IPFRR Comparison

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The Advanced Methods

There are four advanced methods of IPFRR:

- U-turn
- IP-TE
- PQ-Tunnels
- Notvia

Each of these mechanisms has different properties, and hence offer different trade-offs

Issues

- Failure Scenarios
  - Network Elements
  - Traffic Types
- Complexity
  - Encapsulation
  - Computation
  - Routing Extensions
  - Forwarding Extensions
- Coverage

Failure Scenarios

- Must do: link, node, broadcast link, local SRLG (i.e. LC failure)
- Nice to do: SRLG

Traffic Type

- IP Unicast
- MPLS-LDP
- IP Multicast

Complexity-Encapsulation

- Tunnelling gives greater control of the repair path – at a price.
- Where tunnelling is being used it can be done via IP or LDP.
- Some traffic types (e.g. Multicast) probably *need* tunnelling.
- Tunnelling requires label acquisition mechanism.

Complexity - Computation

- All of the methods require more SPFs.
  - How many is too many?
  - What optimizations (incremental, early termination, etc.) can be used?
- Final computation time – not #SPFs is what matters…

The critical issue is how long it takes to be ready to repair the next failure…

Number of SPFs

Method	Link-Node	SRLG	Comment
U-turn	2K+1	3K+1, or K+K^2+1	**Inc. optimises to10 equiv SPFs**
TE	K^2	K^2	**May be optimisable**
PQ	K^2	K^2	
notvia	N	N+L	**Inc + early term optimises to 15 equiv SPF**

Routing Extensions

- All methods need capability extensions
- Notvia requires routing to communicate the additional notvia addresses with specific network components to avoid.
- IP TE requires extensions to RSVP to allow signalling of static IP address associated with tunnel.
- P-Q Space requires directed forwarding label advertisement.

Forwarding Extensions

- TE and notvia require no forwarding extensions for LDP.
- U-turn requires a change to the forwarding, can be simplified by explicit marking (i.e. by use of MPLS label)

Coverage

- What cost completeness, and what cost lack of it?