VCCV Extensions for Ethernet OAM
draft-mohan-pwe3-vccv-eth-00.txt

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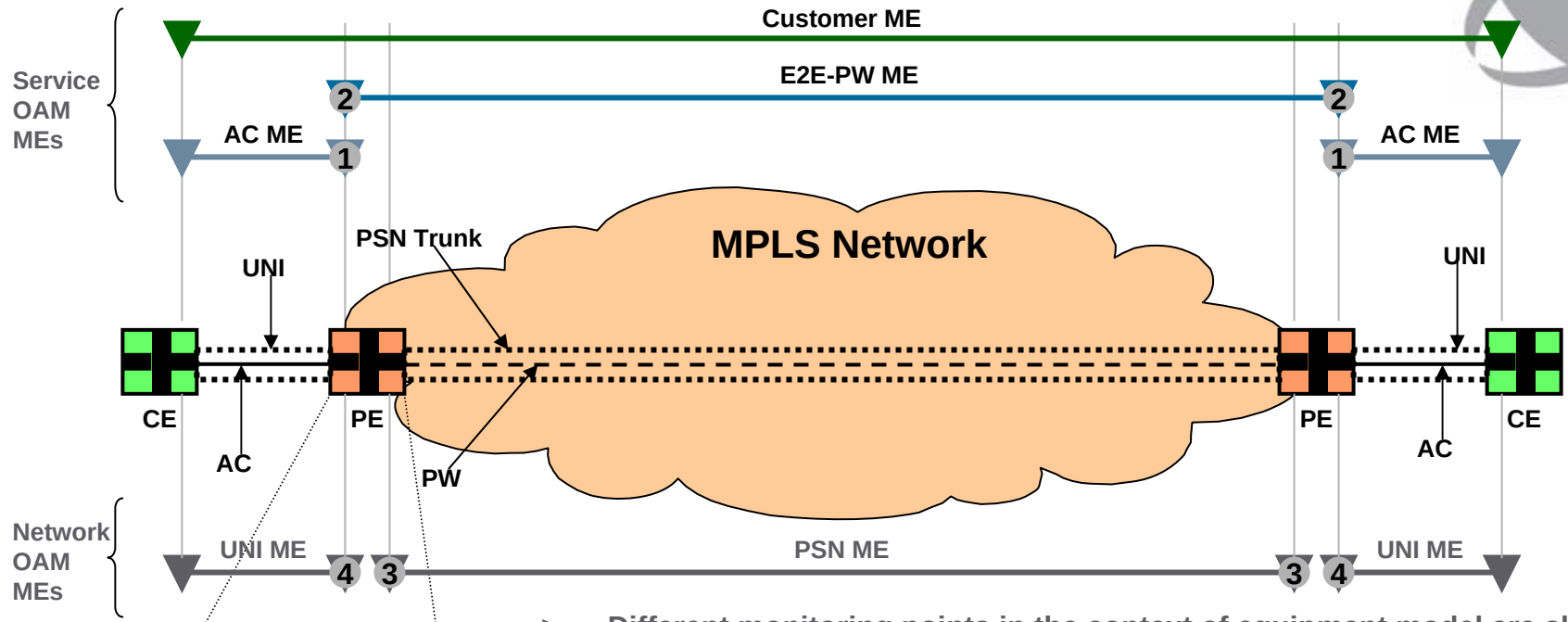
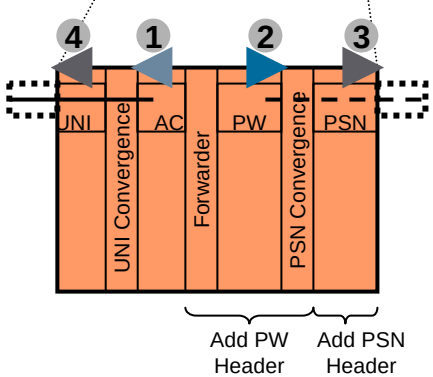
Background

> Assumptions

- Ethernet can be the PSN; therefore the tunnels can be Ethernet
  - Ethernet PSN is already being considered in TRILL, CCAMP etc. WGs
- PWs over Ethernet PSN are possible in a manner similar to PW over MPLS/IP PSN
  - To carry different native payloads
- MS-PWs may be deployed across Ethernet PSN (e.g. in Metro) and MPLS/IP PSN (e.g. in Core)

PWE3 SS-PW OAM Approach – MPLS PSN





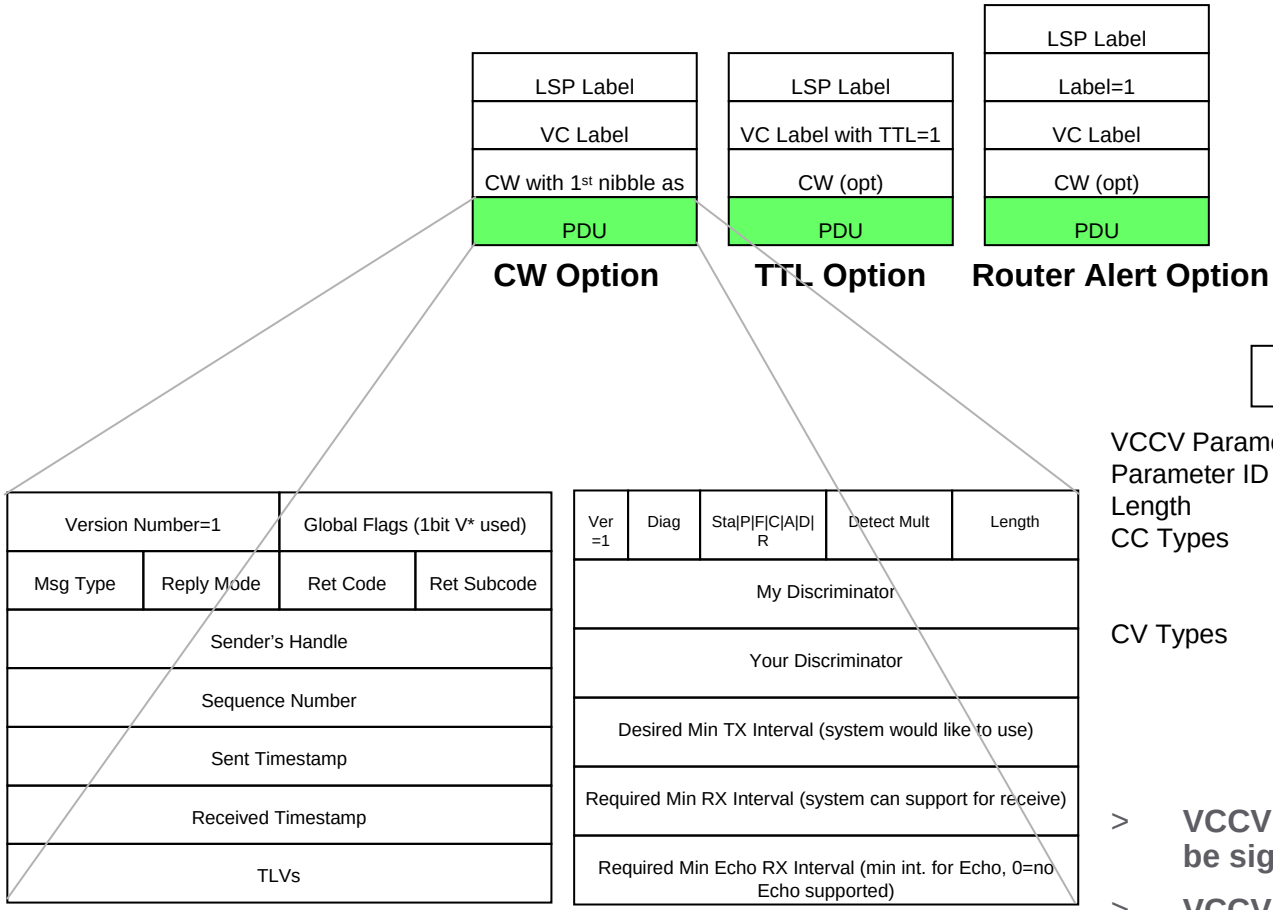
> Different monitoring points in the context of equipment model are shown

> Service MEs for PW service provider include:
- E2E-PW ME (associated with monitoring points marked “2” on PE)
- AC ME (associated with monitoring point marked “1” on PE)

> Network MEs for PW service provider include:
- PSN ME (associated with monitoring points marked “3” on PE)
- UNI ME (associated with monitoring point marked “4” on PE)

ME	OAM Mechanism	Comment
E2E-PW	VCCV channel, PW status	VCCV Payload is BFD/LSP Ping
PSN	LSP Ping, BFD	For MPLS PSN
UNI, AC, Customer ME	Native	Dependent on technology used

VCCV – control and payload



0x0c	0x04	CC Types	CV Types

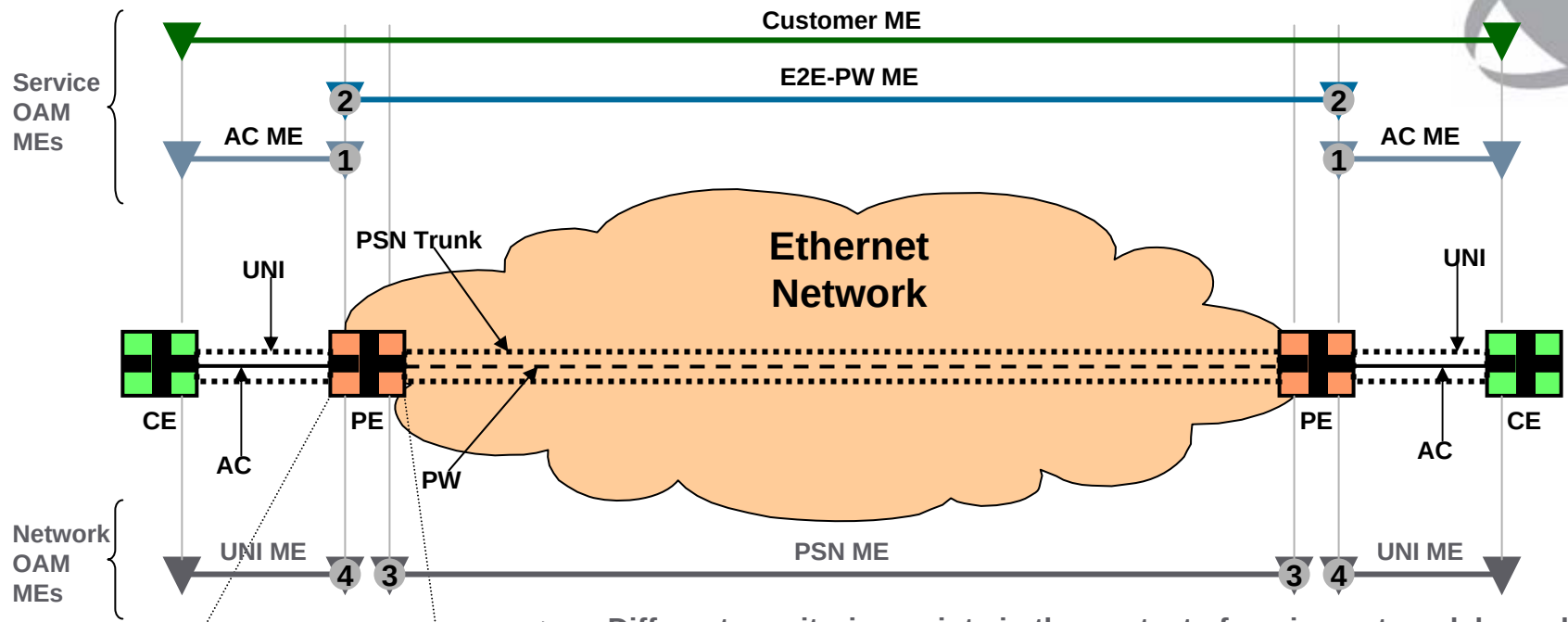
VCCV Parameter Field
Parameter ID = 0x0c
Length = 4
CC Types = 0x01 control word with 1st nibble as 0x0001
= 0x02 MPLS Router Alert Label
= 0x04 MPLS PW Demultiplexor Label TTL=1
CV Types = 0x01 ICMP Ping
= 0x02 LSP Ping
= 0x04 BFD for PW fault Detection only
= 0x08 BFD for PW Fault Detection & AC/PW Status Signaling

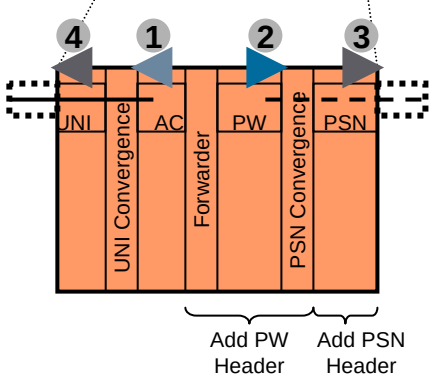
> **VCCV Capabilities/Options are assumed to be signaled at the time of establishing PW**

> **VCCV parameter field is carried in:**
- **For FEC128 – in Interface parameters field**
- **For FEC129 – sub-TLV in Interface parameter field**

VCCV Capability Signaling

PWE3 SS-PW OAM Approach – Ethernet PSN





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ME	OAM Mechanism	Comment
E2E-PW	VCCV channel	Payload is Ethernet OAM
PSN	Ethernet OAM	For Ethernet PSN
UNI, AC, Customer ME	Native	Dependent on technology used

Ethernet OAM as VCCV PDU

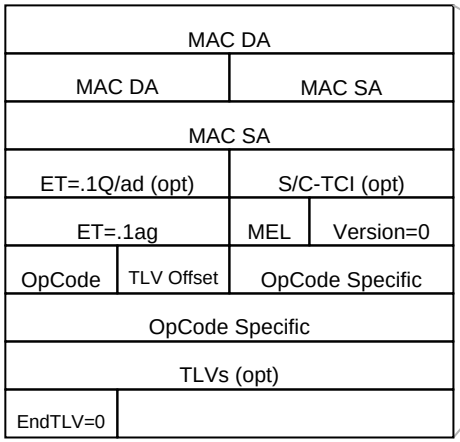
> Rationale

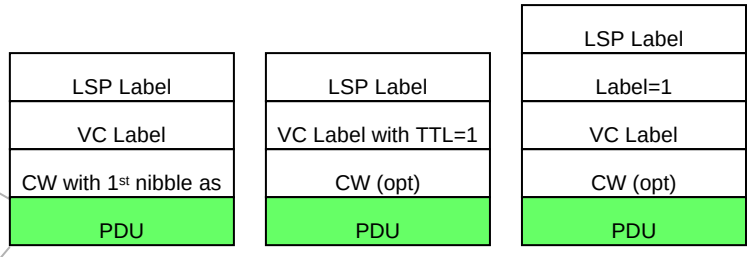
- When the PSN itself is Ethernet, PEs already implement Ethernet OAM
- Ethernet OAM (as defined in Y.1731 and draft 802.1ag) is quite functional
- Ethernet OAM supports upto 8 different MEG Levels allowing hierarchical maintenance domains as applicable in MS-PW
- BFD can be extended to match Ethernet OAM functionality OR Ethernet OAM itself can be used

> VCCV dependency

- Assuming that PW over Ethernet PSN continue to use VCCV as a generic maintenance channel, a capability to carry Ethernet OAM payload needs to be defined in VCCV
  - **Similar to LSP Ping, ICMP Ping, and BFD payloads**

VCCV – Ethernet OAM control and payload





CW Option **TTL Option** **Router Alert Option**

Ethernet OAM values for VCCV application

B-MAC DA	= This could be dummy or might carry OAM specific multicast/Unicast address
B-MAC SA	= This could be dummy or might carry Tx MEP's Unicast address
S/C-Tag (opt)	= Optional forwarding TAG associated with service instance
MEL	= MEG Level (0-7) to identify the hierarchical domain
Version	= 0 (protocol version)
OpCode	= 0x01 CCM
	= 0x03 LBM
	= 0x02 LBR
	= 0x05 LTM
	= 0x04 LTR
	= 0x33 AIS
	= 0x37 TST
	= 0x39 APS
	= 0x41 MCC
	= 0x43 LMM
	= 0x42 LMR
	= 0x45 1DM
	= 0x47 DMM
	= 0x46 DMR

Ethernet OAM

0x0c	0x04	CC Types	CV Types

VCCV Parameter Field

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	= **0x10 Ethernet OAM (.1ag & Y.1731)**

> **VCCV Capabilities/Options are signaled at the time of establishing the PW**

> **VCCV parameter field is carried in:**
- **For FEC128 – in Interface parameters field**
- **For FEC129 – sub-TLV in Interface parameter field**

VCCV Capability Signaling

Next Steps

- Proposal is to add the new “CV Types” code point to VCCV draft
- Reference can be made to Ethernet OAM specifications, work does not need to be repeated in IETF
  - ITU-T Y.1731 – approved in May 2006
  - IEEE 802.1ag – draft recommendation – sub-set of Y.1731
- Some appendix material to highlight the payloads for different functions using Y.1731/802.1ag can be added, if needed
- Applications in MS-PWs can be addressed separately, as part of ongoing MS-PW OAM work

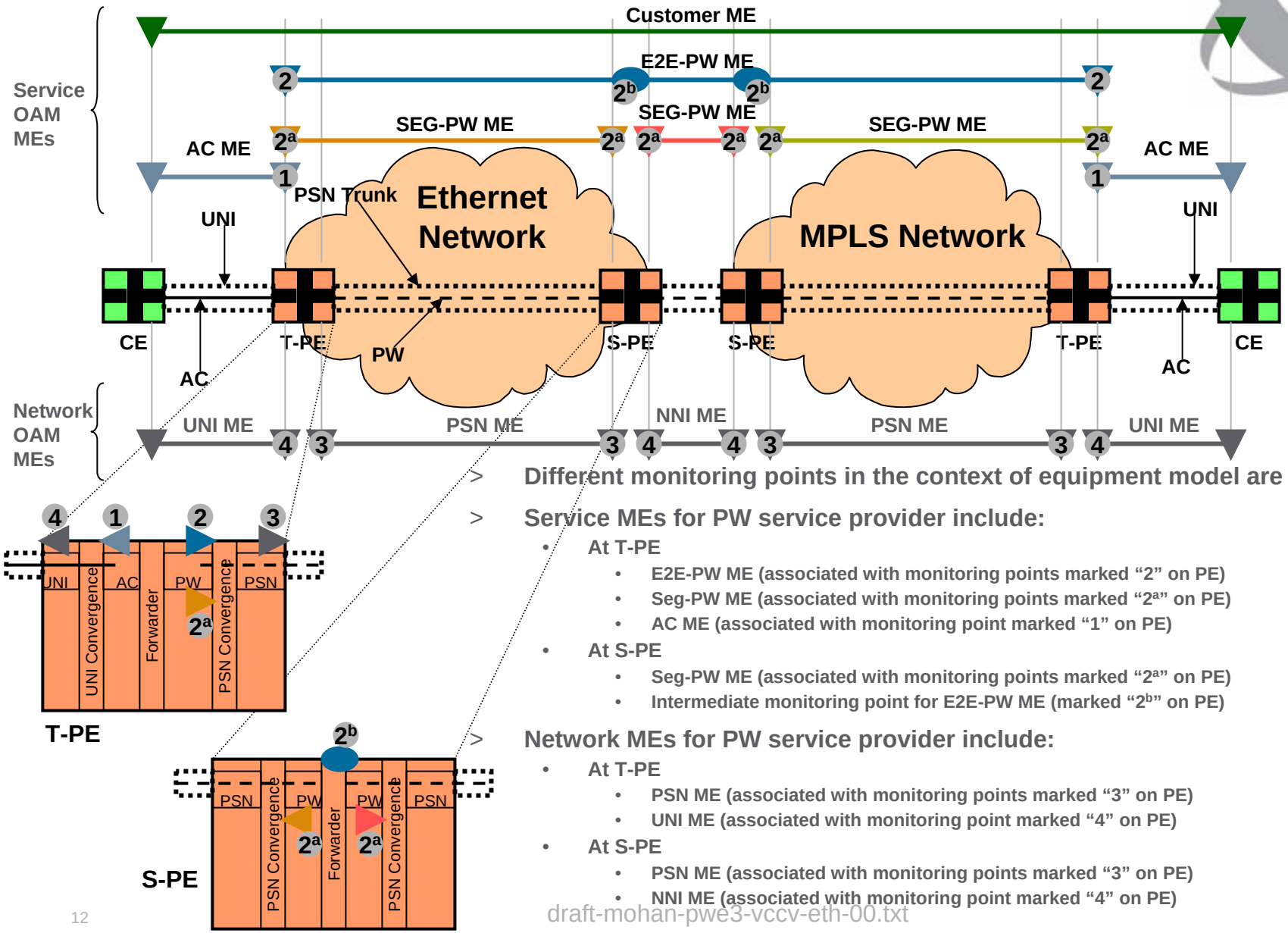
Backup Slides

Ethernet OAM & LSP Ping/BFD Comparison

OAM Functionality	Ethernet OAM	LSP Ping	BFD
Fault Detection	CCM	Echo Request with reply mode=1	Asynchronous mode (with Demand bit clear)
Fault Verification (ping)	LBM/LBR	Echo Request/Reply	Demand Mode (via Poll and Final bits)
Fault Localization/Link Trace (Traceroute)	LTM/LTR	Note[1]	Note[1]
Fault Notification	AIS and BFD	-	Via “Diagnostic code” in BFD
Discovery	mLBM/LBR, CCM	-	-
Performance Monitoring – Loss Measurement	CCM, LMM/LMR	-	-
Performance Monitoring – Delay Measurement	1DM, DMM/DMR	-	-
Protection Switching	APS	-	-
Remote Management	MCC	-	-
Diagnostics (data plane)	TST, LBM/LBR	-	-

> Note[1]
- In SS-PW, there is single PW hop thus Link Trace is not applicable
- In MS-PW, Link Trace is not supported
  - Can be applied using TTL approach and executing multiple echo request/reply
  - With Ethernet OAM PDU, MEG Levels can be used to realize Link Trace in MS-PW

PWE3 MS-PW OAM Approach



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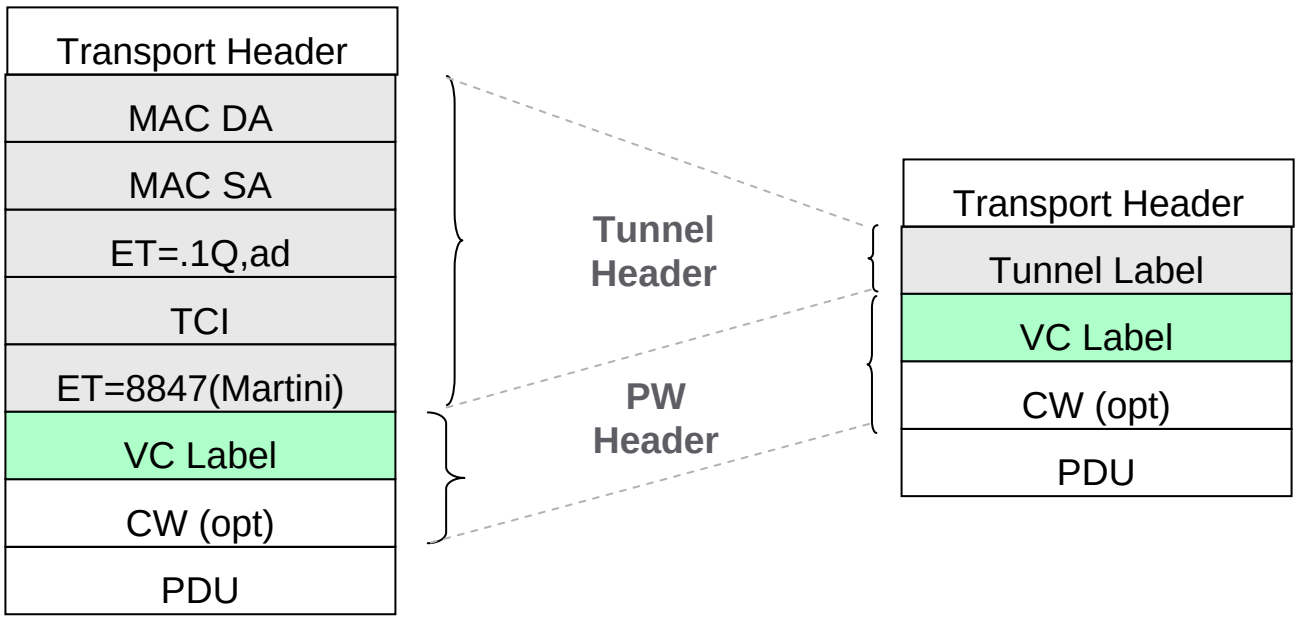
> Service MEs for PW service provider include:

- At T-PE
  - E2E-PW ME (associated with monitoring points marked “2” on PE)
  - Seg-PW ME (associated with monitoring points marked “2^a” on PE)
  - AC ME (associated with monitoring point marked “1” on PE)
- At S-PE
  - Seg-PW ME (associated with monitoring points marked “2^a” on PE)
  - Intermediate monitoring point for E2E-PW ME (marked “2^b” on PE)

> Network MEs for PW service provider include:

- At T-PE
  - PSN ME (associated with monitoring points marked “3” on PE)
  - UNI ME (associated with monitoring point marked “4” on PE)
- At S-PE
  - PSN ME (associated with monitoring points marked “3” on PE)
  - NNI ME (associated with monitoring point marked “4” on PE)

Encapsulations