

Information Model for Impaired Optical Path Validation

draft-bernstein-wson-impairment-info-06.txt

Greg Bernstein

Grotto Networking

Young Lee

Huawei

Xian Zhang

Huawei

Summary of the Objectives

- To provide information model and its protocol independent encodings that captures RWA issues with impairment constraints.
- It addresses both:
 - centralized approach (PCE) to gather impairment data from NE and determine feasible optical path subject to impairment;
 - distributed approach (Signaling) to locally filter impairment constraints to find a feasible optical path.

Assumptions/dependency on Q6 related documents/terminology/technology

- Optical parameters defined in these drafts are from the following ITU-T reference.
 - **[G.680] ITU-T Recommendation G.680, Physical transfer functions of optical network elements, July 2007.**
 - **[G.697] ITU-T Recommendation G.697, Optical Monitoring for dense wavelength division multiplexing system, November 2009.**
 - [G.650.1] ITU-T Recommendation G.650.1, Definitions and test methods for linear, deterministic attributes of single-mode fibre and cable, June 2004.
 - [G.661] ITU-T Recommendation G.661, Definition and test methods for the relevant generic parameters of optical amplifier devices and subsystems, March 2006.
 - [G.671] ITU-T Recommendation G.671, Transmission characteristics of optical components and subsystems, January 2005.

Introduction

- Impairments in optical networks can be accounted for in a number of ways as discussed in the *Impairment Framework* RFC [6566]. This draft provides an information model for path validation in optical networks utilizing *approximate* computations.
- The definitions, characteristics and usage of the optical parameters that form this model are based on ITU-T recommendation G.680 and related. *We do not define any new impairment parameters here.*
- This impairment related model is intentionally compatible with the impairment free model of reference [RWA-Info].
- Appendix A presents a model for distributed estimation of impairment parameters (R+ distributed WA & IV).

Categorization of Impairment Parameters

- Apply to the network element (NE) as a whole
 - Get one parameter of each particular type in this category per NE
- Vary on a per port basis
 - Get one parameter of each particular type in this category per NE port. Not all parameters different so smart encoding can save “space”.
- Vary based on port to port pairs
 - Get one parameter of each particular type in this category per (ingress port, egress port) pair. Not all parameters different so smart encoding can save “space”.

These categories are inferred from ITU-T G.680 and are useful for control plane purposes and don't change G.680.

Frequency Dependence of Parameters

- Many optical parameters can exhibit significant variation over frequencies of interest to the network. For example,
 - Channel chromatic dispersion (ps/nm, Max, Min)
 - Channel uniformity (dB, Max), etc.

Distributed Impairment Accumulation Model

Appendix A of draft

- **Path, Link and NE models**
- **Distributed estimation procedures for the following**
 - **Optical Signal to Noise Ratio (OSNR)**
 - **Residual Dispersion (CD)**
 - **Polarization Mode Dispersion (PMD) and Polarization Dependent Loss (PDL)**

Next Steps and Issues

- Question to Q6: What impairment data are relevant/stable for control plane to collect for its path computation & what ITU-T references are good to reference.
- Is CCAMP ready to take on this work?
- Get input from Joint meeting with ITU-T SG15/Q6 for the directions.