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G. Martinelli, Ed.  
Cisco  
A. Zanardi, Ed.  
CREATE-NET  
X. Zhang, Ed.  
Huawei Technologies  
G. Galimberti  
Cisco  
D. Siracusa  
CREATE-NET  
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Information Encoding for WSON with Impairments Validation  
draft-martinelli-ccamp-wson-iv-encode-02

## Abstract

Impairment-Aware (IA) Routing and Wavelength Assignment (RWA) function might be required in Wavelength Switched Optical Networks (WSON) that already support RWA. This document defines proper encoding to support this operation. It goes in addition to the available impairment-free WSON encoding and it is fully compatible with it.

As the information model, the encoding is independent from control plane architectures and protocol implementations. Its definitions can be used in related protocol extensions.

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## Table of Contents

<a href="#">1.</a>	Introduction . . . . .	<a href="#">2</a>
<a href="#">1.1.</a>	Requirements Language . . . . .	<a href="#">2</a>
<a href="#">2.</a>	Encoding . . . . .	<a href="#">3</a>
<a href="#">2.1.</a>	Optical Parameter . . . . .	<a href="#">3</a>
<a href="#">2.2.</a>	Impairment Vector . . . . .	<a href="#">4</a>
<a href="#">2.3.</a>	Impairment Matrix . . . . .	<a href="#">5</a>
<a href="#">3.</a>	Acknowledgements . . . . .	<a href="#">6</a>
<a href="#">4.</a>	Contributing Authors . . . . .	<a href="#">6</a>
<a href="#">5.</a>	IANA Considerations . . . . .	<a href="#">7</a>
<a href="#">6.</a>	Security Considerations . . . . .	<a href="#">7</a>
<a href="#">7.</a>	References . . . . .	<a href="#">7</a>
<a href="#">7.1.</a>	Normative References . . . . .	<a href="#">7</a>
<a href="#">7.2.</a>	Informative References . . . . .	<a href="#">7</a>
	Authors' Addresses . . . . .	<a href="#">8</a>

## [1.](#) Introduction

In case of WSON where optical impairments play a significant role, the framework document [[RFC6566](#)] defines related control plane architectural options for Impairment Aware Routing and Wavelength Assignment (IA-RWA). This document provides a suitable encoding for the related WSON impairment information model as defined [[I-D.martinelli-ccamp-wson-iv-info](#)].

This document directly refers to ITU recommendations [[ITU.G680](#)] and [[ITU.G697](#)] as already detailed in the information model.

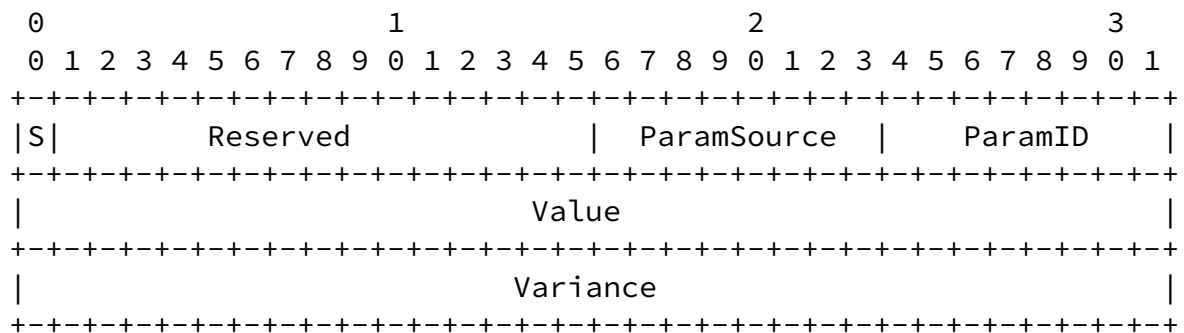
### [1.1.](#) Requirements Language

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].

## [2.](#) Encoding

### [2.1.](#) Optical Parameter

The OPTICAL\_PARAM is defined as a sub TLV object.



The following flag is defined:

S. Standard bit. S=1 identifies a set of parameters standardized by ITU; while S=0 identifies a non-standardized set of parameters.

With the flag S=1 the following parameters are defined:

ParamSource. Where this parameter is defined. Currently only [\[ITU.G697\]](#) has defined this with value 1.

ParamID. Parameter identifier according to the source. [\[ITU.G697\]](#) table V.3 defines the following identifiers:

1. Total Power (dBm)
2. Channel Power (dBm)
3. Reserved (Defined in [\[ITU.G697\]](#) but not used)

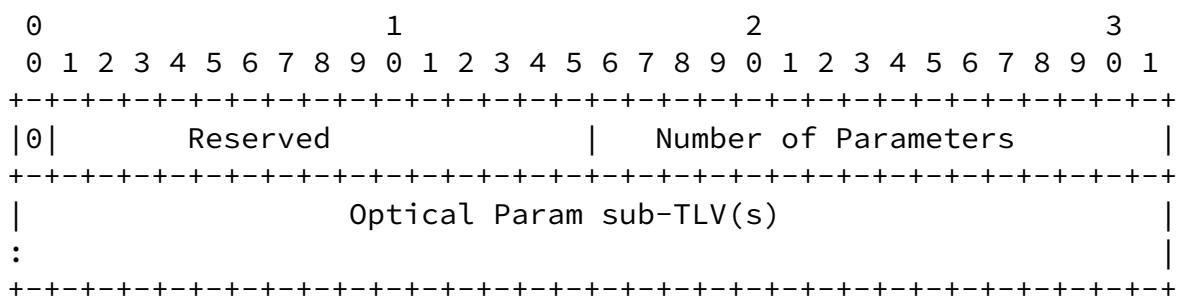
4. Reserved (Defined in [[ITU.G697](#)] but not used)
5. OSNR (db)
6. Q Factor (a pure number)
7. PMD (ps)
8. Residual Chromatic Dispersion (ps/nm)

Value. Value for the parameter. As defined by [[ITU.G697](#)], it is a 32 bit IEEE floating point number.

Variance. Variance for the parameter, a 32 bit IEEE floating point number.

## [2.2.](#) Impairment Vector

This sub-TLV is a list of optical parameters and they MAY have a wavelength dependency information.



Where:

W = 0. Wavelength Dependency flag. There is no wavelength dependency.

Number of Parameters contained in this vector.

Optical Param sub-TLV(s) present a list of Object as defined in [Section 2.1](#).



```

+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|                                     Link Set B #1                                     |
|                                     :                                               |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|                                     Impairment Vector sub-TLV(s)                       |
|                                     :                                               |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|                                     Additional Link Set pairs and Impairment Vector(s) |
|                                     :                                               |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

      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
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| Connectivity | MatrixID | Reserved |1|
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
|                                     Impairment Vector sub-TLV(s)                       |
|                                     :                                               |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

```

Where:

Connectivity: value MUST be 2 for the impairment matrix (Values 0 and 1 are already defined by [\[I-D.ietf-ccamp-general-constraint-encode\]](#)).

MatrixID: matrix identifier, the scope of this integer number is shared with [\[I-D.ietf-ccamp-rwa-info\]](#).

N: Node scope flag. With this flag set there's no Link Set information but only a list of optical parameters TLVs that apply to the whole optical node.

The usage of multiple matrixes with connectivity type equal to 2 (Impairment Matrix) MIGHT be used to grup optical parameters by connectivity. For example, if a subset of parameters apply to the whole node, a unique matrix with flag N=1 is used. At the same some

another subset of parameters applies only to some LinkSet pairs, a specific Impairment Matrix will be added.

### 3. Acknowledgements

TBD

### 4. Contributing Authors

This document was the collective work of several authors. The text and content of this document was contributed by the editors and the co-authors listed below (the contact information for the editors appears in appropriate section and is not repeated below):

Moustafa Kattan  
Cisco  
DUBAI, 500321  
UNITED ARAB EMIRATES

Email: mkattan@cisco.com

Young Lee  
Huawei  
1700 Alma Drive, Suite 100  
Plano, TX 75075  
USA

Phone: +1 972 509 5599 x2240

Fax: +1 469 229 5397

Email: ylee@huawei.com

Fatai Zhang  
Huawei  
F3-5-B R&D Center, Huawei Base  
Bantian, Longgang District  
P.R. China

Phone: +86-755-28972912

Email: zhangfatai@huawei.com

## [5.](#) IANA Considerations

This document does not contain any IANA request.

## [6.](#) Security Considerations

This document defines an protocol-neutral encoding for an information model describing impairments in optical networks and it does not introduce any security issues. If such a encoding is put into use within a network it will by its nature contain details of the physical characteristics of an optical network. Such information would need to be protected from intentional or unintentional disclosure.

## [7.](#) References

### [7.1.](#) Normative References

[ITU.G680]

International Telecommunications Union, "Physical transfer functions of optical network elements ", ITU-T Recommendation G.680, July 2007.

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#### Authors' Addresses

Giovanni Martinelli (editor)  
Cisco  
via Philips 12  
Monza 20900  
Italy

Phone: +39 039 2092044  
Email: [giomarti@cisco.com](mailto:giomarti@cisco.com)

Andrea Zanardi (editor)  
CREATE-NET  
via alla Cascata 56 C, Povo  
Trento 38100  
Italy

Email: [andrea.zanardi@create-net.org](mailto:andrea.zanardi@create-net.org)

Xian Zhang (editor)  
Huawei Technologies  
F3-5-B R&D Center, Huawei Base  
Bantian, Longgang District  
Shenzen 518129  
P.R. China

Phone: +86 755 28972913  
Email: [zhang.xian@huawei.com](mailto:zhang.xian@huawei.com)

Gabriele M. Galimberti  
Cisco  
Via Philips,12  
Monza 20900  
Italy

Phone: +39 039 2091462  
Email: [ggalimbe@cisco.com](mailto:ggalimbe@cisco.com)

Domenico Siracusa  
CREATE-NET  
via alla Cascata 56 C, Povo  
Trento 38100  
Italy

Email: [domenico.siracusa@create-net.org](mailto:domenico.siracusa@create-net.org)

