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Extension to the Link Management Protocol (LMP/DWDM -rfc4209) for Dense Wavelength Division Multiplexing (DWDM) Optical Line Systems to manage black-link optical interface parameters of DWDM application
[draft-g-698-2-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 Black-Link approach defined in ITU-T Recommendation G.698.2[ITU.G698.2]. [[ITU.G698.2](#)]

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1. Introduction

This extension is based on "[draft-galimbe-kunze-g-698-2-snmp-mib-02](#)" and "[draft-kunze-g-698-2-management-control-framework-02](#)", for the relevant parameters specified in G.698.2 [[ITU.G698.2](#)]

Figure 1 Extended LMP Model (from [[RFC4209](#)])

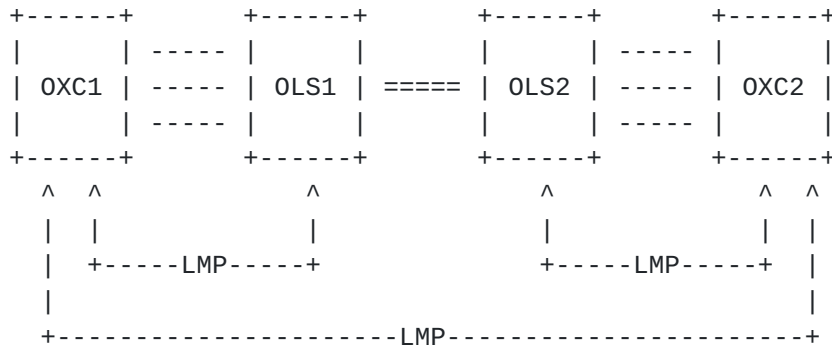


Figure 1: Extended LMP Model

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](#)]. 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 Black Link:

- BL_Capability (sub-object Type = TBA)
- BL_OXC_Status (sub-object Type = TBA)
- BL_OLS_Status (sub-object Type = TBA)

3. Black Link General Parameters - BL_Capability

These are the BL parameters as described in [G698.2]. Please refer to the "[draft-kunze-g-698-2-management-control-framework-02](#)." for more details about these parameters. The parameters relevant to each system are exchanged between the OXC and OLS.

1. Wavelength (in hertz)
2. Wavelength Range - Min and Max wavelengths supported(Hertz)
3. Channel Spacing (hertz)
4. Wavelength Availability bits - variable bits depending on the no of wavelengths available (For eg 80 bits for C-band 25GHz, allocation is in multiples of 1byte - 96 bits - 10bytes)
- 0 - wavelength is available, 1 - used Reference - [draft-ietf-ccamp-rwa-wson-encode-13.txt](#)
5. Vendor Transceiver Class -- 32 bytes
6. Single-channel application codes -- 32 bytes
7. Minimum Mean Channel Output Power (0.1 dbm)
8. Maximum Mean Channel Output Power (0.1 dbm)
9. Minimum Central Frequency (0.01 THz)
10. Maximum Central Frequency (0.01 THz)
11. Maximum Spectral Excursion "0.1 GHz"
12. Maximum Tx Dispersion OSNR Penalty (0.1 dbm)
13. Minimum Mean Input Power (0.1dbm)
14. Maximum Mean Input Power (0.1dbm)
15. Minimum OSNR (0.01Thz)
16. OSNR Tolerance (0.1GHz)

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

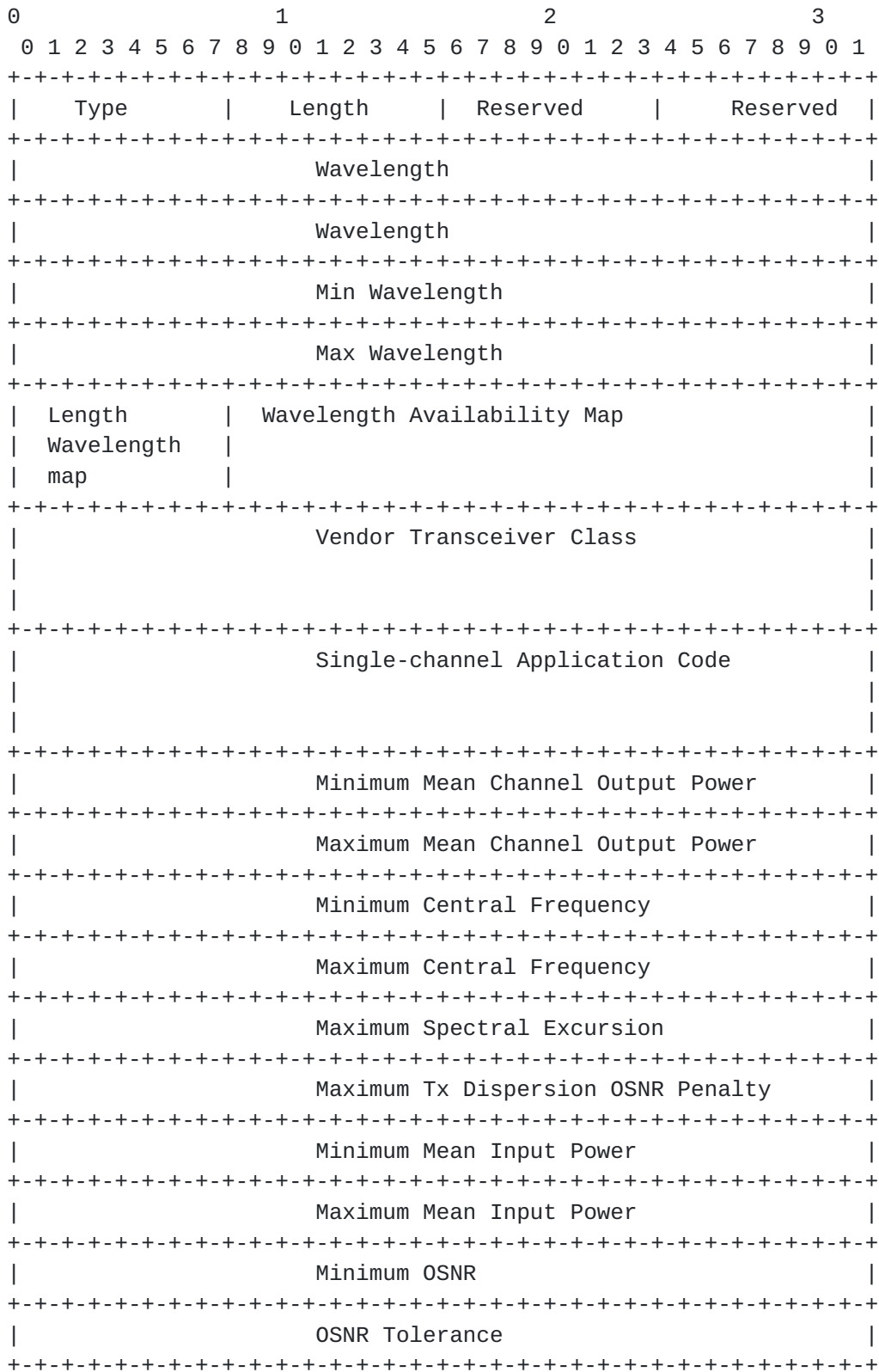


Figure 2: BL_Capability

4. Black Link - BL_OXC_Status

This message is used to convey the status of the link at the OXC to the OLS. This message can be either sent when there is a change in the value or at predefined intervals. These parameters will give the current status of the link at the OXC. 1. Current Output Power (0.1 dbm) 2. Current Input Power (0.1 dbm) 3. Threshold for the input power at OXC (0.1 dbm) - This is the power level above which the OLS will not function. 4. Current Chromatic Dispersion (ps/nm) 5. Current OSNR (0.1 dbm) 6. Maximum Tx Dispersion OSNR Penalty (0.1 dbm) 7. Current Output Power 8. Status of TX - Status of the Transmit link at OXC 9. Status of Rx link at OXC - Status of the Receive link at the OXC 10. Admin Status 11. Operation Status

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

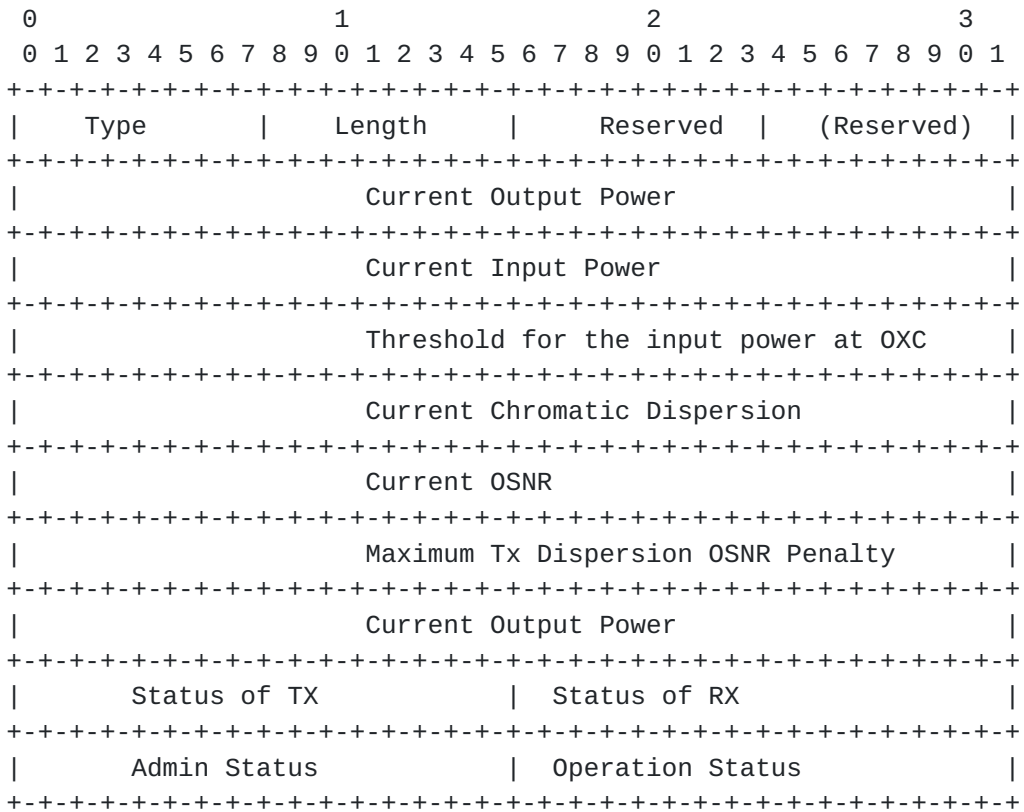


Figure 3: OTN Layers for OPS and OCh

5. Black Link - BL_OLS_Status

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

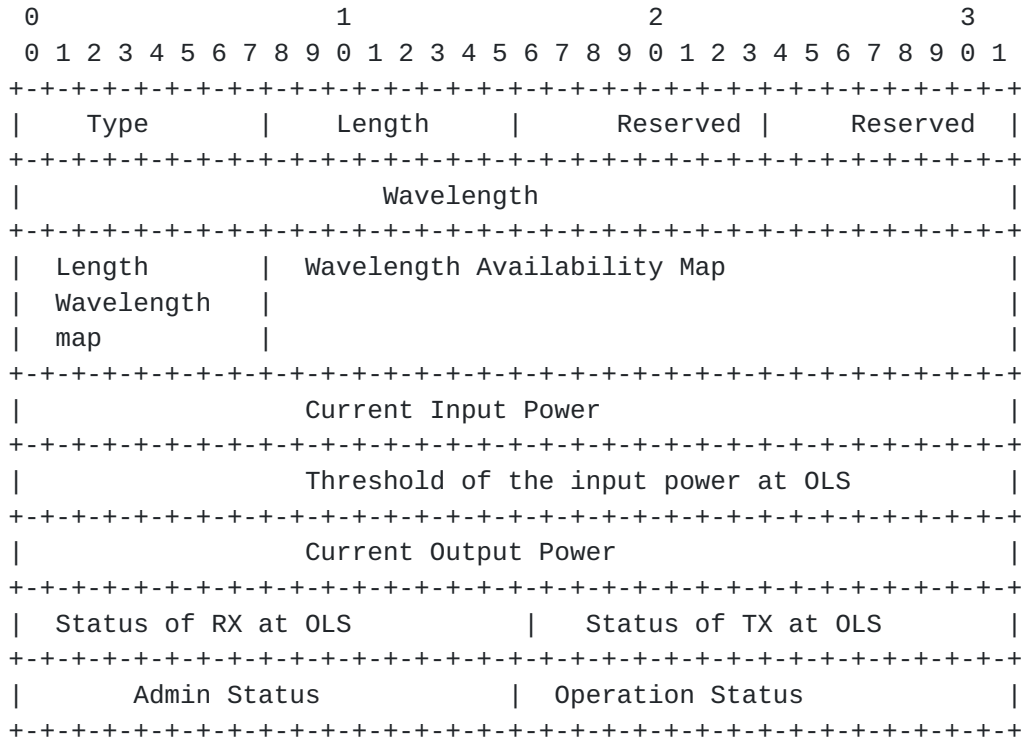


Figure 4: OTN Layers for OPS and OCh

6. 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.

7. 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: o under DATA_LINK Class name (as defined in [[RFC4204](#)]) - BL_Capability (sub-object Type = TBA) - BL_OXC_Status (sub-object Type = TBA) - BL_OLS_Status (sub-object Type = TBA)

8. References

8.1. 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.
- [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.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.

8.2. Informative References

- [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.

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