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Purpose: Discussion

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Abstract

This document provides the draft Corrigendum 1 to Recommendation ITU-T G.8013/Y.1731 (2015) (for consent). The base document is the draft G.8013/Y.1731, posted as [TD56/3](#) (2017).

Recommendation ITU-T G.8013/Y.1731

Operation, administration and maintenance (OAM) functions and mechanisms for Ethernet-based networks

Corrigendum 1

Summary

Corrigendum 1 to Recommendation ITU-T G.8013/Y.1731 (2015) provides:

- Editorial modification on clause 7.3.2, 9.3.2, 9.4.2, 9.6.2, 9.14.2, 9.15.2, 9.16.2, 9.22.2, 9.23.2, and 9.24.2
- Correction on Table V.1 in Appendix V
- Updates of the publishing dates on some references

Recommendation ITU-T G.8013/Y.1731

Operation, administration and maintenance (OAM) functions and mechanisms for Ethernet-based networks

Corrigendum 1

The following corrections should be made to Recommendation ITU-T G.8013/Y.1731 (2015).

1) Clause 2, Reference

Updates the following references as:

- [ITU-T G.8001] Recommendation ITU-T G.8001/Y.1354 (2016), *Terms and definitions for Ethernet frames over transport.*
- [ITU-T G.8021] Recommendation ITU-T G.8021/Y.1341 (2018), *Characteristics of Ethernet transport network equipment functional blocks.*
- [ITU-T G.8113.1] Recommendation ITU-T G.8113.1/Y.1372.1 (2016), *Operations, administration and maintenance mechanism for MPLS-TP in packet transport networks.*
- [IEEE 802.3] IEEE 802.3-2015, *IEEE Standard for Ethernet.*
<<http://standards.ieee.org/findstds/standard/802.3-2015.html>>
- [MEF 10.3] MEF 10.3 (2013), *Ethernet Services Attributes Phase 3.*
<https://www.mef.net/Assets/Technical_Specifications/PDF/MEF_10.3.pdf>

2) Clause 7.3.2, LTM reception and forwarding, and LTR transmission

Update the last paragraph:

It is noted that both included Reply Ingress TLV and Reply Egress TLV are documented as optional in [ITU-T Y.1731] so that they may not be included in the LTR frame of that version. See Annex B for keeping the compatibility.

3) Clause 9.3.2, LBM PDU format

Update this clause as:

9.3.2 LBM PDU format

The LBM PDU format used by a MEP to transmit LBM information is shown in Figure 9.3-1.

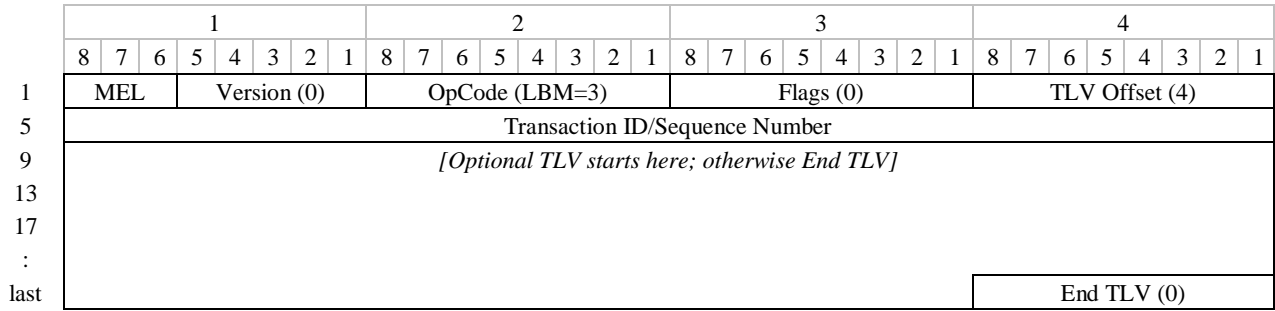


Figure 9.3-1 – LBM PDU format

The fields of the LBM PDU format are as follows:

- MEG Level: Refer to clause 9.1.
- Version: Refer to clause 9.1; value is 0 in the current version of this Recommendation.
- OpCode: value for this PDU type is LBM (3).
- Flags: Set to all-ZEROes.

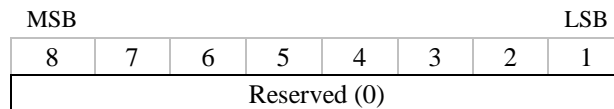


Figure 9.3-2 – Flags format in LBM PDU

- TLV Offset: Set to 4.
- Transaction ID/Sequence Number: A 4-octet value containing either the transaction number for the LBM PDU without test pattern or a Sequence number incremented for successive LBM PDUs with a test pattern.
- Optional TLV: A Data TLV or Test TLV as specified in Figure 9.3-3 or Figure 9.3-4 respectively may be included in any LBM transmitted.
- End TLV: all-ZEROes octet value.

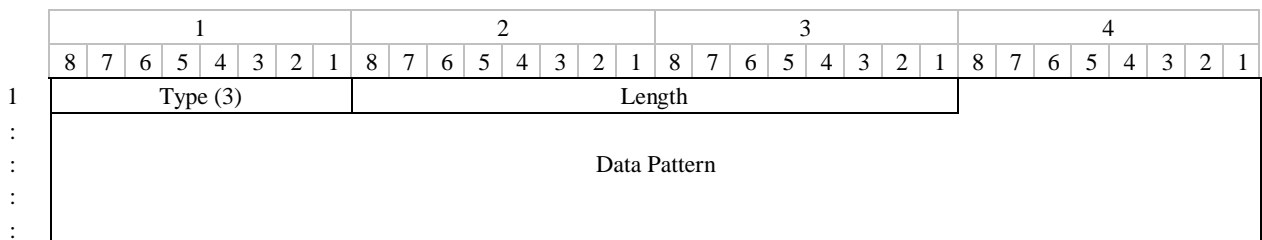


Figure 9.3-3 – Data TLV format

The fields of the Data TLV format are as follows:

- Type: identifies TLV type; value for this TLV type is Data (3).
- Length: identifies size, in octets, of the Value field containing the Data Pattern. In a frame where the PDU is limited to 1492 octets, the maximum length value is 1480 (since 12 octets are required for 8 octets of LBM PDU overhead, 3 octets of Data TLV overhead, and 1 octet of End TLV). Any other TLVs, if present in LBM, will furthermore detract from the maximum length value of 1480.

- Data Pattern: an n-octet (n = Length) arbitrary bit pattern. The receiver should ignore it.

1								2								3								4							
8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
Type (32)								Length								Pattern Type															
Test Pattern (NULL, PRBS)																															
CRC-32 (optional)																															

Figure 9.3-4 – Test TLV format

The fields of the Test TLV format are as follows:

- Type: identifies TLV type; value for this TLV type is Test (32).
- Length: identifies size, in octets, of the Value field containing the pattern type, test pattern and CRC-32. In a frame where the PDU is limited to 1492 octets, the maximum length value is 1480 octets (since 12 octets are required for 8 octets of LBM PDU overhead, 3 octets of Test TLV overhead, and 1 octet of End TLV). Any other TLVs, if present in LBM, will furthermore detract from the maximum length value of 1480. (As one octet is used for pattern type, 1479 octets are available for the test pattern.)
- Pattern Type: identifies test pattern type; values are:
 - 0 'Null signal without CRC-32'
 - 1 'Null signal with CRC-32'
 - 2 'PRBS $2^{31} - 1$ without CRC-32'
 - 3 'PRBS $2^{31} - 1$ with CRC-32'
 - 4-255 Reserved for future standardization
- Test Pattern: an n-octet ($n \leq \text{Length}$) test pattern: PRBS $2^{31} - 1$ or Null (all-zeroes) pattern.
- CRC-32: covers all fields (from Type to last octet before CRC-32).

4) Clause 9.4.2, LBR PDU format

Update this clause as:

9.4.2 LBR PDU format

The LBR PDU format used by a MEP or MIP to transmit LBR information is shown in Figure 9.4-1.

		1								2								3								4							
		8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
1		MEL			Version					OpCode (LBR=2)				Flags				TLV Offset															
5		Transaction ID/Sequence Number																															
9		<i>[Optional TLV(s) start(s) here, otherwise End TLV]</i>																															
13																																	
17																																	
:																																	
last		End TLV (0)																															

Figure 9.4-1 – LBR PDU format

The fields for the LBR PDU format are as follows:

- MEG Level: a 3-bit field the value of which is copied from the received LBM PDU.
 - Version: a 5-bit field the value of which is copied from the LBM PDU.
 - OpCode: value for this PDU type is LBR (2).
 - Flags: a 1-octet field the value of which is copied from the LBM PDU.
 - TLV Offset: a 1-octet field the value of which is copied from the LBM PDU.
 - Transaction ID/Sequence Number: a 4-octet field the value of which is copied from the LBM PDU.
 - Optional TLV(s): If present in LBM PDU, is(are) copied from the LBM PDU.
- NOTE: Per [IEEE 802.1Q], Data TLV or Test TLV are not the only type of TLVs that could be present in a LBM PDU, hence a LBR PDU could include additional TLVs
- End TLV: a 1-octet field the value of which is copied from the LBM PDU.

5) Clause 9.6.2, LTR PDU format

Update this clause as:

9.6.2 LTR PDU format

The LTR PDU format used by a MEP or MIP to transmit LTR information is shown in Figure 9.6-1.

		1								2								3								4							
		8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
1		MEL			Version (0)					OpCode (LTR=4)				Flags				TLV Offset (6)															
5		Transaction ID																															
9		TTL								Relay Action								<i>[Additional TLVs start here]</i>															
17																																	
21																																	
:																																	
last		End TLV (0)																															

Figure 9.6-1 – LTR PDU format

The fields of the LTR PDU format are as follows:

- MEG Level: a 3-bit field the value of which is copied from the received LTM PDU.
- Version: Refer to clause 9.1; value is 0 in the current version of this Recommendation.

- OpCode: value of this PDU type is LTR (4).
- Flags: The format is as shown in Figure 9.6-2.

MSB						LSB	
8	7	6	5	4	3	2	1
HWOonly	FwdYes	TerminalMEP	Reserved (0)				

Figure 9.6-2 – Flags format in LTR PDU

- HWOonly: Bit 8 (HWOonly) is copied from incoming LTM value.
 - FwdYes: Bit 7 is set to 1 if modified LTM frame was relayed, or set to 0 if no LTM frame was relayed.
 - TerminalMEP: Bit 6 is set to 1 if reply egress TLV (or reply ingress TLV, if the reply egress TLV is not present) is a MEP, or set to 0 otherwise.
 - TLV Offset: Set to 6.
 - Transaction ID: a 4-octet field the value of which is copied from the LTM PDU.
 - TTL: a 1-octet field the value of which is copied from the LTM PDU after decrementing it by one.
 - Relay Action: a 1-octet field that reports how the data frame targeted by the LTM would be passed through the MAC relay entity to the egress bridge port as described in clause 21.9.5 in [IEEE 802.1Q]. The value is defined in Table 21-27 of [IEEE 802.1Q].
 - Additional TLVs: LTR egress identifier TLV, reply ingress TLV and/or reply egress TLV as specified in Figures 9.6-3, 9.6.4 and 9.6-5 respectively.
- NOTE: Per [IEEE 802.1Q], LTR Egress Identifier TLV, Reply Ingress TLV or Reply Egress TLV are not the only type of TLVs that could be present in a LTM PDU, hence a LTR PDU could include additional TLVs.
- End TLV: all-ZEROes octet value.

	1								2								3								4							
	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
1	Type (8)								Length																							
2																	Last Egress Identifier															
3																																
4																	Next Egress Identifier															
5																																

Figure 9.6-3 – LTR egress identifier TLV format

The fields of the LTR egress identifier TLV format are as follows:

- Type: identifies TLV type; value for this TLV type is LTR egress identifier (8).
- Length: identifies size, in octets, of the Value field containing the last egress identifier and next egress identifier. This is set to 16.
- Last Egress Identifier: identifies the MEP that initiated, or ETH-LT responder that relayed the LTM frame to which this LTR frame is the response. This field is the same as the egress identifier in the LTM egress identifier TLV of the incoming LTM frame.

- Next Egress Identifier: identifies the ETH-LT responder that transmitted this LTR frame, and which can relay a modified LTM frame to the next hop. If the FwdYes bit of Flags field is 0, the contents of this field are undefined, and ignored by the LTR frame receiver. When not undefined, Octets 12 and 13 are ZEROes while the remaining six octets 14-19 contain a 48-bit IEEE MAC address unique to network element where the ETH-LT responder resides.

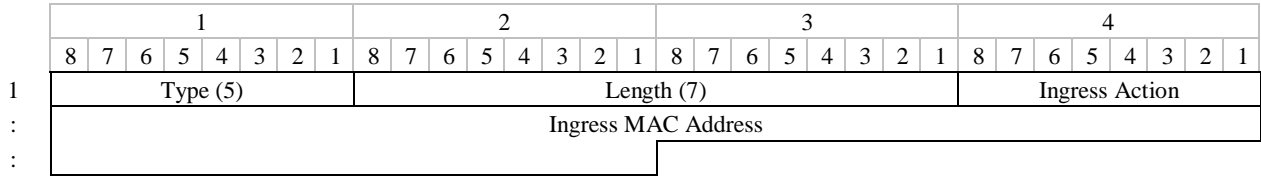


Figure 9.6-4 – Reply ingress TLV format

The fields of the reply ingress TLV format are as follows:

- Type: identifies TLV type; value for this TLV type is ingress reply (5).
- Length: identifies size, in octets, of the Value field. This is set to 7.
- Ingress Action: a 1-octet field which is reserved for definition by IEEE 802.1.
- Ingress MAC Address: a 6-octet field which is reserved for definition by IEEE 802.1.

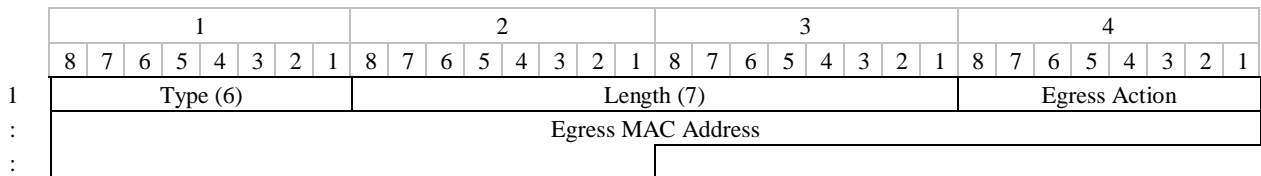


Figure 9.6-5 – Reply egress TLV format

The fields of the reply egress TLV format are as follows:

- Type: identifies TLV type; value for this TLV type is egress reply (6).
- Length: identifies size, in octets, of the Value field. This is set to 7.
- Egress Action: a 1-octet field which is reserved for definition by IEEE 802.1.
- Egress MAC Address: a 6-octet field which is reserved for definition by IEEE 802.1.

6) Clause 9.14.2, 1DM PDU format

Update this clause as:

9.14.2 1DM PDU format

The 1DM PDU format used by a MEP to transmit 1DM information is shown in Figure 9.14-1.

	1								2								3								4							
	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
1	MEL		Version (1)						OpCode (1DM=45)				Flags				TLV Offset (16)															
5	TxTimeStamp																															
9	Reserved for 1DM receiving equipment (0) (for RxTimeStamp)																															
13	<i>[Optional TLVs start(s) here; otherwise End TLV]</i>																															
17																																
21																																
25																																
29																																
:																																
last																									End TLV (0)							

Figure 9.14-1 – 1DM PDU format

The fields of the 1DM PDU format are as follows:

- MEG Level: Refer to clause 9.1.
- Version: Refer to clause 9.1; value for the 1DM PDU on this version is set to 1.
- OpCode: value for this PDU type is 1DM (45).
- Flags: One information element in the Flags field, the LSB bit (Type), is used to indicate the type of the 1DM operation as follows:

MSB							LSB
8	7	6	5	4	3	2	1
Reserved (0)							Type

Figure 9.14-2 – Flags format in 1DM PDU

- Type: Bit 1 is set to 1 if it is the proactive operation, or set to 0 if it is the on-demand operation.
- TLV Offset: Set to 16.
- TxTimeStamp: an 8-octet transmit time stamp field as described in clause 9.14.1.
- Reserved: an 8-octet reserved field set to all-ZEROes.
- Optional TLV(s): A Test ID TLV as specified in Figure 9.14-3 and/or a Data TLV as specified in Figure 9.3-3, with configurable size, in octets may be included in any 1DM transmitted. When a Test ID TLV is included in this field, it is recommended to put Test ID TLV first (prior to Data TLV). For the purpose of ETH-DM, the value part of Data TLV is unspecified.
- End TLV: all-ZEROes octet value.

	1								2								3								4							
	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
1	Type (36)								Length								Test ID															
5	Test ID																															

Figure 9.14-3 – Test ID TLV format

The fields of the Test ID TLV format are as follows:

- Type: identifies TLV type; value for this TLV type is Test ID (36).

- Length: identifies size. Must be 32.
- Test ID: Test ID is a 4-octet field set by the transmitting MEP when used to run multiple tests simultaneously between MEPs.

7) Clause 9.15.2, DMM PDU format

Update this clause as:

9.15.2 DMM PDU format

The DMM PDU format used by a MEP to transmit DMM information is shown in Figure 9.15-1.

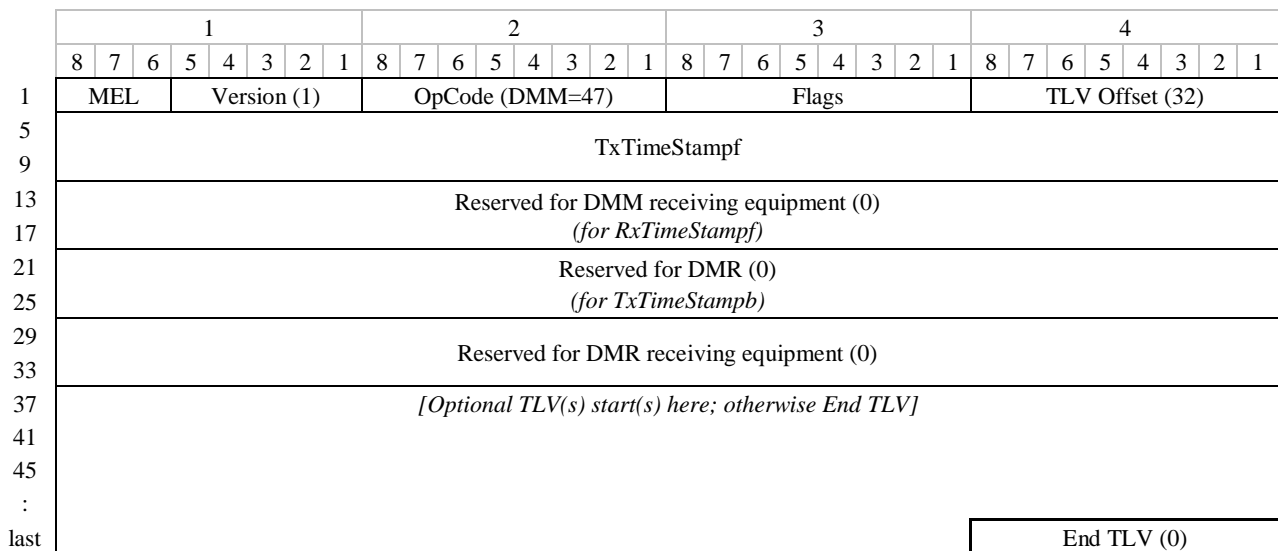


Figure 9.15-1 – DMM PDU format

The fields of the DMM PDU format are as follows:

- MEG Level: Refer to clause 9.1.
- Version: Refer to clause 9.1; value for the DMM PDU is set to 1.
- OpCode: value for this PDU type is DMM (47).
- Flags: Set to all-ZEROes. One information elements in the Flags field, the LSB bit (Type), is used to indicate the type of the DMM operation as follows:

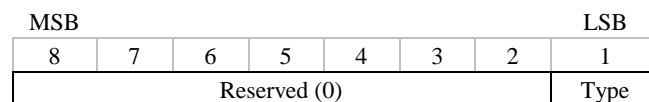


Figure 9.15-2 – Flags format in DMM PDU

- Type: Bit 1 is set to 1 if it is the proactive operation, or set to 0 if it is the on-demand operation.
- TLV Offset: Set to 32.
- TxTimeStampf: an 8-octet transmit time stamp field as described in clause 9.15.1.
- Reserved: 24-octet reserved fields are set to all-ZEROes.

- Optional TLV(s): A Test ID TLV as specified in Figure 9.14-3 and/or a Data TLV as specified in Figure 9.3-3, with configurable size, in octets may be included in any DMM transmitted. When a Test ID TLV is included in this field, it is recommended to put Test ID TLV first (prior to Data TLV). For the purpose of ETH-DM, the value part of Data TLV is unspecified.
- End TLV: an all-ZEROes octet value.

8) Clause 9.16.2, DMR PDU format

Updates this clause as below:

9.16.2 DMR PDU format

The DMR PDU format used by a MEP to transmit DMR information is shown in Figure 9.16-1.

	1								2								3								4							
	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
1	MEL				Version				OpCode (DMR=46)				Flags				TLV Offset															
5	TxTimeStampf																															
9	RxTimeStampf																															
13	TxTimeStampb																															
17	Reserved for DMR receiving equipment (0)																															
21	<i>(for RxTimeStampb)</i>																															
25	<i>[Optional TLV(s) start(s) here; otherwise End TLV]</i>																															
29																																
33																																
37																																
41																																
45																																
:																																
last																																
t	End TLV (0)																															

Figure 9.16-1 – DMR PDU format

The fields of the DMR PDU format are as follows:

- MEG Level: a 3-bit field the value of which is copied from the last received DMM PDU.
- Version: a 5-bit field the value of which is copied from the last received DMM PDU.
- OpCode: value for this PDU type is DMR (46).
- Flags: a 1-octet field the value of which is copied from the last received DMM PDU.
- TLV Offset: a 1-octet field the value of which is copied from the last received DMM PDU.
- TxTimeStampf: an 8-octet field the value of which is copied from last received DMM PDU.
- RxTimeStampf: an 8-octet transmit time stamp field as described in clause 9.16.1.
- TxTimeStampb: an 8-octet transmit time stamp field as described in clause 9.16.1.
- Reserved: Reserved fields are set to all ZEROes.
- Optional TLV(s): If present in DMM PDU, is(are) copied from the DMM PDU. The order of the Optional TLVs is preserved.
- End TLV: a 1-octet field the value of which is copied from the DMM PDU.

9) Clause 9.22.2, SLM PDU format

Updates this clause as below:

9.22.2 SLM PDU format

The SLM PDU format used by a MEP to transmit SLM information is shown in Figure 9.22-1.

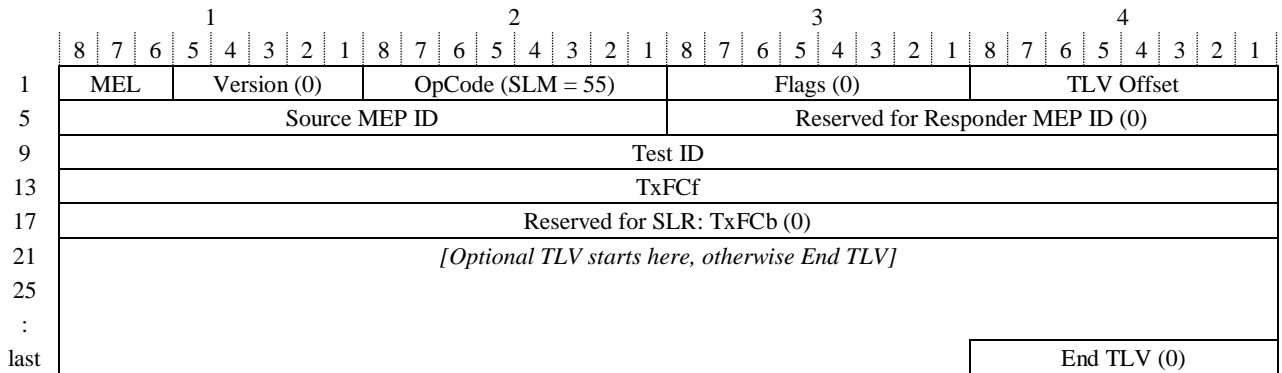


Figure 9.22-1 – SLM PDU format

The fields of the SLM PDU format are as follows:

- MEG Level: Refer to clause 9.1.
- Version: Refer to clause 9.1; value is 0 in the current version of this Recommendation.
- OpCode: value for this PDU type is SLM (55).
- Flags: Set to all-ZEROes.
- TLV Offset: Set to 16.
- Reserved: Reserved fields are set to all ZEROes.
- Source MEP ID: a 2-octet field used to identify the MEP transmitting the SLM frame, as specified in clause 9.22.1.
- Test ID: a 4-octet field used to identify a unique test among MEPs, as specified in clause 9.22.1.
- TxFCf: a 4-octet integer value representing the number of SLM frames transmitted, as specified in clause 9.22.1.
- Optional TLV: A Data TLV as specified in Figure 9.3-3 may be included in any SLM transmitted. For the purpose of ETH-SLM, the value part of Data TLV is unspecified.
- End TLV: an all-ZEROes octet value.

10) Clause 9.23.2, SLR PDU format

Update this clause as:

9.23.2 SLR PDU format

The SLR PDU format used by a MEP to transmit SLR information is shown in Figure 9.23-1.

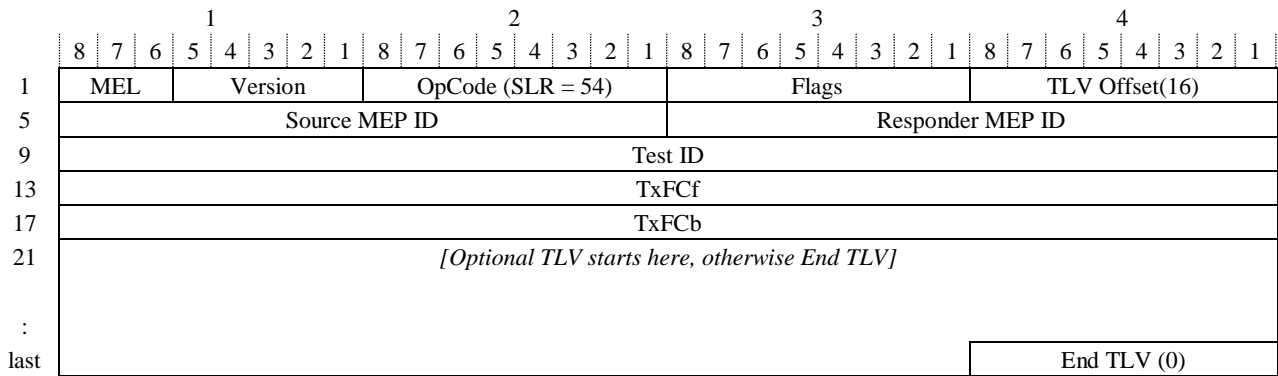


Figure 9.23-1 – SLR PDU format

The fields of the SLR PDU format are as follows:

- MEG Level: a 3-bit field the value of which is copied from the last received SLM PDU.
- Version: a 5-bit field the value of which is copied from the last received SLM PDU.
- OpCode: value for this PDU type is SLR (54).
- Flags: a 1-octet field the value of which is copied from the SLM PDU.
- TLV Offset: a 1-octet field the value of which is copied from the SLM PDU.
- Reserved: Reserved fields are set to all ZEROes.
- Source MEP ID: a 2-octet field the value of which is copied from the SLM PDU.
- Responder MEP ID: a 2-octet field used to identify the MEP transmitting the SLR frame, as specified in clause 9.22.1.
- Test ID: a 4-octet field the value of which is copied from the SLM PDU.
- TxFCf: a 4-octet field the value of which is copied from the SLM PDU.
- TxFCb: a 4-octet integer value representing the number of SLR frames transmitted, as specified in clause 9.22.1.
- Optional TLV: If present in SLM PDU, is copied from the SLM PDU.
- End TLV: a 1-octet field the value of which is copied from the SLM PDU.

11) Clause 9.24.2, 1SL PDU format

Update this clause as:

9.24.2 1SL PDU format

The 1SL PDU format used by a MEP to transmit 1SL information is shown in Figure 9.24-1.

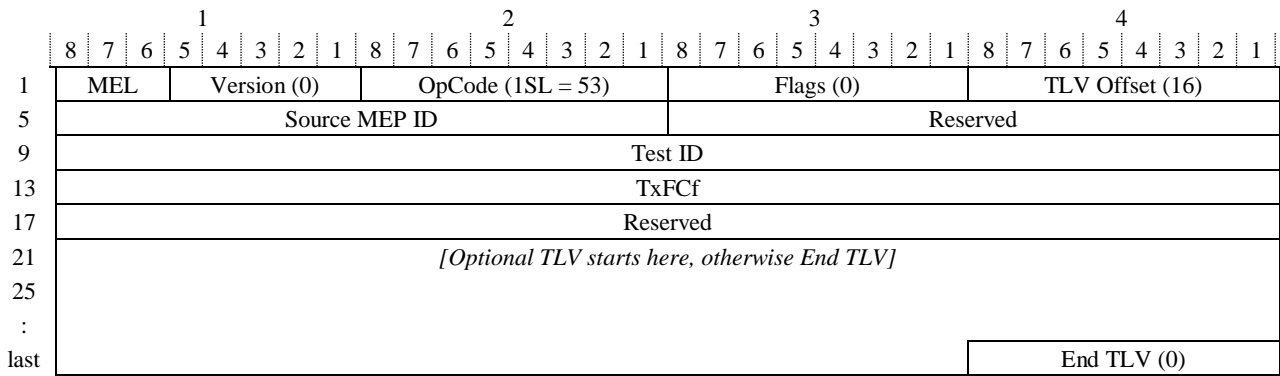


Figure 9.24-1 – 1SL PDU format

The fields of the 1SL PDU format are as follows:

- MEG Level: Refer to clause 9.1.
- Version: Refer to clause 9.1; value is 0 in the current version of this Recommendation.
- OpCode: value for this PDU type is 1SL (53).
- Flags: Set to all-ZEROes.
- TLV Offset: Set to 16.
- Reserved: Reserved fields are set to all ZEROes.
- Source MEP ID: a 2-octet field used to identify the MEP transmitting the 1SL frame, as specified in clause 9.24.1.
- Test ID: a 4-octet field used to identify a unique test among MEPs, as specified in clause 9.24.1.
- TxFCf: a 4-octet integer value representing the number of 1SL frames transmitted, as specified in clause 9.24.1.
- Optional TLV: A Data TLV as specified in Figure 9.3-3 may be included in any 1SL transmitted. For the purpose of ETH-SLM, the value part of Data TLV is unspecified
- End TLV: an all-ZEROes octet value.

12) Appendix V, Terminology alignment with [IEEE 802.1Q]

Update Table V.1 as:

Table V.1 – Terminology mapping

ITU-T G.8013/Y.1731 term	IEEE 802.1Q term	Comments
MEG	MA	
MEG ID	MAID (Domain Name + Short MA Name)	Unlike in [IEEE 802.1Q], the MEG ID does not imply a split between domain name and a short MEG name in this Recommendation.
MEG level	MD Level	