Internet Engineering Task Force
Internet-Draft
Intended status: Standards Track
Expires: September 7, 2015

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March 6, 2015

Extension to the Link Management Protocol (LMP/DWDM -rfc4209) for Dense Wavelength Division Multiplexing (DWDM) Optical Line Systems to manage the application code of optical interface parameters in DWDM application

draft-dharinigert-ccamp-g-698-2-lmp-09

Abstract

This memo defines extensions to LMP(rfc4209) for managing Optical parameters associated with Wavelength Division Multiplexing (WDM) systems or characterized by the Optical Transport Network (OTN) in accordance with the Interface Application Code approach defined in ITU-T Recommendation G.698.2.[ITU.G698.2], G.694.1.[ITU.G694.1] and its extensions.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on September 7, 2015.

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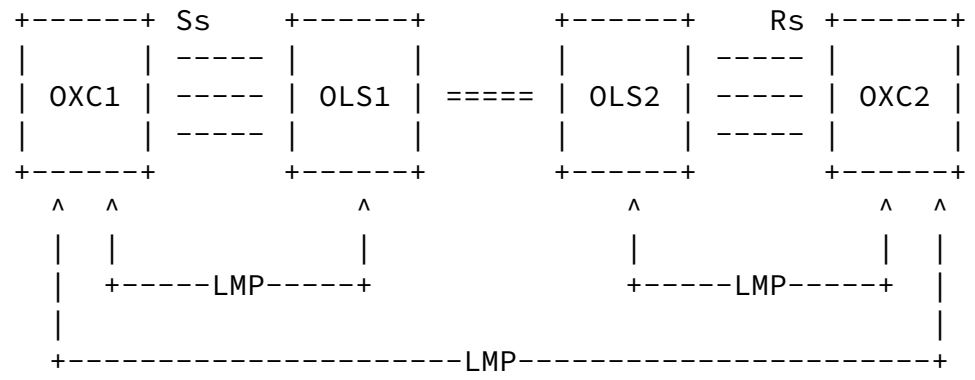
1. Introduction

This extension is based on "draft-galikunze-ccamp-g-698-2-snmp-mib-09", for the relevant interface optical parameters described in recommendations like ITU-T G.698.2 [ITU.G698.2] and G.694.1.[ITU.G694.1]. The LMP Model from RFC4902 provides link property correlation between a client and an OLS device. LMP link property correlation, exchanges the capabilities of either end of the link where the term 'link' refers to the attachment link between OXC and OLS (see Figure 1). By performing link property correlation, both ends of the link exchange link properties, such as application identifiers. This allows either end to operate within a commonly understood parameter window. Based on known parameter limits, each

device can supervise the received signal for conformance using mechanisms defined in RFC3591. For example if the Client transmitter power (OXC1) has a value of 0dBm and the ROADM interface measured power (at OLS1) is -6dBm the fiber patch cord connecting the two nodes may be pinched or the connectors are dirty. More, the

interface characteristics can be used by the OLS network Control Plane in order to check the Optical Channels feasibility. Finally the OXC1 transceivers parameters (Application Code) can be shared with OXC2 using the LMP protocol to verify the Transceivers compatibility. The actual route selection of a specific wavelength within the allowed set is outside the scope of LMP. In GMPLS, the parameter selection (e.g. central frequency) is performed by RSVP-TE.

Figure 1 Extended LMP Model (from [RFC4209])



OXC : is an entity that contains transponders
OLS : generic optical system, it can be - Optical Mux, Optical Demux, Optical Add Drop Mux, etc.
OLS to OLS : represents the black-Link itself
Rs/Ss : in between the OXC and the OLS

Figure 1: Extended LMP Model

2. Extensions to LMP-WDM Protocol

This document defines extensions to [RFC4209] to allow the Black Link

(BL) parameters of G.698.2, to be exchanged between a router or optical switch and the optical line system to which it is attached. In particular, this document defines additional Data Link sub-objects to be carried in the LinkSummary message defined in [RFC4204] and [RFC6205]. The OXC and OLS systems may be managed by different Network management systems and hence may not know the capability and status of their peer. The intent of this draft is to enable the OXC and OLS systems to exchange this information. These messages and their usage are defined in subsequent sections of this document.

The following new messages are defined for the WDM extension for ITU-T G.698.2 [ITU.G698.2]/ITU-T G.698.1 [ITU.G698.1]/ ITU-T G.959.1 [ITU.G959.1]

- OCh_General (sub-object Type = TBA)
- OCh_ApplicationIdentier (sub-object Type = TBA)
- OCh_Ss (sub-object Type = TBA)
- OCh_Rs (sub-object Type = TBA)

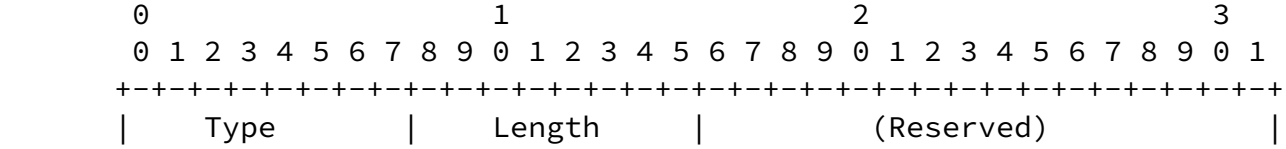
3. General Parameters - OCh_General

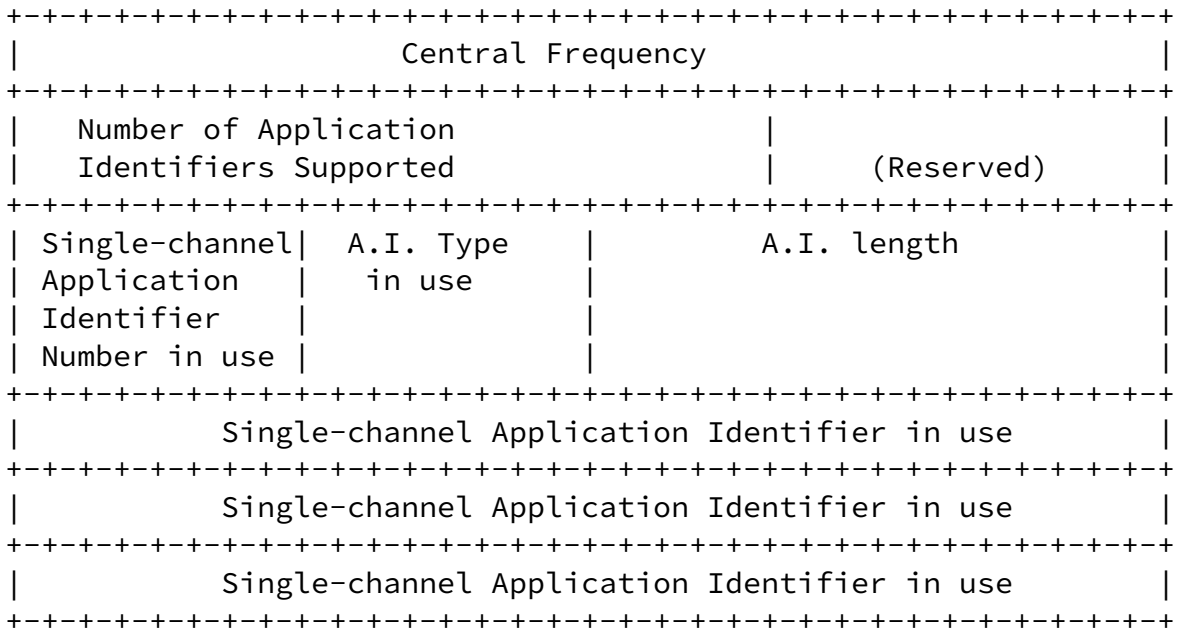
These are the general parameters as described in [G698.2] and [G.694.1]. Please refer to the "draft-galikunze-ccamp-g-698-2-snmp-mib-09" for more details about these parameters and the [RFC6205] for the wavelength definition.

The general parameters are

1. Central Frequency - (Tera Hertz) 4 bytes (see RFC6205 sec.3.2)
2. Number of Application Identifiers (A.I.) Supported
3. Single-channel Application Identifier in use
4. Application Identifier Type in use
5. Application Identifier in use

Figure 2: The format of the this sub-object (Type = TBA, Length = TBA) is as follows:

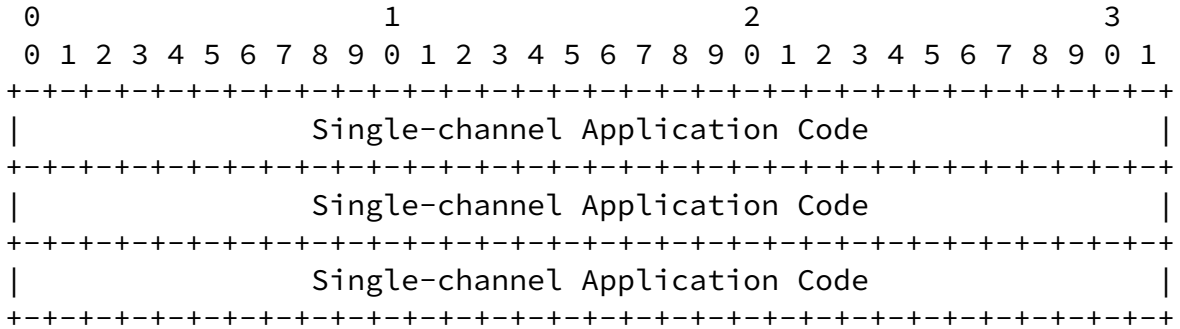




A.I. Type in use: STANDARD, PROPRIETARY

A.I. Type in use: STANDARD

Refer to G.698.2 recommendation : B-DScW-ytz(v)



A.I. Type in use: PROPRIETARY

Note: if the A.I. type = PROPRIETARY, the first 6 Octets of the Application Identifier in use are six characters of the PrintableString must contain the Hexadecimal representation of

an OUI (Organizationally Unique Identifier) assigned to the vendor whose implementation generated the Application Identifier; the remaining octets of the PrintableString are unspecified.

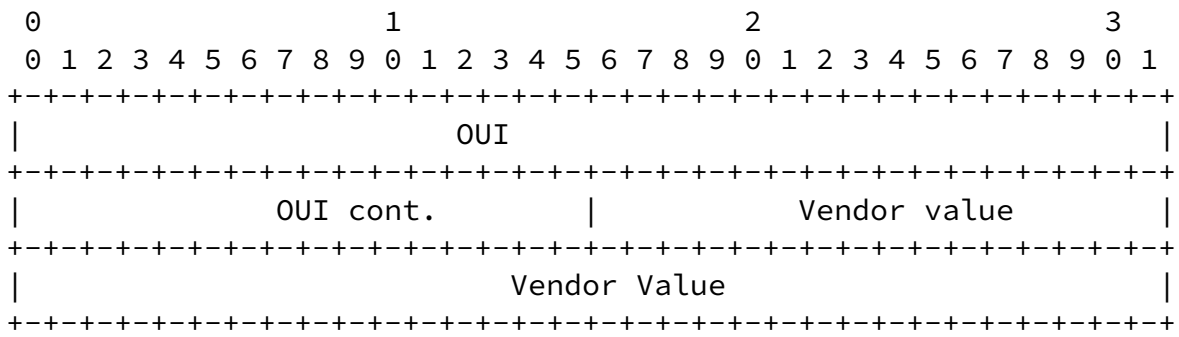


Figure 2: OCh_General

4. ApplicationIdentifier - OCh_ApplicationIdentifier

This message is to exchange the application identifiers supported as described in [G698.2]. Please refer to the "draft-galikunze-ccamp-g-698-2-snmp-mib-09". For more details about these parameters. There can be more than one Application Identifier supported by the OXC/OLS. The number of application identifiers supported is

exchanged in the "OCh_General" message. (from [G698.1]/[G698.2]/[G959.1] and G.874.1)

The parameters are

1. Number of Application Identifiers (A.I.) Supported

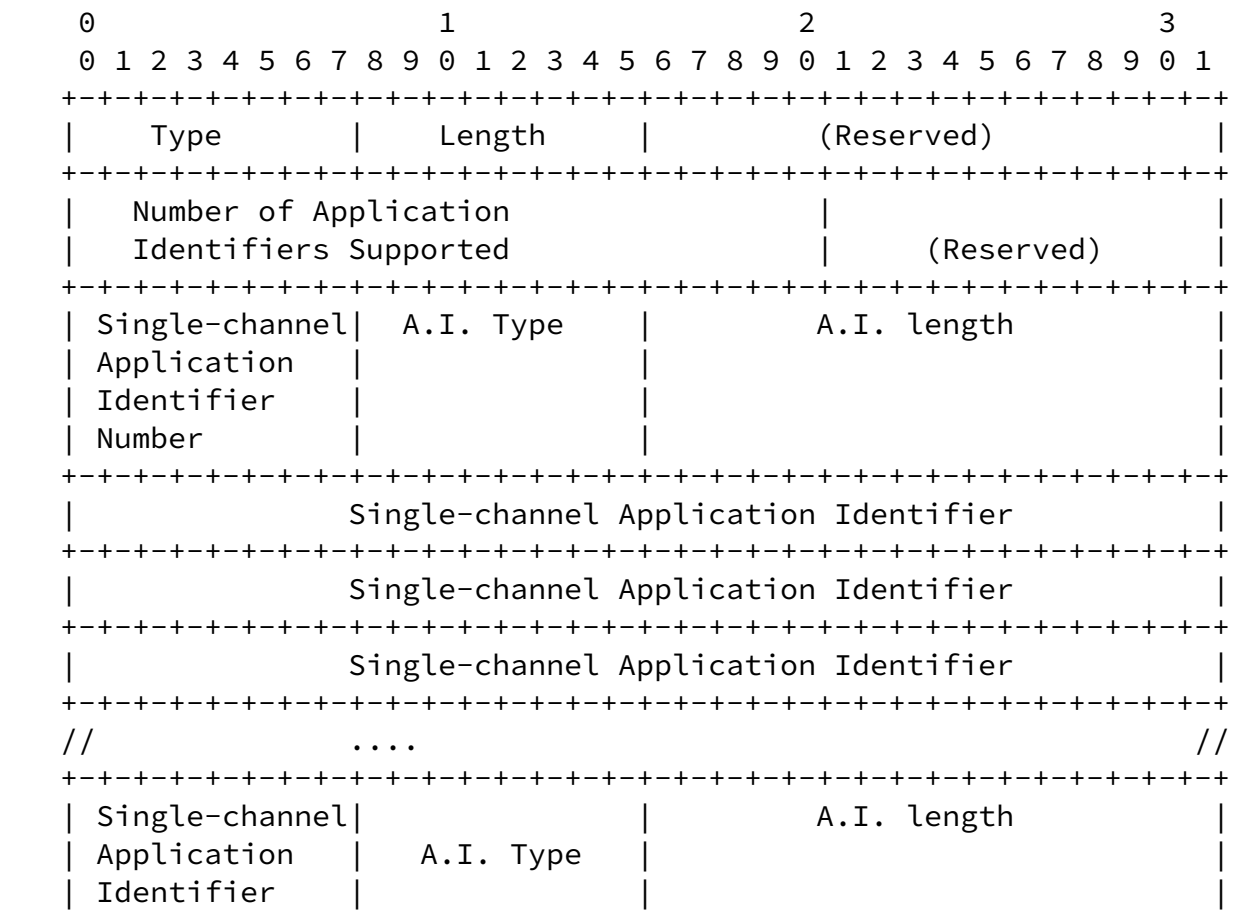
2. Single-channel application identifier Number uniquely identifiers this entry - 8 bits

3. Application Indentifier Type (A.I.) (STANDARD/PROPRIETARY)

4. Single-channel application identifier -- 96 bits (from [G698.1]/[G698.2]/[G959.1]

- this parameter can have
    multiple instances as the transceiver can support multiple
    application identifiers.

Figure 3: The format of the this sub-object (Type = TBA, Length = TBA) is as follows:



```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

A.I. Type in use: STANDARD, PROPRIETARY

A.I. Type in use: STANDARD
Refer to G.698.2 recommendation : B-DScW-ytz(v)

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                Single-channel Application Code                |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                Single-channel Application Code                |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                Single-channel Application Code                |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

A.I. Type in use: PROPRIETARY

Note: if the A.I. type = PROPRIETARY, the first 6 Octets of the Application Identifier in use are six characters of the PrintableString must contain the Hexadecimal representation of an OUI (Organizationally Unique Identifier) assigned to the vendor whose implementation generated the Application Identifier; the remaining octets of the PrintableString are unspecified.

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                          OUI                                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|               OUI cont.        |           Vendor value       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                            Vendor Value                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 3: OCh_ApplicationIdentifier

5. OCh_Ss - OCh transmit parameters

These are the G.698.2 parameters at the Source(Ss reference points). Please refer to "draft-galikunze-ccamp-g-698-2-snmp-mib-09" for more details about these parameters.

1. Output power

Figure 4: The format of the OCh sub-object (Type = TBA, Length = TBA) is as follows:

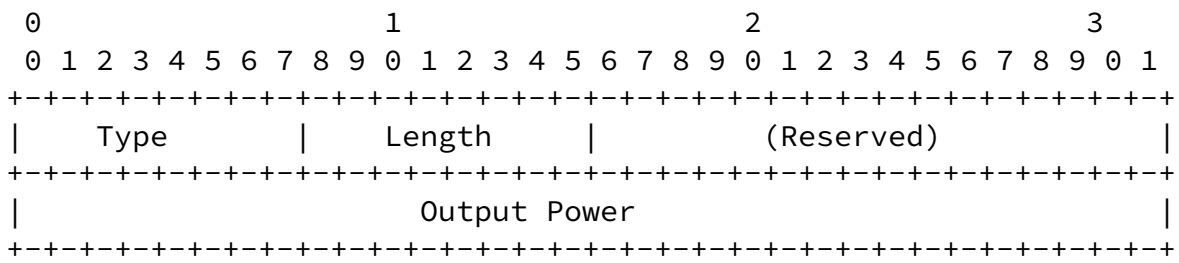


Figure 4: OCh_Ss transmit parameters

6. OCh_Rs - receive parameters

These are the G.698.2 parameters at the Sink (Rs reference points). Please refer to the "draft-galikunze-ccamp-g-698-2-snmp-mib-09" for more details about these parameters.

1. Current Input Power - (0.1dbm) 4bytes

Figure 5: The format of the OCh receive sub-object (Type = TBA, Length = TBA) is as follows:

The format of the OCh receive/OLS Sink sub-object (Type = TBA, Length = TBA) is as follows:

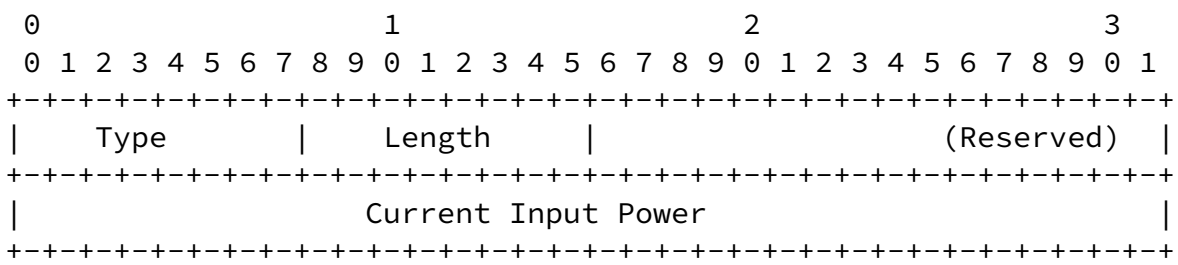


Figure 5: OCh_Rs receive parameters

7. Security Considerations

LMP message security uses IPsec, as described in [RFC4204]. This document only defines new LMP objects that are carried in existing LMP messages, similar to the LMP objects in [RFC:4209]. This document does not introduce new security considerations.

8. IANA Considerations

LMP <xref target="RFC4204"/> defines the following name spaces and the ways in which IANA can make assignments to these namespaces:

- LMP Message Type
- LMP Object Class
- LMP Object Class type (C-Type) unique within the Object Class
- LMP Sub-object Class type (Type) unique within the Object Class

This memo introduces the following new assignments:

LMP Sub-Object Class names:

under DATA_LINK Class name (as defined in <xref target="RFC4204"/>)

- OCh_General (sub-object Type = TBA)
  - OCh_ApplicationIdentifier (sub-object Type = TBA)
  - OCh_Ss (sub-object Type = TBA)
  - OCh_Rs (sub-object Type = TBA)

9. References

9.1. Normative References

[RFC4204] Lang, J., "Link Management Protocol (LMP)", RFC 4204, October 2005.

[RFC4209] Fredette, A. and J. Lang, "Link Management Protocol (LMP) for Dense Wavelength Division Multiplexing (DWDM) Optical Line Systems", RFC 4209, October 2005.

[RFC6205] Otani, T. and D. Li, "Generalized Labels for Lambda-Switch-Capable (LSC) Label Switching Routers", RFC 6205, March 2011.

[RFC4054] Strand, J. and A. Chiu, "Impairments and Other Constraints on Optical Layer Routing", RFC 4054, May 2005.

[ITU.G698.2] International Telecommunications Union, "Amplified multichannel dense wavelength division multiplexing applications with single channel optical interfaces", ITU-T Recommendation G.698.2, November 2009.

[ITU.G694.1] International Telecommunications Union, ""Spectral grids for WDM applications: DWDM frequency grid"", ITU-T Recommendation G.698.2, February 2012.

[ITU.G709] International Telecommunications Union, "Interface for the Optical Transport Network (OTN)", ITU-T Recommendation G.709, February 2012.

[ITU.G872] International Telecommunications Union, "Architecture of optical transport networks", ITU-T Recommendation G.872, October 2012.

[ITU.G874.1]
International Telecommunications Union, "Optical transport network (OTN): Protocol-neutral management information model for the network element view", ITU-T Recommendation G.874.1, October 2012.

9.2. Informative References

[I-D.galimbe-kunze-g-698-2-snmp-mib]
Kunze, R. and D. Hiremagalur, "A SNMP MIB to manage black-link optical interface parameters of DWDM applications", draft-galimbe-kunze-g-698-2-snmp-mib-02 (work in progress), March 2012.

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