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Encoding for WSON Information Model with Impairments Validation.
draft-martinelli-ccamp-wson-iv-encode-01

Abstract

This document defines proper encoding for the Information Model to support Impairment-Aware (IA) Routing and Wavelength Assignment (RWA) function. This operation might be required in Wavelength Switched Optical Networks (WSON) that already support RWA, encoding defined here goes in addition to available 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 must be reused in related protocol extensions.

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Table of Contents

1.	Introduction	3
1.1.	Requirements Language	3
2.	Encoding	3
2.1.	Optical Parameter	3
2.2.	Impairment Vector	4
2.3.	Impairment Matrix	5
3.	Acknowledgements	6
4.	IANA Considerations	6
5.	Security Considerations	6
6.	References	6
6.1.	Normative References	6
6.2.	Informative References	6
	Authors' Addresses	7

1. Introduction

In case of WSON where optical impairments plays a significant role, the framework document [[RFC6566](#)] defines related control plane architectural options for an Impairment Aware routing and wavelength assignment (IA-RWA). This document provides a suitable encoding for the related WSON Impairment Information Model 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.

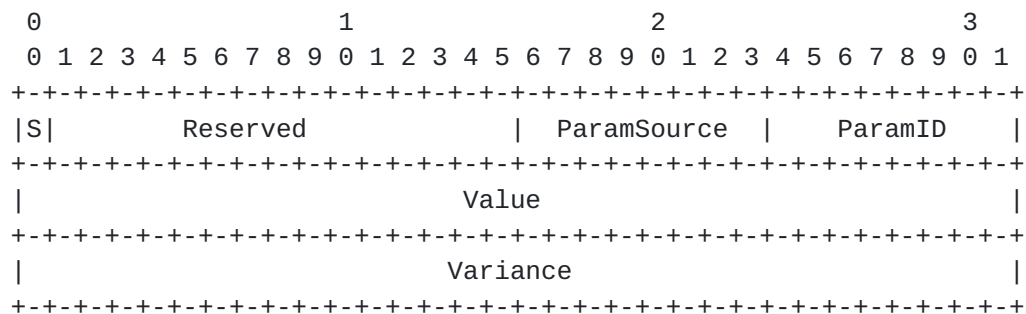
1.1. Requirements Language

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 flags are defined:

S. Standard bit. With S=1 identify ITU set of parameters, S=0 identify other set of parameters.

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

ParamSource. Where this parameter was 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:

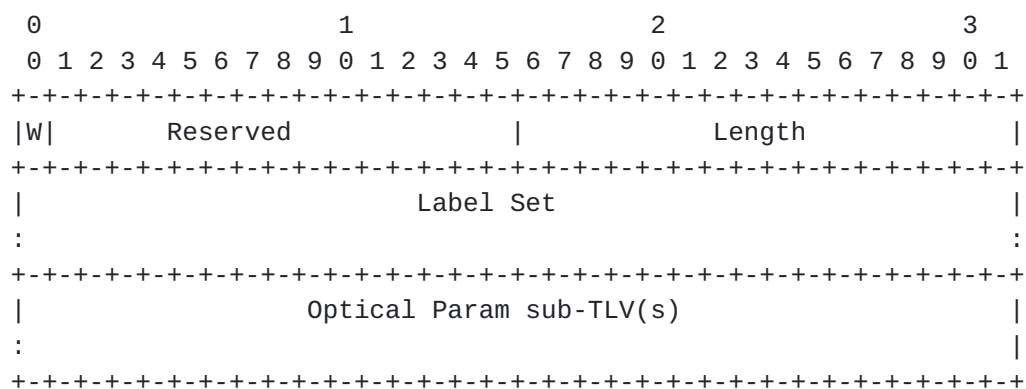
1. Total Power (dBm)
2. Channel Power (dBm)
3. Reserved (Defined in [[ITU.G697](#)] but not used)
4. Reserved (Defined in [[ITU.G697](#)] but not used)
5. OSNR (db)
6. Q Factor (a pure number)
7. PMD (ps)
8. Residual Chromatic Dispersion (ps/nm)

Value. Value for the parameter. As defined by [ITU.G697] 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 be grouped by wavelength dependency. To This purpose an optional Label Set sub-TLV is added as a first sub-TLV.



Where:

W. Wavelength Dependency flag. With W=1 there is be a Label Set sub-TLV which details to which set of wavelenghs the list of parameters is applicable.

Length, the length of this TLV [EDITOR NOTE: may become numbers of parameters? length will be already within TLV header].

The Label Set object is defined in [\[I-D.ietf-ccamp-general-constraint-encode\] Section 2.1](#). Likely an inclusive range will be the only option required by the Action defined in the Label Set.

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

2.3. Impairment Matrix

As defined by the [\[I-D.martinelli-ccamp-wson-iv-info\]](#) the Impairment Matrix follow the same structure as the Connectivity Matrix.

```

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 | W|N|
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
| Link Set A #1 |
:               :
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
| Link Set B #1 |
:               :
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
| Impairment Vector sub-TLV(s) |
:                               :
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
| Additional Link Set pairs and Optical Parameters |
:                                                   :
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

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 flags. 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.

W: Wavelength Dependency Matrix [EDITOR NOTE: to evaluate vs a the flag at vector/parameter level.].

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

3. Acknowledgements

TBD

4. IANA Considerations

This document does not contain any IANA request.

5. Security Considerations

All drafts are required to have a security considerations section. See [RFC 3552](#) [[RFC3552](#)] for a guide.

6. References

6.1. Normative References

- [ITU.G680]
International Telecommunications Union, "Physical transfer functions of optical network elements", ITU-T Recommendation G.680, July 2007.
- [ITU.G697]
International Telecommunications Union, "Optical monitoring for dense wavelength division multiplexing systems", ITU-T Recommendation G.697, February 2012.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

6.2. Informative References

- [I-D.ietf-ccamp-general-constraint-encode]
Bernstein, G., Lee, Y., Li, D., and W. Imajuku, "General Network Element Constraint Encoding for GMPLS Controlled Networks", [draft-ietf-ccamp-general-constraint-encode-08](#) (work in progress), July 2012.

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Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", [draft-narten-iana-considerations-rfc2434bis-09](#) (work in progress), March 2008.

[RFC3552] Rescorla, E. and B. Korver, "Guidelines for Writing RFC Text on Security Considerations", [BCP 72](#), [RFC 3552](#), July 2003.

[RFC6566] Lee, Y., Bernstein, G., Li, D., and G. Martinelli, "A Framework for the Control of Wavelength Switched Optical Networks (WSONs) with Impairments", [RFC 6566](#), March 2012.

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