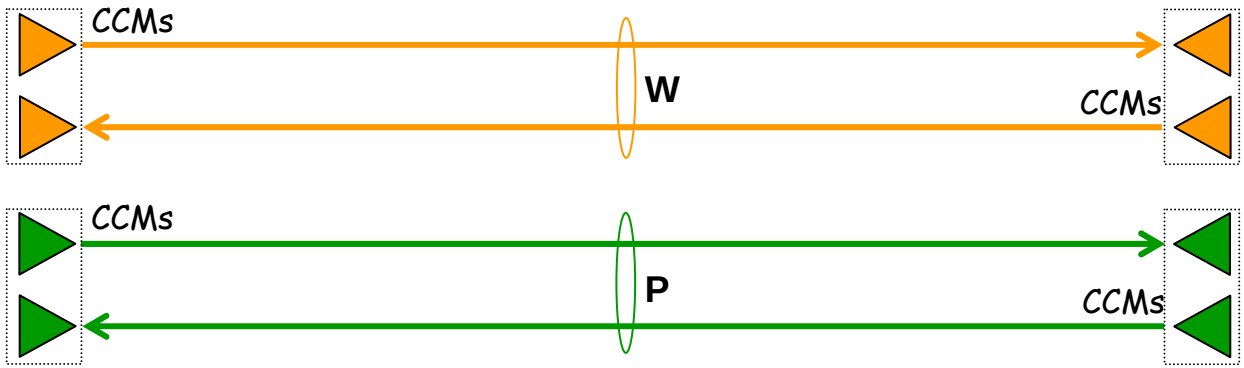


1) Mgmt: APS Model – Focus View



1) Mgmt: MSW Complete





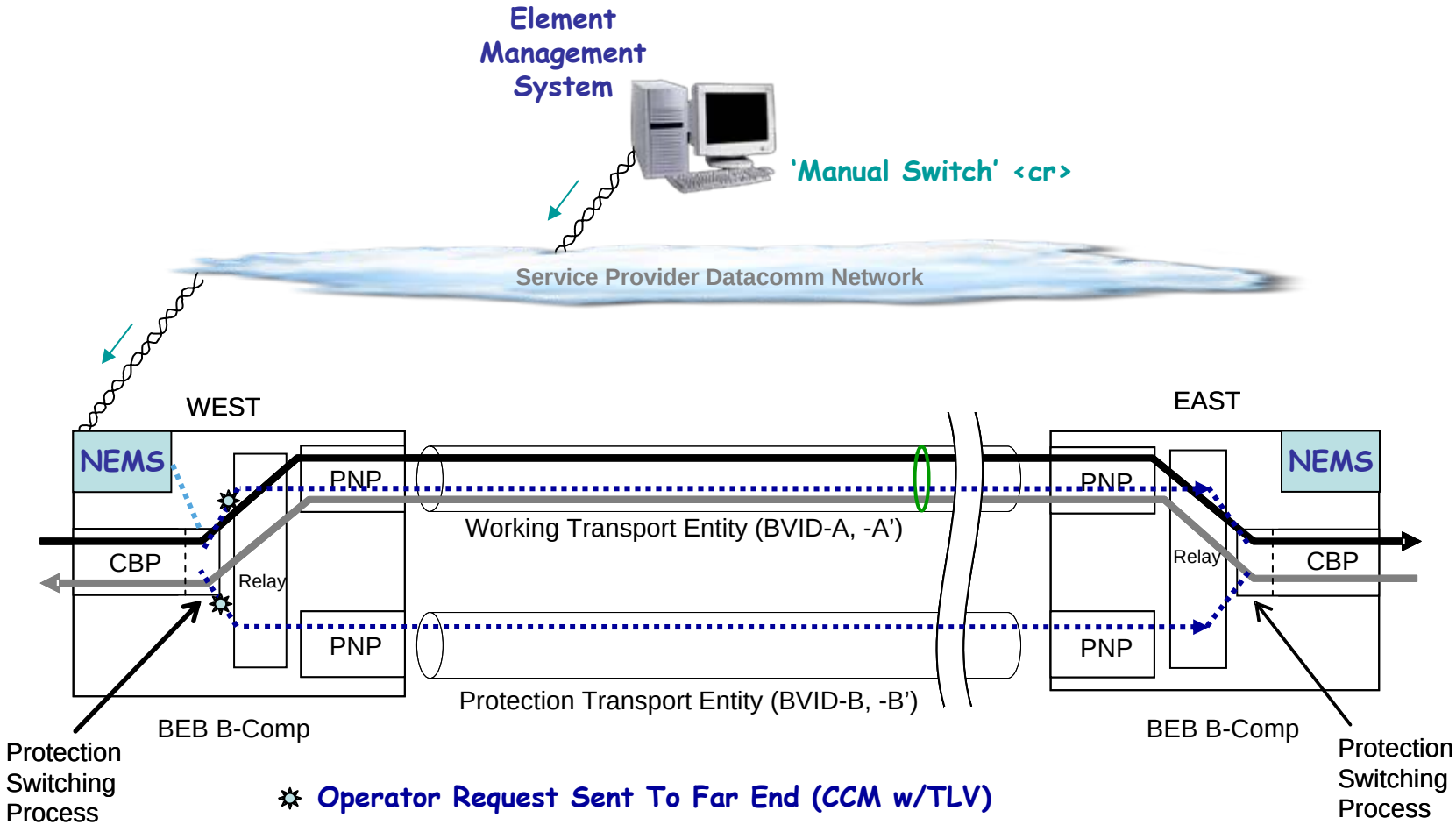
1) Mgmt: Key Characteristics

- **No in-band APS signalling**
- **Requires Selective Bridge & Merging Selector to avoid prolonged frame loss during MSW**
- **Potential for frame mis-ordering from differential delay between W / P trunks (simple workaround possible*)**

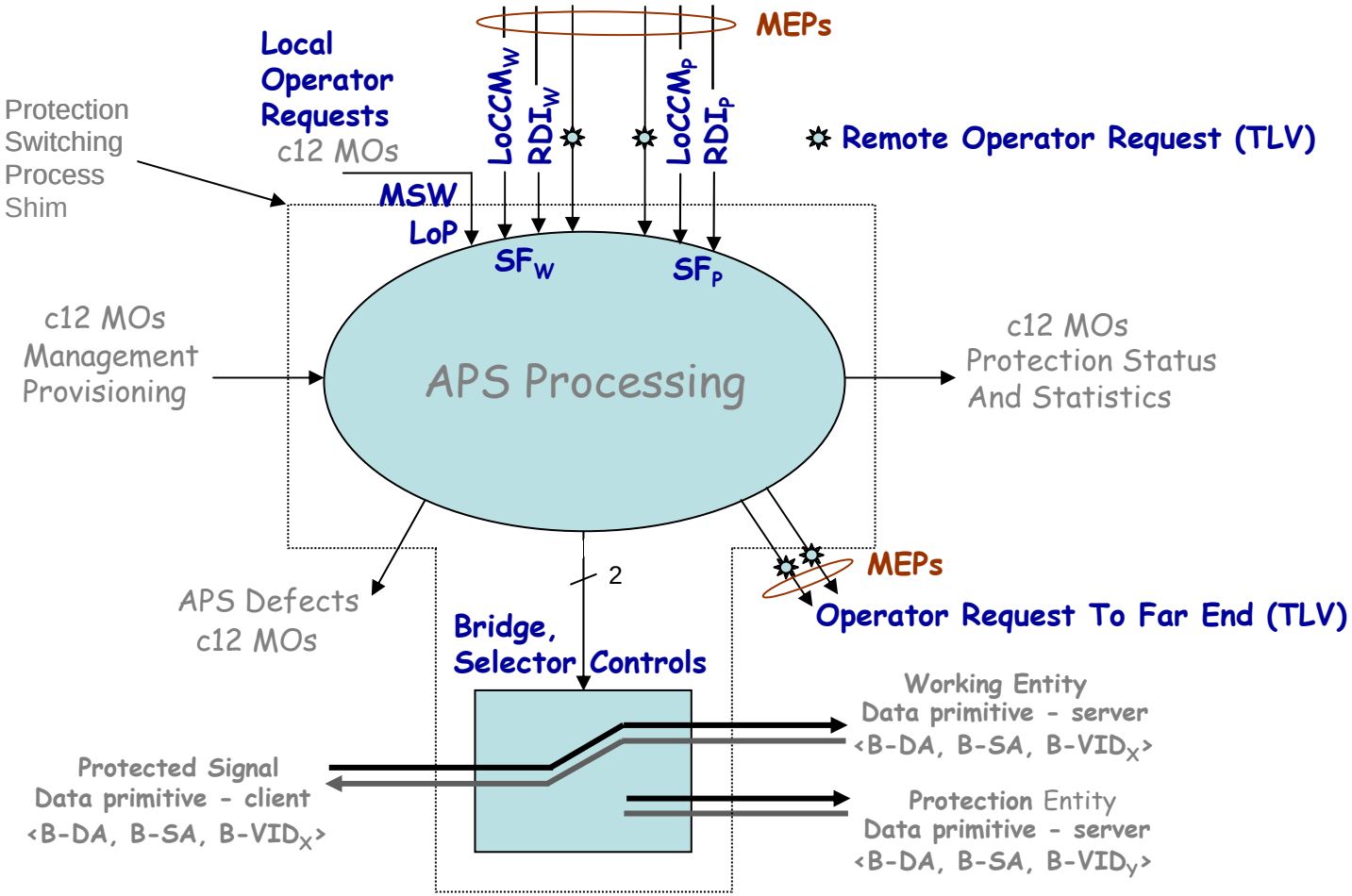
(Lockout of Protection request is signalled similarly. The NEMS at each end put the P trunk into out-of-service state.)

* Before activating Bridge, cease data frame transmission for a couple of ms (e.g., covers 20% delta on a 2000km trunk)

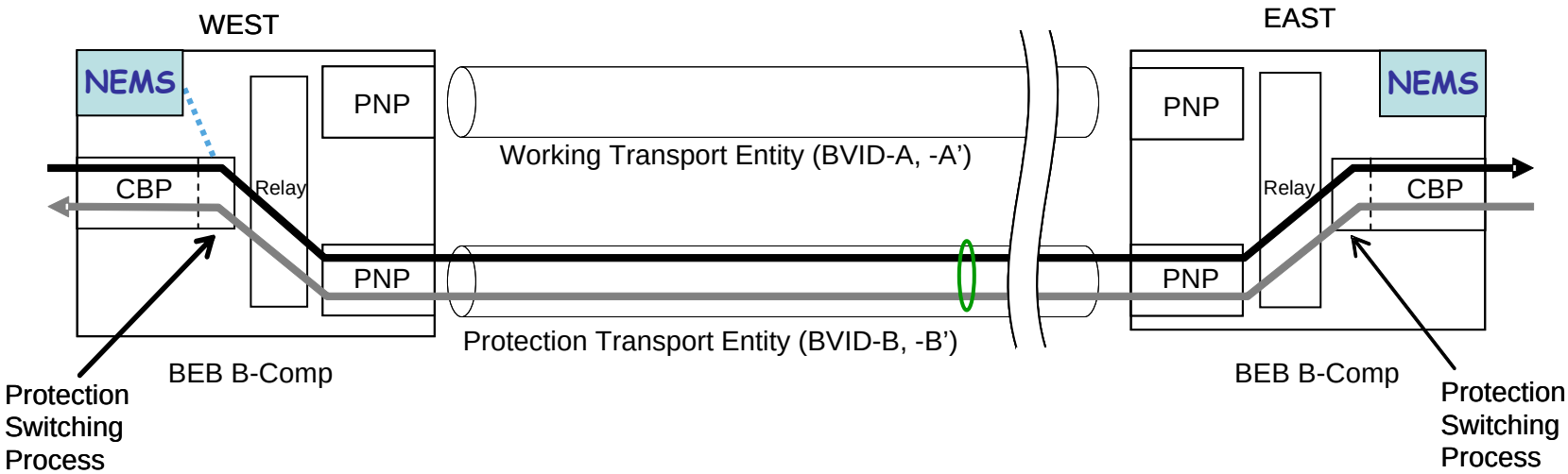
2) CCM: Operator Request MSW

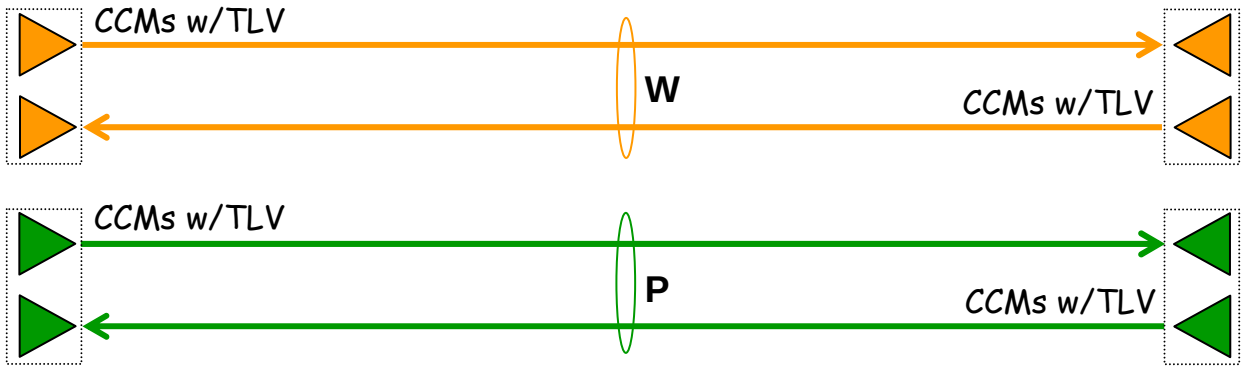


2) CCM: APS Model – Focus View



2) CCM: MSW Complete



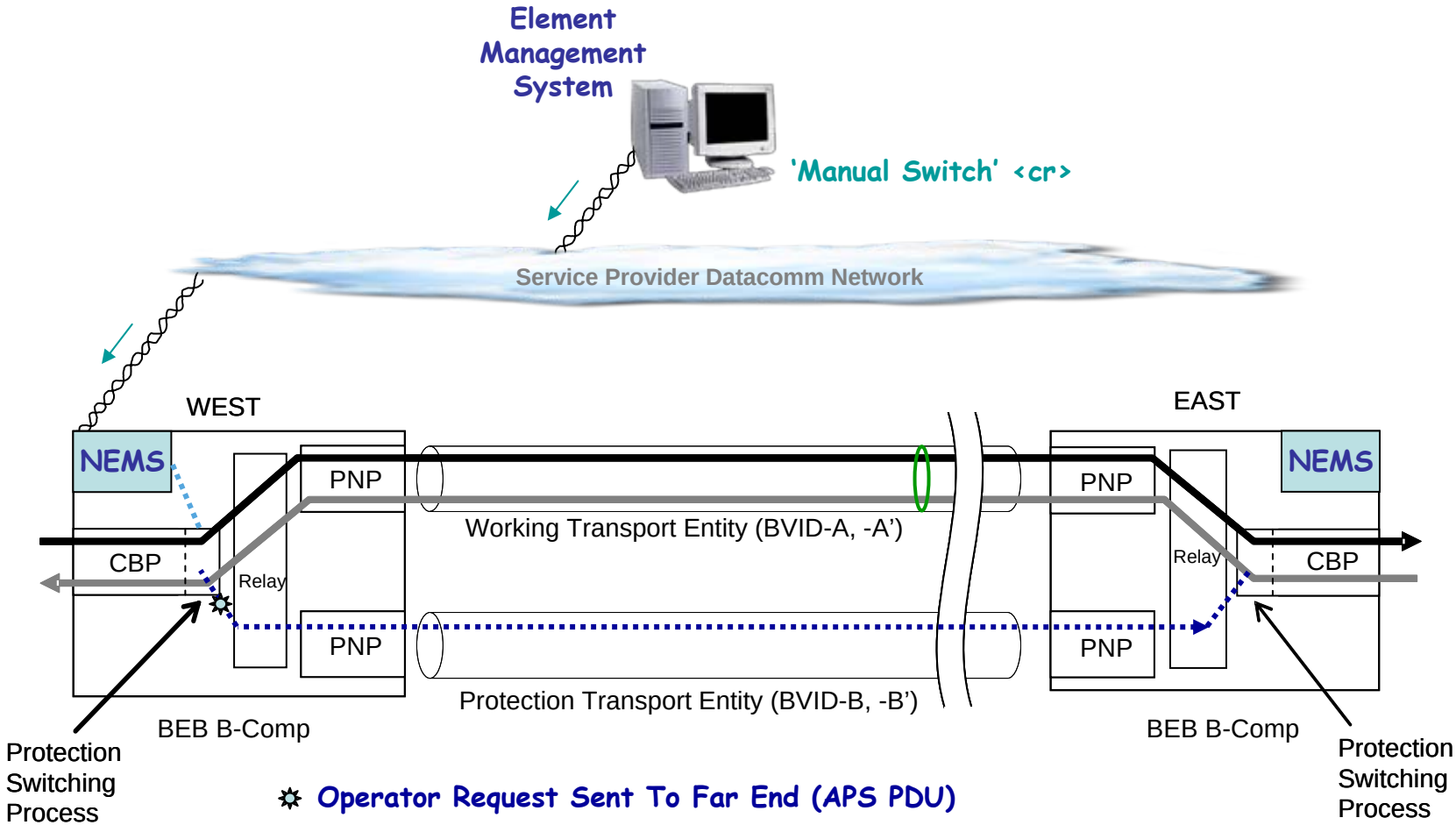


2) CCM: Key Characteristics

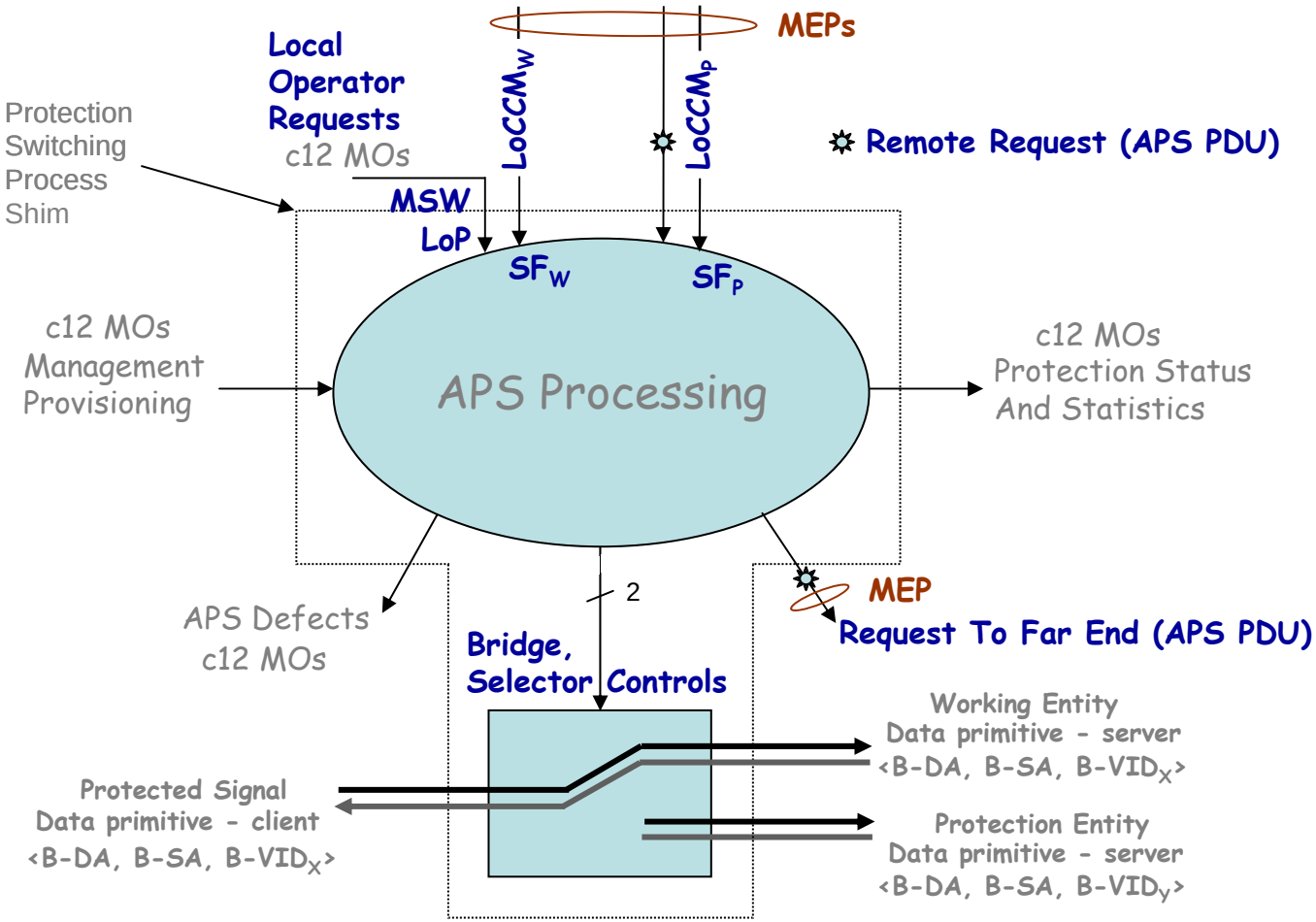
- **Uses in-band APS signalling (in CCM I/F Status TLV)**
- **Can use Selective Bridge & Selective Selector to avoid potential frame mis-ordering**

(Lockout of Protection request is signalled similarly.)

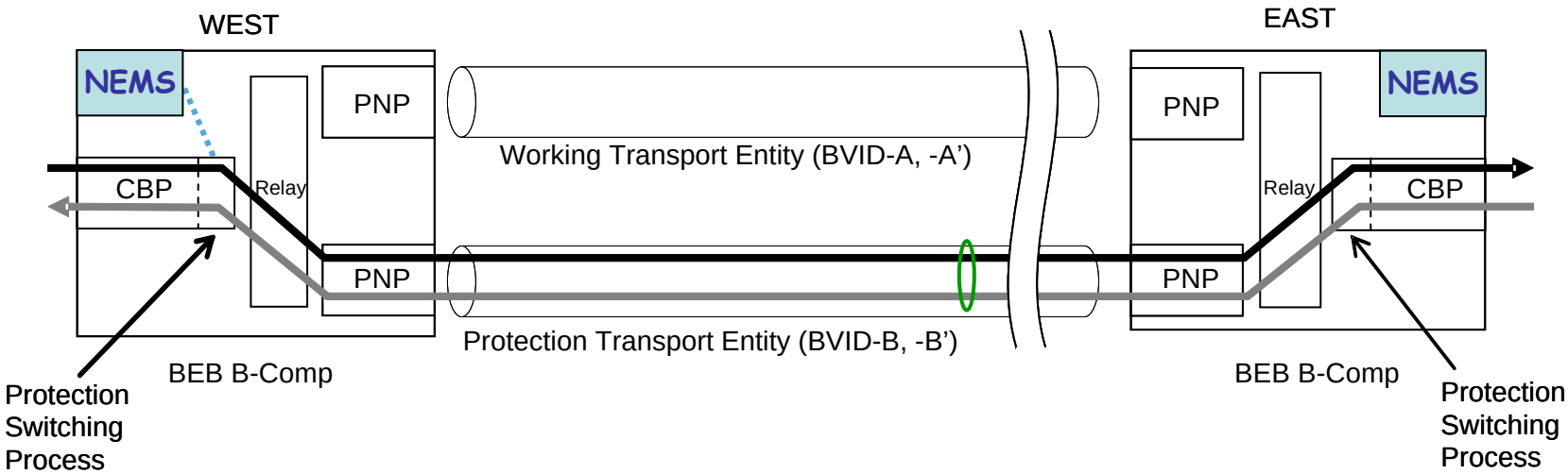
3) G.8031: Operator Request MSW

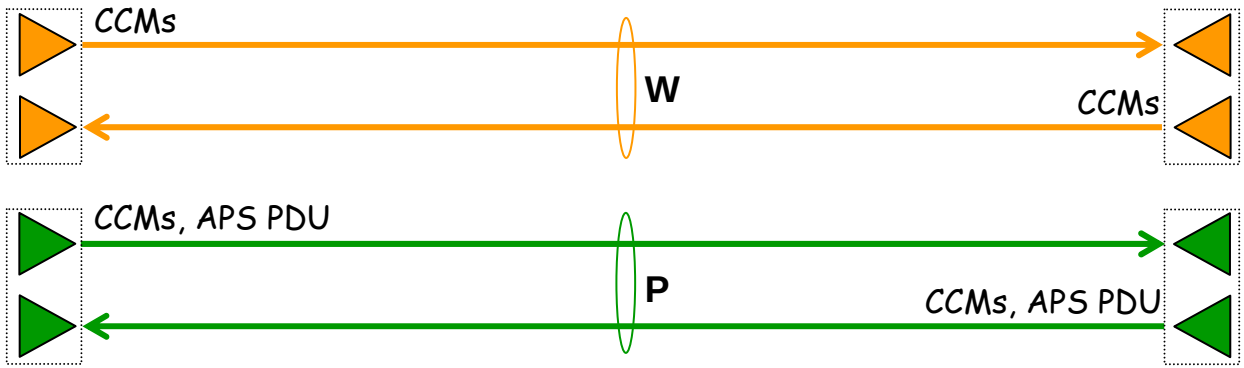


3) G.8031: APS Model - Focus View



3) G.8031: MSW Complete





3) G.8031: Key Characteristics

- **Uses in-band APS signalling (in APS PDU)**
- **Can use Selective Bridge & Selective Selector to avoid potential frame mis-ordering**
- **Both automatic requests and operator requests can be signalled in APS PDU (CCM w/RDI flag not needed as a trigger)**

(Lockout of Protection request is signalled similarly.)

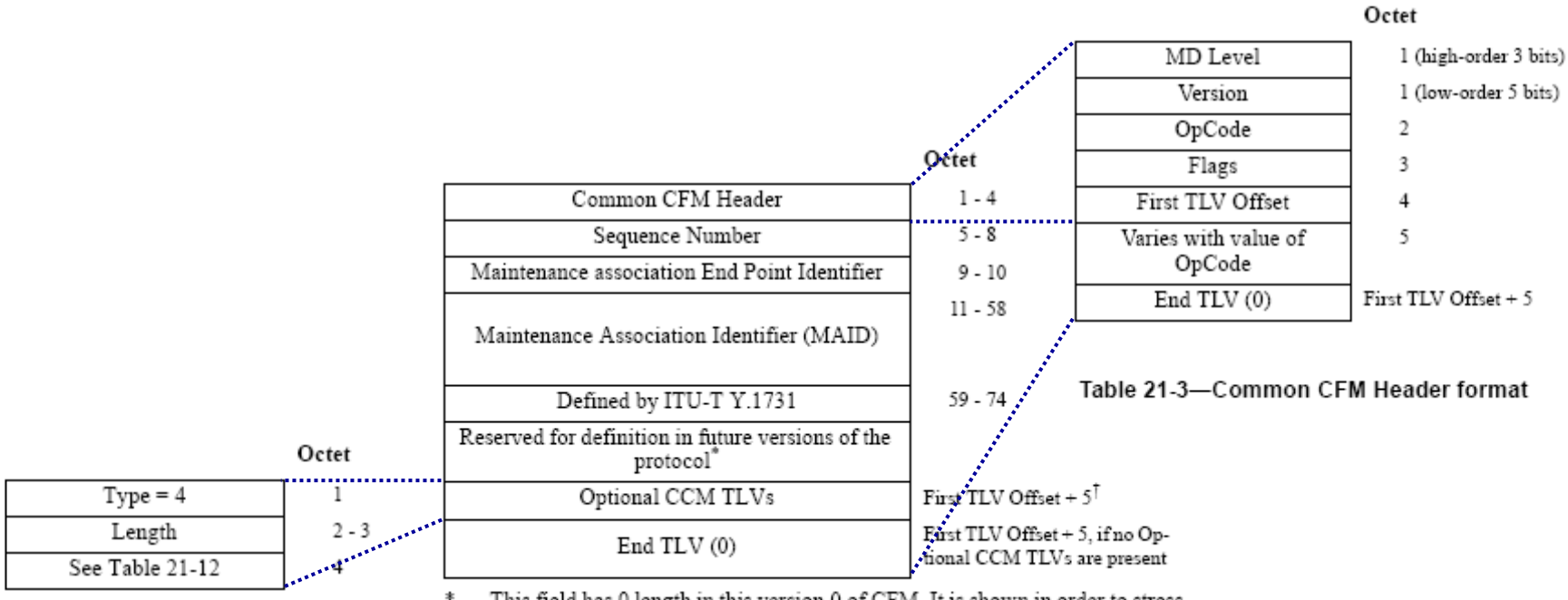
Key Characteristics Comparison

Characteristic	Option 1 Dual Mgmt Requests	Option 2 CCM w/TLV	Option 3 G.8031 Subset
In-band signalling		√	√
Out-of-band signalling	√		
Selective bridge	√	√	√
Selective selector		√	√
Merging selector	√		
Mis-ordered frames potential	Workaround possible		
Similar signalling for Auto requests			√
Uses CCM w/RDI for Auto requests	√	√	

- **Dual Mgmt Requests: Simplest, if OOB signalling is acceptable**
- **CCM w/TLV, G.8031: Use IB signalling, essentially both the same**
- **G.8031: Incorporates signalling for automatic (fault) requests too**

REFERENCE

CFM, CCM, I/F Status TLV Formats



Octet	
MD Level	1 (high-order 3 bits)
Version	1 (low-order 5 bits)
OpCode	2
Flags	3
First TLV Offset	4
Varies with value of OpCode	5
End TLV (0)	First TLV Offset + 5

Table 21-3—Common CFM Header format

Octet	
Common CFM Header	1 - 4
Sequence Number	5 - 8
Maintenance association End Point Identifier	9 - 10
Maintenance Association Identifier (MAID)	11 - 58
Defined by ITU-T Y.1731	59 - 74
Reserved for definition in future versions of the protocol*	
Optional CCM TLVs	First TLV Offset + 5†
End TLV (0)	First TLV Offset + 5, if no Optional CCM TLVs are present

Octet	
Type = 4	1
Length	2 - 3
See Table 21-12	4

Table 21-11—Interface Status TLV format

* This field has 0 length in this version 0 of CFM. It is shown in order to stress that additional information can be present in future versions of CFM, and that a version 0 receiver ignores its contents, if present.

† Octet 75 for transmitted CCMs.

Table 21-15—Continuity Check Message format

I/F Status TLV Values

Table 21-12— Interface Status TLV values

mnemonic	Interface Status (IETF RFC 2863 ifOperStatus)	value
isUp	up	1
isDown	down	2
isTesting	testing	3
isUnknown	unknown	4
isDormant	dormant	5
isNotPresent	notPresent	6
isLowerLayerDown	lowerLayerDown	7

(256-7 codepoints available)