

## **SIP: Session Initiation Protocol – Locating SIP Servers**

### **Status of this Memo**

This document is an Internet-Draft and is in full conformance with all provisions of Section 10 of RFC2026.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF), its areas, and its working groups. Note that other groups may also distribute working documents as Internet-Drafts.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as “work in progress.”

The list of current Internet-Drafts can be accessed at <http://www.ietf.org/ietf/lid-abstracts.txt>

To view the list Internet-Draft Shadow Directories, see <http://www.ietf.org/shadow.html>.

### **Copyright Notice**

Copyright (c) The Internet Society (2001). All Rights Reserved.

### **Abstract**

This document describes how a SIP client locates a SIP server based on the Request-URI or a preconfigured outbound proxy server. This document updates the process described in RFC 2543.

## **1 Introduction**

This document updates Sections 1.3 and 1.4.2 and supersedes Appendix D of RFC 2543 [1]. Inter alia, it defines the term outbound proxy and replaces references to the obsoleted RFC 2052 with current references to RFC 2782.

### **1.1 Terminology**

In this document, the key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” are to be interpreted as described in RFC 2119 [2] and indicate requirement levels for compliant SIP implementations.

### **1.2 Definitions**

**Outbound proxy:** A *proxy* that is located near the originator of requests. It receives all outgoing requests from a particular UAC, including those requests whose Request-URLs identify a host other than the outbound proxy. The outbound proxy sends these requests, after any local processing, to the address indicated in the Request-URI. (All other proxy servers are simply referred as proxies, not *inbound* proxies.)

## 2 Locating a SIP Server

When a client wishes to send a request, the client either sends it to a locally configured SIP proxy server, the so-called *outbound proxy*, independent of the **Request-URI**, or sends it to the IP address and port corresponding to the **Request-URI**. The outbound proxy can be configured by any mechanism, including DHCP [3] and can be specified either as a set of parameters such as network address or host name, protocol port and transport protocol, or as a SIP URI.

If the **Request-URI** is used, the client needs to determine the protocol, port and IP address of a server to which to send the request. A client **SHOULD** follow the steps below to obtain this information.

UACs and stateful proxies **SHOULD** determine the destination address once per transaction rather than for each request, i.e., requests within the same transaction **SHOULD** be sent to the same network address. However, a stateless proxy **MUST** always select the same destination within the set of hosts with the same SRV priority. This can be accomplished, for example, by using the modulo  $N$  of a hash of the **Call-ID** value or some other combination of transaction-identifying headers as the uniform random number described in the weighting algorithm of RFC 2782. Here,  $N$  is the sum of weights within the priority class.

A client **SHOULD** be able to interpret explicit network notifications (such as ICMP messages) which indicate that a server is not reachable, rather than relying solely on timeouts. (For socket-based programs: For TCP, `connect()` returns `ECONNREFUSED` if the client could not connect to a server at that address. For UDP, the socket needs to be bound to the destination address using `connect()` rather than `sendto()` or similar so that a second `write()` or `send()` fails with `ECONNREFUSED` if there is no server listening) If the client finds the server is not reachable at a particular address, it **SHOULD** behave as if it had received a 400-class error response to that request.

The client tries to find one or more addresses for the SIP server by querying DNS. If a step elicits no addresses, the client continues to the next step. However if a step elicits one or more addresses, but no SIP server at any of those addresses responds, then the client concludes the server is down and does not continue on to the next step.

If the client is configured with the address of an outbound proxy, the parameters of the outbound proxy, including transport protocol and port, become the *destination* used below.

If there is no outbound proxy, the destination is the **Request-URI**. The destination address is the **maddr** parameter if it exists and the **host** element if not. The transport protocol is the **transport** parameter.

The service identifier for DNS SRV records [4] is “\_sip”.

1. If the destination address is a numeric IP address, the client contacts the server at the given address and the port number specified in the SIP-URI or, if not specified, the default port (5060).

If the destination specifies a protocol, the client contacts the server using that protocol. If no protocol is specified, the client first tries UDP. If attempt fails, or if the client does not support UDP but supports other protocols, it tries those protocols in some implementation-defined order.

The client then skips the remaining steps.

2. If the destination specifies no port number or port number 5060, the transport protocol determines the use of one of the following three rules:
  - If the destination does not specify a transport protocol, DNS SRV records are retrieved according to RFC 2782 [4]. The results of the query or queries are merged and ordered based on priority, keeping only records with transport protocols that the client supports. Then, the searching technique outlined in RFC 2782 [4] is used to select servers in order. Server selection across requests

is independent of previous choices, except as noted above for stateless proxies. Message length or other request properties do not influence the server selection. The client attempts to contact each server in the order listed, at the port number specified in the SRV record. If none of the servers can be contacted, the client gives up. If there are no SRV records (with any transport protocol), DNS address records are used, as described below.

- If a transport protocol is specified and this protocol is supported by the client, the procedure in the paragraph above is used, limited to DNS resource records with the transport protocol specified in the SIP-URI.
- If the transport protocol specified is not supported by the client, the client gives up.

If there are no SRV records, the next step applies.

3. If the destination specifies a port number other than 5060 or if there are no SRV records, the client queries the DNS server for address records for the destination address. Address records include A RR's, AAAA RR's, or other similar records, chosen according to the client's network protocol capabilities.

If the DNS server returns no address records, the client gives up. If there are address records, the same rules as in step 2 apply.

Clients MUST NOT cache query results except according to the rules in RFC 1035 [5].

### 3 Security Considerations

The security considerations in RFC 2543 [1] apply.

### 4 Authors' Addresses

Henning Schulzrinne  
Dept. of Computer Science  
Columbia University  
1214 Amsterdam Avenue  
New York, NY 10027  
USA  
electronic mail: [schulzrinne@cs.columbia.edu](mailto:schulzrinne@cs.columbia.edu)

Jonathan Rosenberg  
dynamicsoft  
72 Eagle Rock Ave  
East Hanover, NJ 07936  
USA  
electronic mail: [jdrosen@dynamicsoft.com](mailto:jdrosen@dynamicsoft.com)

## References

- [1] M. Handley, H. Schulzrinne, E. Schooler, and J. Rosenberg, "SIP: session initiation protocol," Request for Comments 2543, Internet Engineering Task Force, Mar. 1999.
- [2] S. Bradner, "Key words for use in RFCs to indicate requirement levels," Request for Comments 2119, Internet Engineering Task Force, Mar. 1997.
- [3] G. Nair and H. Schulzrinne, "DHCP option for SIP servers," Internet Draft, Internet Engineering Task Force, Apr. 2000. Work in progress.
- [4] A. Gulbrandsen, P. Vixie, and L. Esibov, "A DNS RR for specifying the location of services (DNS SRV)," Request for Comments 2782, Internet Engineering Task Force, Feb. 2000.
- [5] P. V. Mockapetris, "Domain names - implementation and specification," Request for Comments 1035, Internet Engineering Task Force, Nov. 1987.

## Full Copyright Statement

Copyright (c) The Internet Society (2001). All Rights Reserved.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this paragraph are included on all such copies and derivative works. However, this document itself may not be modified in any way, such as by removing the copyright notice or references to the Internet Society or other Internet organizations, except as needed for the purpose of developing Internet standards in which case the procedures for copyrights defined in the Internet Standards process must be followed, or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by the Internet Society or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and THE INTERNET SOCIETY AND THE INTERNET ENGINEERING TASK FORCE DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.