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Setting up a SIP (Session Initiation Protocol) connection in a dual
stack network using connection oriented transports
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Abstract

The Session Initiation Protocol (SIP) supports multiple transports running both over IPv4 and IPv6 protocols. In more and more cases, a SIP user agent (UA) is connected to multiple network interfaces. In these cases setting up a connection from a dual stack client to a dual stack server may suffer from the issues described in [RFC 6555](#) [[RFC6555](#)] - Happy Eyeballs - significant delays in the process of setting up a working flow to a server. This negatively affects user experience.

This document builds on [RFC 6555](#) and explains how a [RFC3261](#) [[RFC3261](#)] compliant SIP implementation can quickly set up working flows to a given hostname (located by using DNS NAPTR and SRV lookups) in a dual stack network using connection oriented transport protocols. A solution for connectionless transport protocols is discussed in a separate document.

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[1.](#) Introduction

The core SIP [[RFC3261](#)] RFCs were written with support for both IPv4 and IPv6 in mind, but they were not fully equipped to handle highly hybridized environments during this transitional phase of migration from IPv4 to IPv6 networks, where many server and client implementations run on dual stack hosts. In such environments, a dual-stack host will likely suffer greater connection delay, and by extension an inferior user experience, than an IPv4-only host. The need to remedy this diminished performance of dual-stack hosts led to the development of the Happy Eyeballs [[RFC6555](#)] algorithm, that has since been implemented in many applications.

This document updates [RFC 3261](#) [[RFC3261](#)] procedures so that a dual-

stack client using connection oriented transport SHOULD set up multiple connections in parallel, based on the result of DNS queries. This document starts at the point where a SIP implementation has a hostname that resolves in A and AAAA records. This can either be part of a SIP URI including a port number or the

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result of a lookup using DNS NAPTR and SRV records as described in [RFC 3263](#) [[RFC3261](#)], updated by [RFC 7984](#) [[RFC7984](#)]

Procedures for connectionless transport protocols for SIP will be described in a separate document.

While this document use the term "dual-stack" based on [RFC 6555](#) and earlier terminology, the authors acknowledge that the same solution can be applied to multi-interface environments as well as future versions of IP alongside with the current ones.

[2.](#) Terminology and Conventions Used in This Document

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](#)].

[RFC 3261](#) [[RFC3261](#)] defines additional terms used in this document that are specific to the SIP domain such as "proxy"; "registrar"; "redirect server"; "user agent server" or "UAS"; "user agent client" or "UAC"; "back-to-back user agent" or "B2BUA"; "dialog"; "transaction"; "server transaction".

This document uses the term "SIP Server" that is defined to include the following SIP entities: user agent server, registrar, redirect server, a SIP proxy in the role of user agent server, and a B2BUA in the role of a user agent server.

This document also uses the following terminology to make clear distinction between SIP entities supporting only IPv4, only IPv6 or supporting both IPv4 and IPv6.

IPv4-only UA/UAC/UAS: An IPv4-only UA/UAC/UAS supports SIP signaling and media only on the IPv4 network. It does not understand IPv6 addresses.

IPv6-only UA/UAC/UAS: An IPv6-only UA/UAC/UAS supports SIP signaling and media only on the IPv6 network. It does not understand IPv4 addresses.

IPv4/IPv6 UA/UAC/UAS: A UA/UAC/UAS that supports SIP signaling and media on both IPv4 and IPv6 networks; such a UA/UAC/UAS is known (and will be referred to in this document) as a "dual-stack" [[RFC4213](#)] UA/UAC/UAS.

Discussion: Do we need special handling of websocket transport?

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[3.](#) Background: DNS Procedures in a Dual-Stack Network

SIP used DNS to find a server based on a SIP URI. This process is described in [RFC 3263](#) [[RFC3263](#)] and updated in [draft-ietf-sipcore-dns-dual-stack](#). Using these procedures, a host name is selected and DNS lookups of address records for all address families will generate a list of IP addresses to connect to. This list will be used as input for setting up a connection.

[4.](#) Setting up the connection

The Happy Eyeballs RFC [[RFC6555](#)] does not specify the algorithm used, but requirements on algorithms used for quickly setting up a working connection for the user. The reader is encouraged to read the available documentation as well as study Open Source implementations in order to learn from experience since the publishing of [RFC 6555](#) in 2012.

In short, the SIP client is expected to set up two connections, with some head start for one address family (which possibly should be configurable) and then select the first working connection and close the other one. The SIP message is sent on the selected connection only.

The reason behind this is to avoid the timeout on one connection before another address will be tested - which in the case of SIP with default timers is 32 seconds. Waiting for timeout before trying with a secondary address will lead to a very poor user experience.

5. Security Considerations

This document makes two normative changes to the existing procedures in the SIP protocol. The specific security vulnerabilities, attacks and threat models of the various protocols discussed in this document (SIP, DNS, SRV records, etc.) are well documented in their respective specifications.

6. IANA Considerations

This document does not require any actions by IANA.

7. Acknowledgements

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Acknowledgements for reviews and input: Your name can be here!

8. References

8.1. Normative References

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