SRLG Issues and Potential Solutions

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Current SRLGs

- A single 32 bit flat (unstructured) number space

  - Administrated by the organization responsible for a particular network

  - If any structure exists, it is specific to the organization

- Authors have gotten input from many folks

  - All agree there is a problem

  - Various opinions on what is most problematic

  - Various opinions on what should be done

- This presentation (more so than the draft) is to stimulate wider discussion

Multi-layer multi-domain Identification

- SRLGs in multi-domain and multilayer networks are likely not unique

- When crossing administrative domains risk of collisions exits

- Potential solution: Add an ASN

Path Diversity

- When a diverse path cannot be found, some would like a "Maximally Diverse Path"

- With current information, this means select a path with the fewest SRLGs in common

- Availability of resources in networks vary widely

  - Particularly true in optical networks

- Ideally "Maximally Diverse Path" between LSPs A and B would be Max(Availability(LSP A or LSP B))
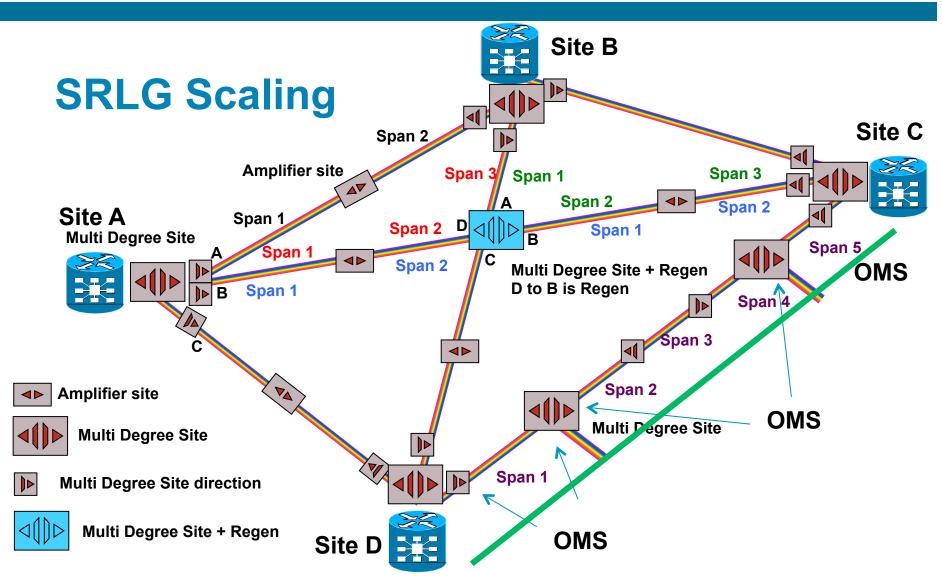
Availability Requirements

- Client may request specific availability for (UNI) circuits provided by the SP (e.g., five-nines of SLA).

- SP may use client's circuit availability requirement as a constraint on what resources can be used for the circuit

SRLG Availability

- Associate an availability with the resource identified by the SRLG

- Availability = MTBF/(MTBF+MTTR).

- Availability can be compactly represented in discrete levels, e.g. # of 9's

Multilayer Considerations

- Not all the information at layer 0 may be interesting at layer 3

  - In fact the majority of SRLGs in an optical network may not be interesting to IP/MPLS networks

- Some form of abstraction / reduction is needed

- Possibilities

  - Filtering

  - Summarization by mapping

  - Other abstract representation?

  - Perhaps a combination is needed

SRLG Scaling

- **An SP may assign an SRLG for each risk. We can easily have hundreds of SRLGs for LSPs transiting the domain it operates.**
- **Some SRLGs that are important to one layer, may not be important for another layer.**

Filtering

- Availability information

- Type of equipment

- Operator assigned priority

SRLG Type

- **Enables Examination of a resource type associated with an SRLG.**

- **May be used to filter SRLG information in multi-domain/ multi-layer networks.**

- **Many possiblities**

  ➢ OMS (between adjacent ROADMs – a.k.a. line)

  ➢ OTS (between adjacent amplifiers – a.k.a. span)

  ➢ Fiber Duct: Conduit carrying fibers (which represent optical sections).

  ➢ Building: Building hosting multiple network elements, and represents a common risk.

  ➢ Optical NE: Amplifier, ROADM or other optical NE used along an optical TE link.

  ➢ Power feed: a common power source feeding multiple NEs

  ➢ Geographic region: an area susceptible to a disaster such as earthquake or flood.

  ➢ ODU path – can be nested

  ➢ ODU line (between OTN XCs)

  ➢ OTU (between regens)

  ➢ More to be added in future revision.

Type issues

- A small space may be overly constrained

- Too large a space leads to entropy, i.e.

  - Overlapping values

  - Overly specific

- Standardized Registry or simply operator assigned?

  - Operator assigned would not help in true multi-domain situations (including those arising through acquisitions

  - May also complicate the multilayer case

  - Standardized Registry hard to administrate if it is small but as noted the problems of a large space have been noted

- But a registry should not be ruled out

  - Space divided between standard, FCFS, and private

SRLG Priority

- Operator assigned priority associated with the SRLG

  ➢ Could be automatically assigned based on type

- Number of levels need not be large

- Potential mechanism for SRLG filtration

  ➢ For example, in a multi-layer network, only higher priority SRLGs may be exposed to the client layer

  ➢ Setting of priorities could be a cooperative effort between transport and packet departments

Information flows and repositories

- How should the information be collected

- Clearly

  - SRLGs numbers needed to be collected

  - For inter-domain, a means of knowing when you cross an AS boundary

- Other information (priority, type, availability)

  - Are these sufficiently stable that they could exist off-line and be made available by distributing config-lets

  - Is it worth saving the bits?

Next Steps

- Encourage discussion on the list

- Please offer feedback

- Update draft for Berlin