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D. McPherson
Arbor Networks
N. Shen
Cisco Systems

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Dynamic Hostname Exchange Mechanism for IS-IS

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Abstract

RFC 2763 defined a simple and dynamic mechanism for routers running IS-IS to learn about symbolic hostnames. RFC 2763 defined a new TLV that allows the IS-IS routers to flood their name-to-systemID mapping information across the IS-IS network.

This document obsoletes RFC 2763. This document moves the capability provided by RFC 2763 to the Standards Track.

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1. Introduction

IS-IS uses a variable 1-8 byte system ID (normally 6 bytes) to represent a node in the network. For management and operation reasons, network operators need to check the status of IS-IS adjacencies, entries in the routing table, and the content of the IS-IS link state database. It is obvious that, when looking at diagnostics information, hexadecimal representations of system IDs and Link State Protocol Data Unit (LSP) identifiers are less clear than symbolic names.

One way to overcome this problem is to define a name-to-systemID mapping on a router. This mapping can be used bidirectionally, e.g., to find symbolic names for system IDs and to find system IDs for symbolic names. One way to build this table of mappings is by static definitions. Among network administrators who use IS-IS as their IGP, it is current practice to define such static mappings.

Thus, every router has to maintain a statically-configured table with mappings between router names and system IDs. These tables need to contain the names and system IDs of all routers in the network, and must be modified each time an addition, deletion, or change occurs.

There are several ways one could build such a table. One is via static configurations. Another scheme that could be implemented is via DNS lookups. In this document, we provide a third solution, which in wide-scale implementation and deployment has proven to be easier and more manageable than static mapping or DNS schemes.

1.1. Specification of Requirements

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. Possible Solutions

The obvious drawback of static configuration of mappings is the issue of scalability and maintainability. The network operators have to maintain the name tables. They have to maintain an entry in the table for every router in the network, on every router in the network. The effort to create and maintain these static tables grows with the total number of routers on the network. Changing the name or system ID of one router, or adding a new router will affect the configurations of all the other routers on the network. This will make it very likely that those static tables are outdated.

Having one table that can be updated in a centralized place would be helpful. One could imagine using the DNS system for this. A drawback is that during the time of network problems, the response time of DNS services might not be satisfactory or the DNS services might not even be available. Another possible drawback might be the added complexity of DNS. Also, some DNS implementations might not support A and PTR records for Connection Network Service (CLNS) Network Service Access Points (NSAPs).

A third way to build dynamic mappings would be to use the transport mechanism of the routing protocol itself to advertise symbolic names in IS-IS link-state PDUs. This document defines a new TLV that allows the IS-IS routers to include the name-to-systemID mapping data in their LSPs. This will allow simple and reliable transport of name mapping information across the IS-IS network.

3. Dynamic Hostname TLV

The Dynamic hostname TLV is defined here as TLV type 137.

Length - total length of the value field.

Value - a string of 1 to 255 bytes.

The Dynamic hostname TLV is optional. This TLV may be present in any fragment of a non-pseudonode LSP. The value field identifies the symbolic name of the router originating the LSP. This symbolic name can be the FQDN for the router, it can be a subset of the FQDN, or it can be any string operators want to use for the router. The use of FQDN or a subset of it is strongly recommended. The content of this value is a domain name, see [RFC2181]. The string is not null-terminated. The system ID of this router can be derived from the LSP identifier.

If this TLV is present in a pseudonode LSP, then it SHOULD NOT be interpreted as the DNS hostname of the router.

The Value field is encoded in 7-bit ASCII. If a user-interface for configuring or displaying this field permits Unicode characters, that user-interface is responsible for applying the ToASCII and/or ToUnicode algorithm as described in [RFC3490] to achieve the correct format for transmission or display.

4. Implementation

The Dynamic hostname TLV is optional. When originating an LSP, a router may decide to include this TLV in its LSP. Upon receipt of an LSP with the Dynamic hostname TLV, a router may decide to ignore this TLV, or to install the symbolic name and system ID in its hostname mapping table for the IS-IS network.

A router may also optionally insert this TLV in its pseudonode LSP for the association of a symbolic name to a local LAN.

If a system receives a mapping for a name or system ID that is different from the mapping in the local cache, an implementation SHOULD replace the existing mapping with the latest information.

5. Security Considerations

Since the name-to-systemID mapping relies on information provided by the routers themselves, a misconfigured or compromised router can inject false mapping information. Thus, this information needs to be treated with suspicion when, for example, doing diagnostics about a suspected security incident.

This document raises no other new security issues for IS-IS. Security issues with IS-IS are discussed in [RFC5304].

6. Acknowledgments

The original efforts and corresponding acknowledgements provided in [RFC2763] have enabled this work. In particular, we'd like to acknowledge Henk Smit as an author of that document.

7. IANA Considerations

This document specifies TLV 137, "Dynamic Name". This TLV has already been allocated and reserved [RFC2763]. As such, no new actions are required on the part of IANA.

8. Informative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC2181] Elz, R. and R. Bush, "Clarifications to the DNS Specification", RFC 2181, July 1997.

[RFC2763] Shen, N. and H. Smit, "Dynamic Hostname Exchange Mechanism for IS-IS", RFC 2763, February 2000.

[RFC3490] Faltstrom, P., Hoffman, P., and A. Costello, "Internationalizing Domain Names in Applications (IDNA)", RFC 3490, March 2003.

[RFC5304] Li, T. and R. Atkinson, "IS-IS Cryptographic Authentication", RFC 5304, October 2008.

Authors' Addresses

Danny McPherson
Arbor Networks, Inc.
EMail: danny@arbor.net

Naiming Shen
Cisco Systems, Inc.
EMail: naiming@cisco.com