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Extension to the Link Management Protocol (LMP/DWDM -rfc4209) for Dense Wavelength Division Multiplexing (DWDM) Optical Line Systems to manage optical parameters of DWDM applications
[draft-dharinigert-ccamp-opt-imp-lmp-00](#)

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 parameters defined in ITU-T Recommendation G.698.2.[[ITU.G698.2](#)], G.694.1.[[ITU.G694.1](#)] and their extensions./>

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Internet-Draft [draft-dharinigert-ccamp-opt-imp-lmp-00](#)

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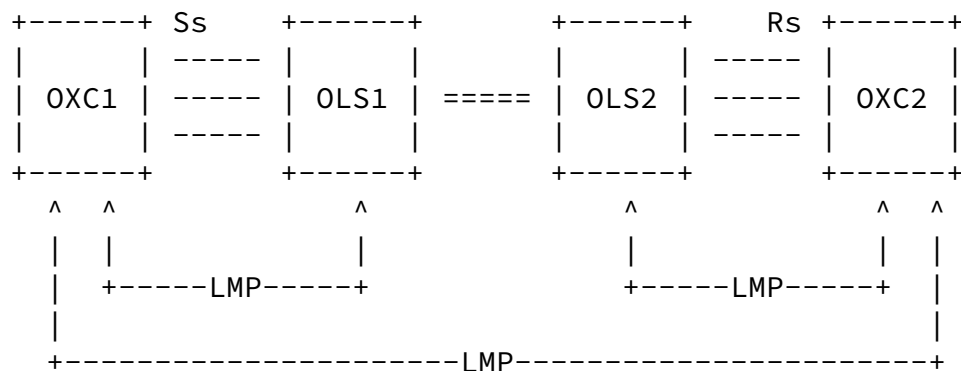
[1.](#) Introduction

This extension is based on "[draft-galikusze-ccamp-opt-imp-snmp-mib-00](#)" and "[draft-kunze-g-698-2-management-control-framework-02](#)", for the relevant optical parameters mainly (but not restricted to) described in recommendations like ITU-T G.698.2 [[ITU.G698.2](#)] and G.694.1 [[ITU.G694.1](#)]. This document further extend the [draft-dharinigert-ccamp-g-698-2-lmp-03](#). The LMP Model from [RFC4902](#) is extended to provide link property correlation between a client and an OLS device. By using LMP, the capabilities of either end of this link are exchanged 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 can agree on a common parameter window that can be supported and supervised by each device. The actual selection of a specific parameter value within the parameter window is outside the scope of LMP. In GMPLS the parameter selection

(e.g. wavelength) is performed by RSVP-TE and Wavelength routing by IGP. This document does not include the ITU-T G.698.2 "application-code" and few other parameters described in the draft [draft-dharinigert-ccamp-g-698-2-lmp-03](#)

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 : inbetween 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, as described in the draft [draft-kunze-g-698-2-management-control-framework-02](#), 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]

- BL_General (sub-object Type = TBA)
- BL_Ss (sub-object Type = TBA)
- BL_SsRs (sub-object Type = TBA)
- BL_Rs (sub-object Type = TBA)
- BL_OLS_Status (sub-object Type = TBA)

3. Optical General Parameters - OP_General

These are the general parameters as described in [G698.2] and [G.694.1]. Please refer to the "[draft-galikusze-ccamp-g-698-2-snmplib-02](#)" for more details about these parameters and the [[RFC6205](#)] for the wavelength definition.

The general parameters are

1. Min Wavelength Range - (Tera Hertz) 4 bytes (see [RFC6205](#) sec.3.2 and 3.3 TLV): Grid/Cannel Spacing/Identifier/n
2. Max Wavelength Range - (Tera Hertz) 4 bytes (see [RFC6205](#) sec.3.2 and 3.3 TLV): Grid/Cannel Spacing/Identifier/n
3. BER mantisa - 4 bytes
4. BER exponent - 4 bytes
5. FEC Coding - 1 byte
6. Administrative state - 1 byte
7. Operation state - 1 byte

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

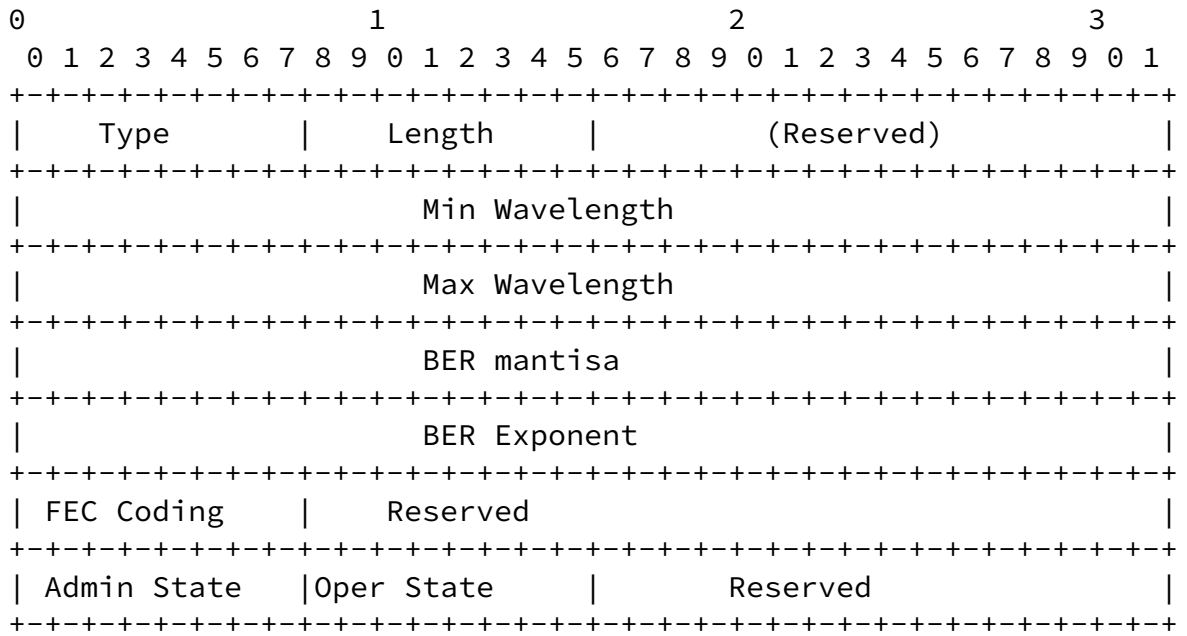


Figure 2: OP_General

4. Vendor Transceiver Class - OP_VendorClass

These are the general parameters as described in [G698.2]. Please refer to the "[draft-galikunze-ccamp-g-698-2-snmp-mib-02](#)". for more details about these parameters.

The general parameters are

1. Vendor Transceiver Class -- 32 bytes

When Single-channel application code (which is defined in G.698.2) is used in the message, then the vendor transaction class need not be used (i.e. all 0) and the optional parameters except nominal central frequency need not be used. When vendor transaction class is used in the message, then the Single-channel application code need not be used (i.e. all 0) and the optional parameters needs to be used.

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

TBA) is as follows:

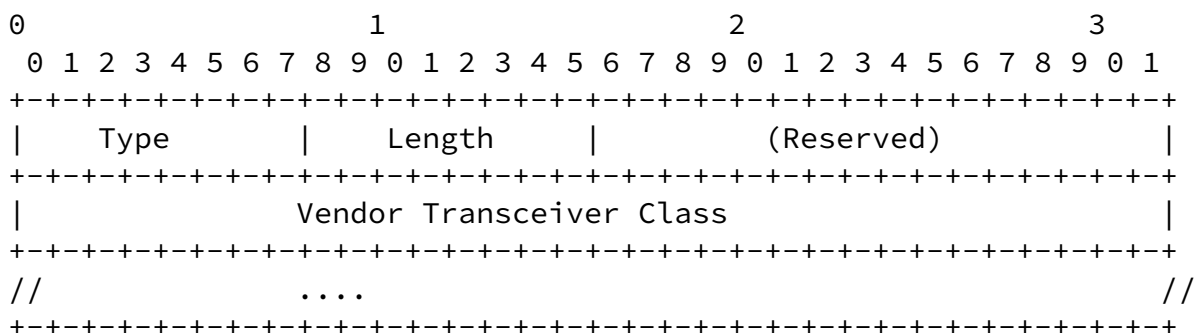


Figure 3: Vendor Transceiver Class

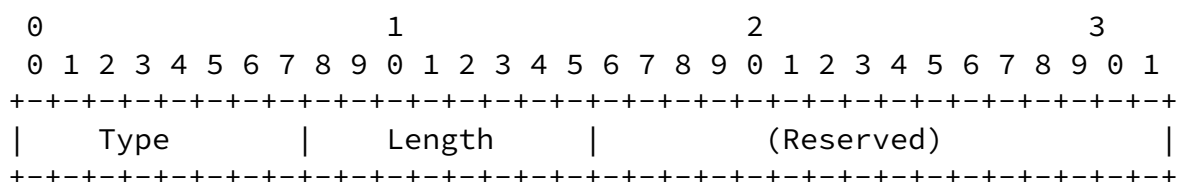
5. Optical Parameters - OP_Ss

These are the G.698.2 parameters at the Source(Ss reference points). Please refer to "[draft-galikusze-ccamp-g-698-2-snmp-mib-02](#)" for more details about these parameters.

1. Minimum Central Frequency - (THz) 4 bytes (see [RFC6205](#) sec.3.2 and 3.3 TLV): Grid / Cannel Spacing / Identifier / n
2. Maximum Central Frequency - (THz) 4 bytes (see [RFC6205](#) sec.3.2 and 3.3 TLV): Grid / Cannel Spacing / Identifier / n

3. Maximum Spectral Excursion - (0.1 GHz) 4 bytes
4. Maximum Tx Dispersion OSNR Penalty - (0.1 dbm) 4 bytes
5. Current Output Power - (0.1dbm) 4 bytes
6. Status of TX - Status of the Transmit link at OXC - 4 bytes

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



Minimum Central Frequency
Maximum Central Frequency
Maximum Spectral Excursion
Maximum Tx Dispersion OSNR Penalty
Current Output Power
Status of TX

Figure 4: Optical Parameters - OP_Ss

6. Optical Parameters - OP_SsRs

These are the G.698.2 parameters for the path (Ss-Rs). Please refer to the "[draft-galikusze-ccamp-g-698-2-snmp-mib-02](#)" for more details about these parameters.

1. Minimum Chromatic Dispersion - (ps/nm) 4 bytes
2. Maximum Chromatic Dispersion -(ps/nm) 4 bytes
3. Minimum Src Optical ReturnLoss -(0.1 db) 4 bytes
4. Maximum Discrete Reflectance Src To Sink - (0.1 db) 4 bytes
5. Maximum Differential Group Delay - (ps) 4 bytes
6. Maximum Polarisation Dependent Loss - (0.1 db) 4 bytes
7. Maximum Inter Channel Crosstalk - (0.1 db) 4 bytes
8. Interferometric Crosstalk - (0.1 db) 4 bytes
9. Optical Path OSNR Penalty - (0.1 db) 4 bytes
10. Fiber type - 1 byte

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

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

Type	Length	(Reserved)
	Minimum Chromatic Dispersion	
	Maximum Chromatic Dispersion	
	Minimum Src Optical ReturnLoss	
	Maximum Discrete Reflectance Src To Sink	
	Maximum Differential Group Delay	
	Maximum Polarisation Dependent Loss	
	Maximum Inter Channel Crosstalk	
	Interferometric Crosstalk	
	Optical Path OSNR Penalty	
Fiber Type	Reserved	

Figure 5: Optical Parameters - OP_SsRs

7. Optical Parameters - OP_Rs

These are the G.698.2 parameters at the Sink (Rs reference points). Please refer to the "[draft-galikusze-ccamp-g-698-2-snmp-mib-02](#)" for more details about these parameters.

1. Threshold of the input power at OLS - The power level above which the OLS will not function (0.1dbm) 4bytes
2. Current Optical OSNR (0.1dB)
3. Q factor
4. Post FEC BER Mantissa
5. Post FEC BER Exponent
6. Status of RX - Status of the Receive link at OXC - 2bytes

Figure 6: The format of the Black link sub-object (Type = TBA, Length

= TBA) is as follows:

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

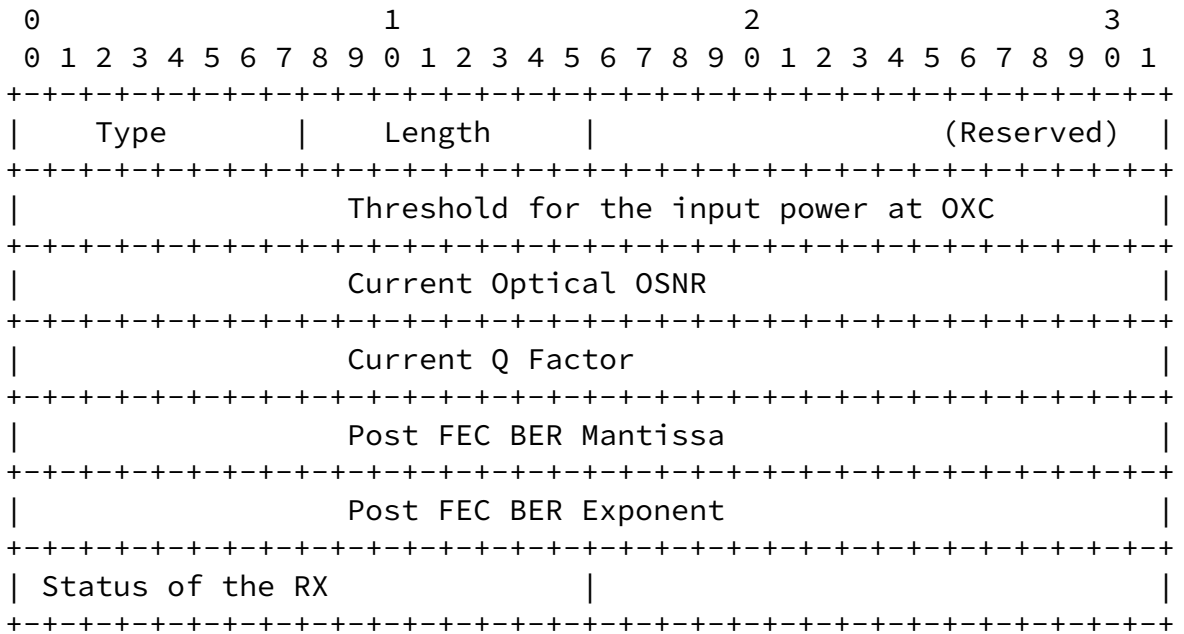


Figure 6: Optical Parameters - OP_Rs

8. DWDM Network - OLS_Status

This message is sent by the OLS to the OXC. It includes the wavelength information and the status of the OLS.

1. Wavelength - The wavelength which has been accepted by the OLS (Tera Hertz) 4 bytes. (see [RFC6205](#) sec.3.2 and 3.3 TLV): Grid / Cannel Spacing / Identifier / n
2. Length of the Wavelength Availability Map 1 byte
3. Wavelenth Availability bits - variable bits depending on the nunner of wavelengths available (For eg 96 bits for C-band 50GHz) (Allocation is in multiples of 1byte - 96 bits - 12 bytes)
0 - wavelength is available, 1 - used - variable length
4. Current Input Power (0.1dbm) 4 bytes
- This is the current input power at OLS
5. Delta between output power at the Src(OXC)and Input Power at OLS (0.1dbm) 4 bytes
- This is the delta between the input power and the transmitted output power at the OXC (from message 2.2 BL_Src)
6. Threshold of the input power at OLS 4 bytes
- This is the power level above which the OLS will not function.
7. Current Output Power (0.1dbm) 4 bytes

- This is the transmitted output power at the OLS.
- 8. Status of Rx link at OLS 2 bytes
 - Status of the Receive link at the OLS
- 9. Status of Tx link at OLS 2 bytes
 - Status of the Transmit link at the OLS

Figure 7: The format of the Black link sub-object (Type = TBA, Length = TBA) is as follows:

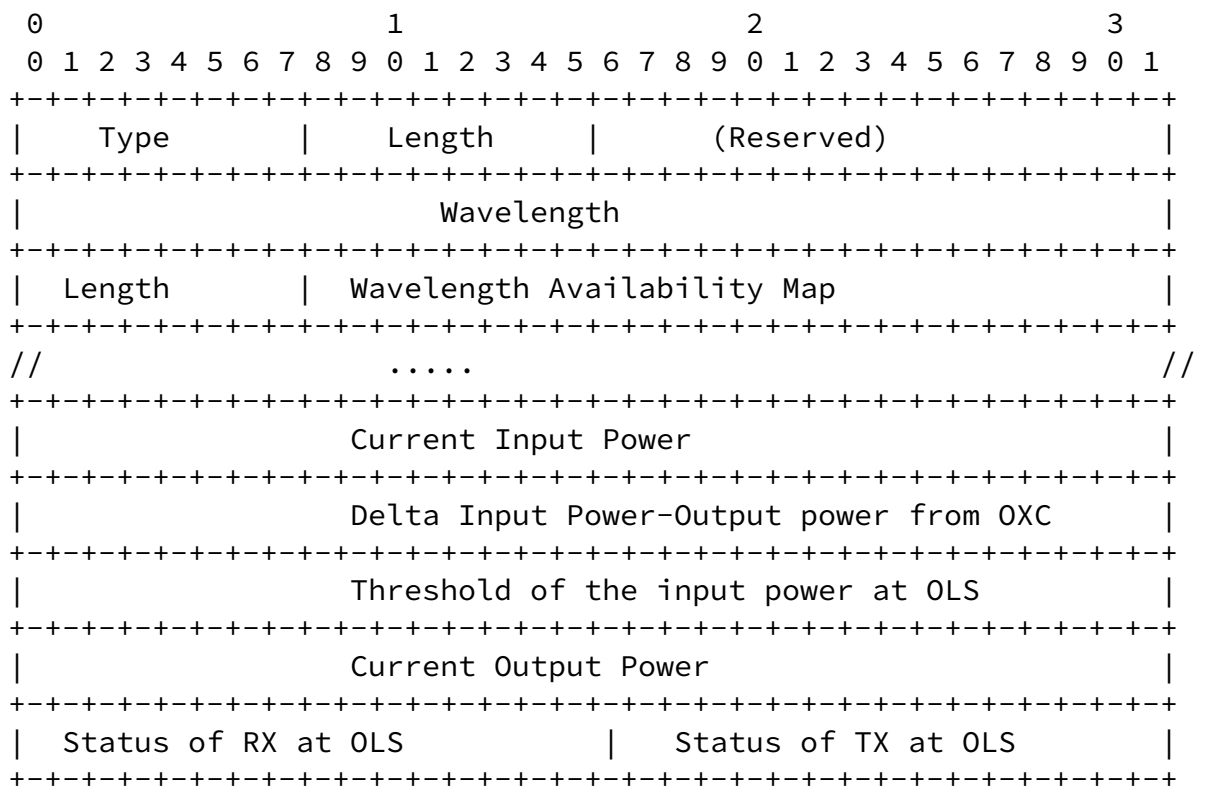


Figure 7: DWDM Network - OLS_Status

9. 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.

10. IANA Considerations

LMP [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 [[RFC4204](#)]) - BL_General (sub-object Type = TBA) - BL_Applicationcode (sub-object Type = TBA) - BL_Ss (sub-object Type = TBA) - BL_SsRs (sub-object Type = TBA) - BL_Rs (sub-object Type = TBA) - OLS_Status (sub-object Type = TBA)

[11](#). References

[11.1](#). 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, March 2003.

[ITU.G872]

International Telecommunications Union, "Architecture of optical transport networks ", ITU-T Recommendation G.872, November 2001.

11.2. Informative References

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[I-D.kunze-g-698-2-management-control-framework]

Kunze, R., "A framework for Management and Control of optical interfaces supporting G.698.2", [draft-kunze-g-698-2-management-control-framework-00](#) (work in progress), July 2011.

[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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