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Open Shortest Path First (OSPF) protocol extensions for Label Switched Path restoration

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Abstract

Traffic engineering using MPLS involves the setting up of label switched paths (LSP) possibly with explicit routing and with bandwidth guarantees (for label switched paths). The reliability of these LSPs can be increased by providing a backup LSP onto which traffic can be switched upon failure of an element in the path of the active LSP. Backup LSPs can be routed in a way that bandwidth can be shared between backup links of more than one active path while still guaranteeing recoverability for a set of failures. This sharing greatly increases the network efficiency, thereby increasing the number of LSPs that can be carried while maintaining guarantees. Algorithms which can route such recoverable LSPs while using only aggregate network usage information are being developed. To route the active LSP and the (possibly shared) backup LSP, the topology information of the network is needed and this can be provided by a link state routing protocol like OSPF. This document describes the encoding of the additional information within the link state advertisement (LSA) of OSPF to enable

routing of shared backup paths.

1. Introduction

The concept of sharing links along backup paths is explained in [4]. OSPF (as described in [2]) is a link state protocol that can provide topology information about the network. Extensions to OSPF to enable traffic engineering are described in [1]. This document proposes further TE extensions to OSPF. These extensions provide aggregate information useful to calculate shared backup paths.

2. Extensions to the Type 10 LSA

The opaque LSA [5] Type 10 (with area flooding scope) is used to convey traffic engineering capabilities [1]. The semantic content of the extensions proposed here are essentially identical to the corresponding extensions to IS-IS [3].

The extensions described here add more information about a link to the Type 10 LSA. New sub-TLVs are defined for the link TLV (section 2.4.2 of [1]). All sub-TLVs defined in this document are optional.

Sub-TLV Type	Length (octets)	Name
x1	4*8	link bandwidth allocated for active paths with backup
x2	4*8	link bandwidth allocated for active paths without backup
x3	4*8	link bandwidth allocated for backup paths

Note : Only logical numbers (x1, .. x3) are used to describe the sub-TLV. Actual values can be assigned when this document is made a working group document.

2.1 Sub-TLV x1 : Link bandwidth allocated for active paths with backup

This sub-TLV contains the bandwidth that is reserved on this link for active paths that have backup paths.

The link bandwidths allocated for active paths is encoded in 32 bits in IEEE floating point format. The units are bytes (not bits!) per second.

2.2 Sub-TLV x2 : Link bandwidth allocated for active paths without backup

This sub-TLV contains the bandwidth that is reserved on this link for active paths that do not have a backup.

The link bandwidths allocated for active paths without a backup is encoded in 32 bits in IEEE floating point format. The units are bytes (not bits!) per second.

2.3 Sub-TLV x3 : Link bandwidth allocated for backup paths

This sub-TLV contains the bandwidth that is allocated to backup paths.

The link bandwidths allocated for backup paths is encoded in 32 bits in IEEE floating point format. The units are bytes (not bits!) per second.

3. Security Considerations

This document raises no new security issues for OSPF.

4. IANA Considerations

The responsible Internet authority (presently called IANA) should assign values to x1, x2 and x3.

5. Acknowledgments

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6. References

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[3] Kini, S., et al, "Intermediate System to Intermediate System (IS-IS) protocol extensions for Label Switched Path restoration" Work in progress, Internet Draft <draft-kini-isis-lsp-restoration-00.txt>, November 2000.

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