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F. Gont
UTN/FRH
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Deprecation of ICMP Source Quench messages
draft-ietf-tsvwg-source-quench-01.txt

Abstract

This document formally deprecates the use of ICMP Source Quench messages by transport protocols, formally updating [RFC 792](#), [RFC 1122](#), and [RFC 1812](#). Additionally, it requests that the status of [RFC 1016](#) be changed to "Historic".

Status of this Memo

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1. Introduction

The ICMP specification [[RFC0792](#)] defined the ICMP Source Quench message (type 4, code 0), which was meant as a mechanism for congestion control. ICMP Source Quench has been known to be an ineffective (and unfair) antidote for congestion, and generation of ICMP Source Quench messages by routers has been formally deprecated by [[RFC1812](#)] since 1995. However, reaction to ICMP Source Quench messages in transport protocols has never been formally deprecated.

This document formally deprecates reaction to ICMP Source Quench messages by transport protocols such as TCP, formally updating [[RFC0792](#)], [[RFC1122](#)], and [[RFC1812](#)]. Additionally, it requests that the status of [[RFC1016](#)] be changed to "Historic". The rationale for these specification updates is:

- o Processing of ICMP Source Quench messages by routers has been deprecated for more than 20 years [[RFC1812](#)].
- o Virtually all popular host implementations have removed support for ICMP Source Quench messages since (at least) 2005 [[RFC5927](#)].
- o Widespread deployment of ICMP filtering makes it impossible to rely on ICMP Source Quench messages for congestion control.
- o The IETF has moved away from ICMP Source Quench messages for congestion control (note e.g. the development of ECN [[RFC3168](#)], and the fact that ICMPv6 [[RFC4443](#)] does not even specify a Source Quench message).

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. ICMP Source Quench messages

The ICMP specification [[RFC0792](#)] defined the ICMP Source Quench message (type 4, code 0), which was meant to provide a mechanism for congestion control. The Host Requirements RFC [[RFC1122](#)] stated in [Section 4.2.3.9](#) that hosts MUST react to ICMP Source Quench messages by slowing transmission on the connection, and further added that the RECOMMENDED procedure was to put the corresponding connection in the slow-start phase of TCP's congestion control algorithm [[RFC5681](#)].

[[RFC1812](#)] noted that research suggested that ICMP Source Quench was an ineffective (and unfair) antidote for congestion, and formally deprecated the generation of ICMP Source Quench messages by routers,

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stating that routers SHOULD NOT send ICMP Source Quench messages in response to congestion.

[RFC5927] discussed the use of ICMP Source Quench messages for performing "blind throughput-reduction" attacks, and noted that most TCP implementations silently ignore ICMP Source Quench messages.

We note that TCP implements its own congestion control mechanisms [RFC5681] [RFC3168], that do not depend on ICMP Source Quench messages.

It is interesting to note that ICMPv6 [RFC4443] does not specify a "Source Quench" message.

3. Updating [RFC 1122](#)

This document hereby updates [Section 3.2.2.3 of \[RFC1122\]](#) as follows:

A host SHOULD NOT send ICMP Source Quench messages.

If a Source Quench message is received, the IP layer MAY silently discard it.

[Section 4.2.3.9 of \[RFC1122\]](#) is updated as follows:

TCP SHOULD silently discard any received ICMP Source Quench messages.

4. Updating [RFC 1812](#)

This document hereby updates [Section 4.3.3.3 of \[RFC1812\]](#) as follows:

A router SHOULD ignore any ICMP Source Quench messages it receives.

5. General Advice to Transport Protocols

If a Source Quench message is received by a transport-protocol instance (e.g., a TCP connection), it SHOULD be silently ignored.

6. Changing the status of [RFC 1016](#) to Historic

This document requests the RFC Editor to change the status of [\[RFC1016\]](#) to "Historic".

7. Security Considerations

ICMP Source Quench messages could be leveraged for performing blind throughput-reduction attacks against TCP and similar protocols. This attack vector, along with possible countermeasures, have been discussed in great detail in [[RFC5927](#)] and [[CPNI-TCP](#)]. However, as noted in [[RFC5927](#)] and [[CPNI-TCP](#)], virtually all current versions of popular TCP implementations already silently ignore ICMP Source Quench messages.

Silently ignoring ICMP Source Quench messages, as specified in this document, eliminates the aforementioned attack vector.

If deemed necessary, ICMP Source Quench messages could be filtered at firewalls.

8. IANA Considerations

IANA is requested to mark ICMP type 4 (Source Quench) as "Deprecated" in the ICMP Parameters registry [[ICMPPARREG](#)] with a reference to this document.

9. Acknowledgements

The author of this document would like to thank (in alphabetical order) Fred Baker, David Black, Scott Bradner, James Carlson, Antonio De Simone, Gorry Fairhurst, Alfred Hoenes, Mahesh Jethanandani, Carlos Pignataro, Anantha Ramaiah, Dan Wing, and Andrew Yourtchenko, for providing valuable feedback on earlier versions of this document.

This document has benefited from discussions within the TCPM Working Group while working on [[RFC5927](#)].

10. References

10.1. Normative References

- [RFC0792] Postel, J., "Internet Control Message Protocol", STD 5, [RFC 792](#), September 1981.
- [RFC0793] Postel, J., "Transmission Control Protocol", STD 7, [RFC 793](#), September 1981.
- [RFC1016] Prue, W. and J. Postel, "Something a host could do with source quench: The Source Quench Introduced Delay

(SQuID)", [RFC 1016](#), July 1987.

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- [RFC1812] Baker, F., "Requirements for IP Version 4 Routers", [RFC 1812](#), June 1995.
- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC5681] Allman, M., Paxson, V., and E. Blanton, "TCP Congestion Control", [RFC 5681](#), September 2009.

10.2. Informative References

- [CPNI-TCP] CPNI, "Security Assessment of the Transmission Control Protocol (TCP)", 2009, <<http://www.cpni.gov.uk/Docs/tn-03-09-security-assessment-TCP.pdf>>.
- [FreeBSD] The FreeBSD Project, "<http://www.freebsd.org>".
- [ICMPPARREG] Internet Control Message Protocol (ICMP) Parameters, "<http://www.iana.org/assignments/icmp-parameters>".
- [Linux] The Linux Project, "<http://www.kernel.org>".
- [NetBSD] The NetBSD Project, "<http://www.netbsd.org>".
- [OpenBSD] The OpenBSD Project, "<http://www.openbsd.org>".
- [OpenSolaris] OpenSolaris, "<http://www.opensolaris.org>".
- [RFC3168] Ramakrishnan, K., Floyd, S., and D. Black, "The Addition of Explicit Congestion Notification (ECN) to IP", [RFC 3168](#), September 2001.
- [RFC4443] Conta, A., Deering, S., and M. Gupta, "Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification", [RFC 4443](#), March 2006.
- [RFC5927] Gont, F., "ICMP Attacks against TCP", [RFC 5927](#), July 2010.

Appendix A. Survey of support of ICMP Source Quench in some popular TCP/IP implementations

A large number of implementations completely ignore ICMP Source Quench messages meant for TCP connections. This behavior has been implemented in, at least, Linux [[Linux](#)] since 2004, and in FreeBSD [[FreeBSD](#)], NetBSD [[NetBSD](#)], OpenBSD [[OpenBSD](#)], and Solaris 10 since 2005. Additionally, OpenSolaris [[OpenSolaris](#)] has always shipped with support for ICMP Source Quench messages disabled.

Appendix B. Changes from previous versions of the draft (to be removed by the RFC Editor before publishing this document as an RFC)

B.1. Changes from [draft-ietf-tsvwg-source-quench-00](#)

- o Discusses the motivation for deprecating ICMP Source Quench messages (as suggested by Anantha Ramaiah).
- o Incorporates IANA considerations such that ICMP Source Quench messages are deprecated in the corresponding registry.

B.2. Changes from [draft-gont-tsvwg-source-quench-01](#)

- o Addresses nits and editorial changes suggested by Gorrry Fairhurst.
- o Added the status of Solaris and OpenSolaris to [Appendix A](#).
- o Document resubmitted as [draft-ietf](#).

B.3. Changes from [draft-gont-tsvwg-source-quench-00](#)

- o This revision reflects the recent discussion about ICMP Source Quench messages on the tsvwg mailing-list. A detailed list of the changes is available at:
<http://www.ietf.org/mail-archive/web/tsvwg/current/msg10407.html>

Author's Address

Fernando Gont
Universidad Tecnologica Nacional / Facultad Regional Haedo
Evaristo Carriego 2644
Haedo, Provincia de Buenos Aires 1706
Argentina

Phone: +54 11 4650 8472
Email: fernando@gont.com.ar
URI: <http://www.gont.com.ar>