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Optional Checksums in Intermediate System to Intermediate System (ISIS)

Status of this Memo

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Abstract

This document describes an optional extension to the Intermediate System to Intermediate System (ISIS) protocol, used today by several Internet Service Proviers (ISPs) for routing within their clouds. ISIS is an interior gateway routing protocol developed originally by OSI and used with IP extensions as Interior Gateway Protocol (IGP). ISIS originally does not provide Complete Sequence Numbers Protocol Data (CSNP) and Partial Sequence Numbers Protocol Data Unit (PSNP) checksums, relying on the underlying layers to verify the integrity of information provided. Experience with the protocol shows that this precondition does not always hold and scenarios can be imagined that impact protocol functionality. This document introduces a new optional Type, Length and Value (TLV) providing checksums.

1. Introduction

ISIS [ISO90, Cal90a, Cal90b] CSNPs and PSNPs and IIHs can be corrupted in case of faulty implementations of L2 hardware or lack of checksuming on a specific network technology. As a particularly ugly case, corruption of length and/or TLV length fields may lead to the generation of extensive numbers of "empty" LSPs in the receiving node. Since we cannot rely on authentication as a checksum mechanism, this document proposes an optional TLV to add checksums to the elements.

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 [Bra97].

2. TLV Description

This optional TLV MAY BE included in all CSNP, PSNP and IIH packets and an implementation that implements optional checksums MUST accept PDUs if they do NOT contain the optional checksum. Implementations that receive an optional checksum TLV and support it MUST discard the PDU if the checksum is incorrect. An implementation that does NOT implement optional checksums MUST accept a PDU that contains the checksum TLV. An implementation that supports optional checksums and receives it within any other PDU than CSNP, PSNP or IIH MUST discard the PDU. Such an implementation MUST discard the PDU as well if more than one optional checksum TLVs are included within it. Additionally, any implementation supporting optional checksums MUST accept PDUs with an optional checksum with the value 0 and consider such a checksum as correct.

3. Checksum Computation

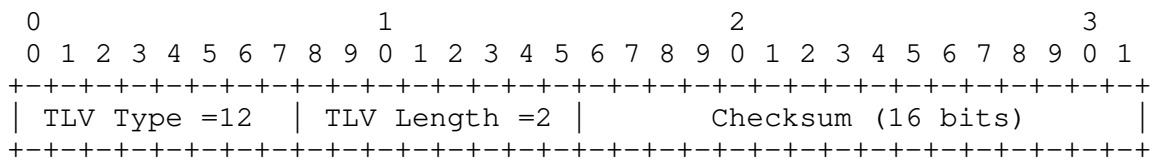
The checksum is a fletcher checksum computed according to [ISO98], Annex C over the complete PDU. To compute the correct checksum, an implementation MUST add the optional checksum TLV to the PDU with the initial checksum value of 0 and compute the checksum over such a PDU.

4. Interaction with TLVs using PDU Data to Compute Signatures

The implementation MUST either omit the optional checksum on an interface or send a 0 checksum value if it includes in the PDU signatures that provide equivalent or stronger functionality, such as HMAC or MD5. Otherwise an implementation that handles such signatures but does not handle the optional checksums, may fail to compute the MD5 signature on the packet. Such a failure would be caused by the fact that MD5 is computed with the checksum value set to 0 and only as a final step is the checksum value being filled in.

5. TLV Format

[Prz01] lists the according value of the TLV type and discusses issues surrounding the assignment of new TLV codepoints.



6. Acknowledgments

Tony Li mentioned the original problem. Mike Shand provided comments. Somehow related problems with purging on LSP checksum errors have been observed by others before. Nischal Sheth spelled out the issues of interaction between MD5 and the optional checksums.

7. Security Considerations

ISIS security applies to the work presented. No specific security issues as to the new element are known.

References

[Bra97] Bradner, S., "Key Words for Use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[Cal90a] Callon, R., "OSI ISIS Intradomain Routing Protocol", RFC 1142, February 1990.

[Cal90b] Callon, R., "Use of OSI ISIS for Routing in TCP/IP and Dual Environments", RFC 1195, December 1990.

[ISO90] ISO. Information Technology - Telecommunications and Information Exchange between Systems - Intermediate System to Intermediate System Routing Exchange Protocol for Use in Conjunction with the Protocol for Providing the Connectionless-Mode Network Service. ISO, 1990.

[ISO98] ISO. Information Technology - Protocol for Providing the Connectionless-Mode Network Service: Protocol Specification. ISO, 1998.

[Prz01] Przygienda, T., "Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System", RFC 3359, August 2002.

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