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

draft-dharinigert-ccamp-g-698-2-lmp-04

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 extendsions./>

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1. Introduction

This extension is based on "draft-galikunze-ccamp-g-698-2-snmp-mib-03" and "draft-kunze-g-698-2-management-control-framework-02", for the relevant interface optical parameters described in recommendations like ITU-T G.698.2 [ITU.G698.2]. 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 whithin 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.

Figure 1 Extended LMP Model (from [RFC4209])

```
          +------+ Ss    +------+       +------+    Rs +------+
          |      | ----- |      |       |      | ----- |      |
          | OXC1 | ----- | OLS1 | ===== | OLS2 | ----- | OXC2 |
          |      | ----- |      |       |      | ----- |      |
          +------+       +------+       +------+       +------+
            ^  ^             ^              ^             ^  ^
            |  |             |              |             |  |
            |  +-----LMP-----+              +-----LMP-----+  |
            |                                                |
            +----------------------LMP-----------------------+

        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_ApplicationCode (sub-object Type = TBA)
- BL_VendorTransceiverClass (sub-object Type = TBA)
- BL_Ss (sub-object Type = TBA)
- BL_Rs (sub-object Type = TBA)

3. Black Link General Parameters - BL_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-04" for more details about these parameters and the [RFC6205] for the wavelength definition.

The general parameters are

1. Bit-Rate/line coding of optical tributary signals
2. Wavelength - (Tera Hertz) 4 bytes (see RFC6205 sec.3.2)
3. Number of Application Codes Supported
4. Number of Vendor Transceiver Classes Supported

Figure 2: The format of the this 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)            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Bit-Rate/Line coding                    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       Wavelength                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Number of application codes | Number of vendor transeiver   |
|     Supported                 |  classes  Supported           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 2: BL_General

4. Black Link ApplicationCode - BL_ApplicationCode

This message is to exchange the application code supported as described in [G698.2]. Please refer to the "draft-galikunze-ccamp-g-698-2-snmp-mib-04". for more details about these parameters. There can be more than one Application Code supported by the OXC/OLS.

The number of application codes supported is exchanged in the "BL_General" message. (from [G698.1]/[G698.2]/[G959.1]

The parameters are

1. Single-channel application code identifire - 8 bits

2. Single-channel application codes -- 32 bytes (from [G698.1]/[G698.2]/[G959.1] - this parameter can have multiple instances as the transceiver can support multiple application codes.

Figure 3: The format of the this 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)            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Single-channel|           (Reserved)                          |
|    Application|                                            |
| CodeIdentifier|                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|               Single-channel Application Code                 |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//              ....                                            //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 3: BL_ApplicationCode

5. Black Link Vendor Transceiver Class - BL_ApplicationCode

This message is to exchange the application code supported as described in [G698.2]. Please refer to the "draft-galikunze-ccamp-g-698-2-snmp-mib-04". for more details about these parameters. There can be more than one Vendor Transceiver Class supported by the OXC/OLS. The number of Vendor Transceiver Classes supported is exchanged in the "BL_General" message. (from [G698.1]/[G698.2]/[G959.1]

The parameters are

1. Single-channel Transceiver Class identifier - 8 bits

2. Vendor Trancsiver Class -- 32 bytes
   (from [G698.1]/[G698.2]/[G959.1] - this parameter can have multiple instances as the transceiver can support multiple application codes.

Figure 4: The format of the this 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)            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Single-channel|           (Reserved)                          |
|Trancsiver     |                                               |
|ClassIdentifier|                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|               Single-channel Vendor Trancsiver Class          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//              ....                                            //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 4: BL_VendorTransceiverClass

6. Black Link - BL_Ss

These are the G.698.2 parameters at the Source(Ss reference points). Please refer to "draft-galikunze-ccamp-g-698-2-snmp-mib-03" for more details about these parameters.

1. Output power
2. Minimum Mean Channel Output Power -(0.1 dbm) 4 bytes
3. Maximum Mean Channel Output Power -(0.1 dbm) 4 bytes

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)            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Output Power                             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Minimum Mean Channel Output Power        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Maximum Mean Channel Output Power        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 5: Black Link - BL_Ss

7. Black Link - BL_Rs

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-02" for more details about these parameters.

1. Current Input Power - (0.1dbm) 4bytes
2. Minimum Mean Input Power - (0.1dbm) 4bytes
3. Maximum Mean Input Power - (0.1dbm) 4bytes
4. Minimum OSNR - (0.1dB) 4bytes
5. OSNR Tolerance - (0.1dB) 4bytes

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:

```
 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)  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                   Current Input Power                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Maximum Mean Input Power                     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Minimum Mean Input Power                     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Minimum OSNR                                 |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  OSNR Tolerance                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 6: Black Link - BL_Rs

8. 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.

9. 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"/>)

- BL_General (sub-object Type = TBA)
- BL_ApplicationCode (sub-object Type = TBA)
- BL_VendorTransceiverClass (sub-object Type = TBA)
- BL_Ss (sub-object Type = TBA)
- BL_Rs (sub-object Type = TBA)

10. References

10.1. 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.

10.2. 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.

[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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