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D. Hiremagalur, Ed.
G. Grammel, Ed.
Juniper
G. Galimberti, Ed.
Z. Ali, Ed.
Cisco
R. Kunze, Ed.
Deutsche Telekom
D. Beller, Ed.
ALU
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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-dwdm-if-lmp-00](#)

Abstract

This memo defines extensions to LMP([rfc4209](#)) for managing Optical parameters associated with Wavelength Division Multiplexing (WDM) systems in accordance with the Interface Application Identifier approach defined in ITU-T Recommendation G.694.1.[\[ITU.G694.1\]](#) and its extensions.

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[1.](#) Introduction

This extension addresses the use cases described by "[draft-kdkgall-ccamp-dwdm-if-mng-ctrl-fwk-00](#)". LMP [[RFC4902](#)] provides link property correlation capabilities that can be used between a transceiver device and an Optical Line System (OLS) device. Link property correlation is a procedure by which, intrinsic parameters and capabilities are exchanged between two ends of a link. Link property correlation as defined in [RFC3591](#) allows either end of the link to supervise the received signal and operate within a commonly understood parameter window. Here the term 'link' refers in particular to the attachment link between OXC and OLS (see Figure 1). The relevant interface parameters are in line with "[draft-galikunze-ccamp-dwdm-if-snmp-mib-00](#)" and "[draft-dharini-netmod-ext-xponder-yang-00](#)".

Figure 1 shows a set of reference points (Rs and Ss), for a single-channel connection between transmitter (Tx) and receiver (Rx) devices. Here the DWDM network elements in between those devices include an Optical Multiplexer (OM) and an Optical Demultiplexer (OD). In addition it may include one or more Optical Amplifiers (OA) and one or more Optical Add-Drop Multiplexers (OADM).

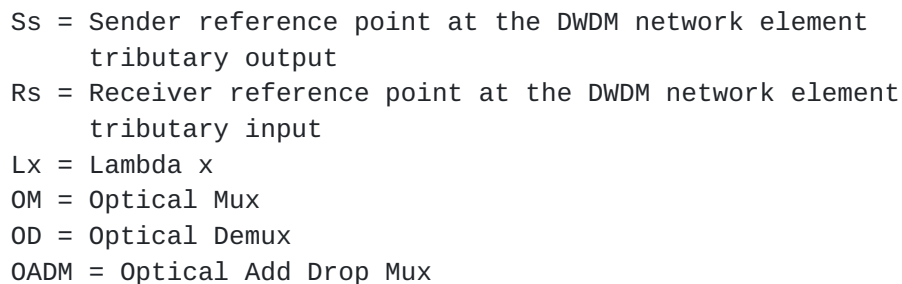


Figure 1: Linear Single Channel approach

Figure 2 Extended LMP Model (from [RFC4209])

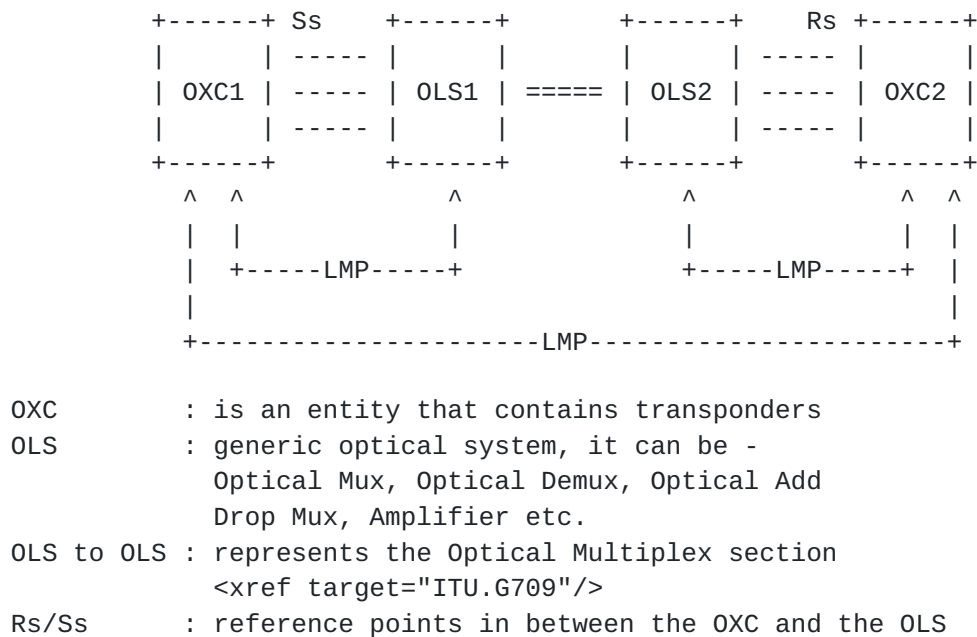


Figure 2: Extended LMP Model

3. Use Cases

The use cases are described in [draft-kdkgall-ccamp-dwdm-if-mng-ctrl-fwk](#)

4. Extensions to LMP-WDM Protocol

This document defines extensions to [RFC4209] to allow a set of characteristic parameters, 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. 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_ApplicationIdentifier (sub-object Type = TBA)
- OCh_Ss (sub-object Type = TBA)
- OCh_Rs (sub-object Type = TBA)

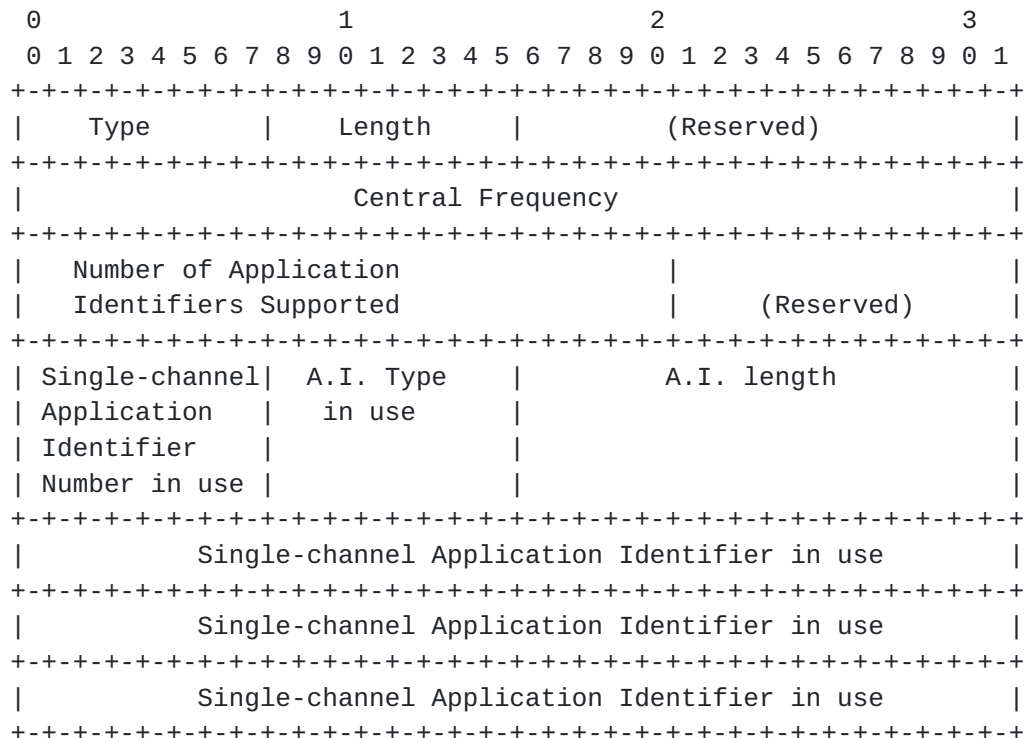
5. General Parameters - OCh_General

These are a set of general parameters as described in [G698.2] and [G.694.1]. Please refer to the "[draft-galikunze-ccamp-g-698-2-snmp-mib-12](#)" and "[draft-dharini-netmod-g-698-2-yang-05](#)" for more details about these parameters and the [[RFC6205](#)] for the wavelength definition.

The general parameters are

1. Central Frequency - (Tera Hz) 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 3: The format of the this sub-object (Type = TBA, Length = TBA) is as follows:



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

Figure 3: 0Ch_General

This message is to exchange the application identifiers supported as described in [G698.2]. There can be more than one Application Identifier supported by the transmitter/receiver in the OXC. The number of application identifiers supported is exchanged in the "OCh_General" message. (from [G698.1]/[G698.2]/[G959.1] and G.874.1)

1. Number of Application Identifiers (A.I.) Supported
2. Single-channel application identifier Number uniquely identifies this entry - 8 bits
3. Application Identifier 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.

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	2	3	4	5	6	7	8	9	
Type										Length										(Reserved)																				
Number of Application																																								
Identifiers Supported																				(Reserved)																				
Single-channel										A.I. Type										A.I. length																				
Application																																								
Identifier																																								
Number																																								
Single-channel Application Identifier																																								
Single-channel Application Identifier																																								
Single-channel Application Identifier																																								
Single-channel Application Identifier																																								
//																																								
....																																								
Single-channel																																								
Application										A.I. Type										A.I. length																				
Identifier																																								
Number																																								


```

|           Single-channel Application Identifier           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|           Single-channel Application Identifier           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
|           Single-channel Application Identifier           |
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

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 4: OCh_ApplicationIdentifier

7. 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-11](#)" for more details about these parameters.

1. Output power

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

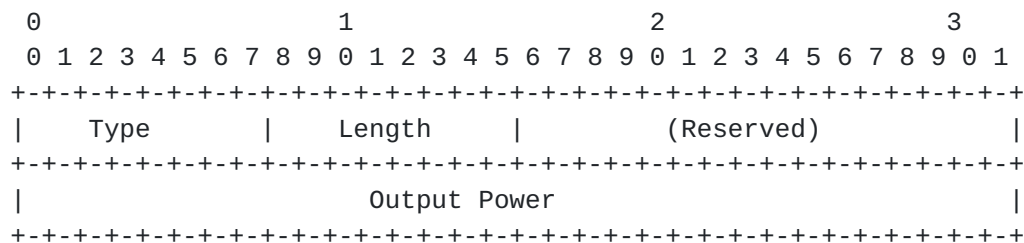


Figure 5: OCh_Ss transmit parameters

8. OCh_Rs - receive parameters

These are the G.698.2 parameters at the Sink (Rs reference points).

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

Figure 6: 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:

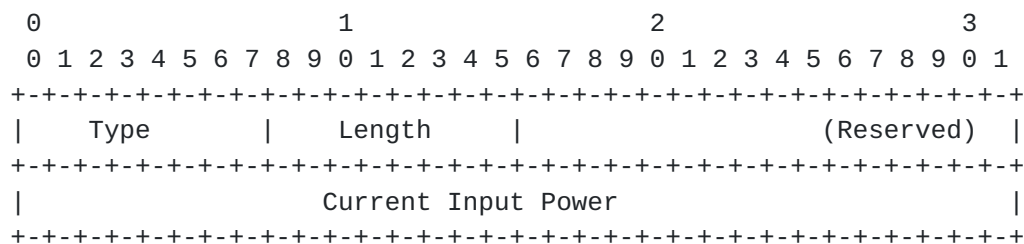


Figure 6: OCh_Rs receive parameters

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 <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)

11. Contributors

Arnold Mattheus
Deutsche Telekom
Darmstadt
Germany
email a.mattheus@telekom.de

John E. Drake
Juniper
1194 N Mathilda Avenue
HW-US, Pennsylvania
USA
jdrake@juniper.net

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Authors' Addresses

Dharini Hiremagalur (editor)
Juniper
1194 N Mathilda Avenue
Sunnyvale - 94089 California
USA

Phone: +1408
Email: dharinih@juniper.net

Gert Grammel (editor)
Juniper
Oskar-Schlemmer Str. 15
80807 Muenchen
Germany

Phone: +49 1725186386
Email: ggrammel@juniper.net

Gabriele Galimberti (editor)

Cisco

Via S. Maria Molgora, 48

20871 - Vimercate

Italy

Phone: +390392091462

Email: ggalimbe@cisco.com

Zafar Ali (editor)

Cisco

3000 Innovation Drive

KANATA

ONTARIO K2K 3E8

Email: zali@cisco.com

Ruediger Kunze (editor)

Deutsche Telekom

Dddd, xx

Berlin

Germany

Phone: +49xxxxxxxxxx

Email: RKunze@telekom.de

Dieter Beller (editor)

ALU

Lorenzstrasse, 10

70435 Stuttgart

Germany

Phone: +4971182143125

Email: Dieter.Beller@alcatel-lucent.com

