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Nair/Schulzrinne
Columbia University

# DHCP Option for SIP Servers

STATUS OF THIS MEMO



Abstract

This document defines a DHCP option that contains one or more pointers to one or more SIP servers. This enables a SIP client to obtain the addresses of the SIP servers during bootup.

## 1 Terminology

DHCP client: A DHCP [1] client is an Internet host that uses DHCP to obtain configuration parameters such as a network address.

DHCP server: A DHCP server is an Internet host that returns configuration parameters to DHCP clients.

SIP server: As defined in RFC 2543 [2]. In the context of this document, a SIP server refers to the host the application is running on.

SIP client: As defined in RFC 2543. In the context of this document, a SIP client refers to the host the application is running on.

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 [3].

## 2 Introduction

The Session Initiation Protocol (SIP) [2] is an application-layer control protocol that can establish, modify and terminate multimedia sessions or calls. In particular, it is used for signalling of Internet telephony calls. A SIP system has two components: user agents and servers. The user agent is the SIP end system that acts on behalf of someone who wants to participate in a SIP call.

This draft specifies a DHCP option [1,4] that allows SIP user agents (clients) to locate a local SIP server that is to be used for all outbound SIP requests. (SIP clients MAY contact the address identified in the SIP URL directly, without involving a local SIP server. However in some circumstances, in particular with firewalls, SIP clients need to use a local server for outbound requests.)

## 3 Overview

We identify two methods of notifying the client of the servers' location:

1. DNS [5] SRV records: IP address can be resolved by the client, using DNS and the name string passed through a DHCP option. The client first uses the SRV [6] resource records to resolve the host name. If this fails the A resource records are tried.

2. List of IP addresses: Used in case there is no DNS server OR in the case that the client host is not DNS capable.

Any or all of these methods may be used to notify the client of the servers' location.

One approach to using these methods through DHCP is to have a separate DHCP option for each method. This approach makes it easier for the client to ignore an option that it is not concerned with. This is an issue in the case of smaller embedded systems that do not implement DNS or with systems that do not recognize the DNS SRV record. In these cases the client is interested only in the IP address of the SIP server or the DNS `A' record, as the case may be.

This approach however consumes at least two option numbers from the option number space.

In order to conserve the option number space, we propose to include both methods within a single option space. This is done by separating them into individual sub-options. The drawback of this method is that it is more complicated than the individual option approach mentioned above. However in addition to conserving precious option number space, it logically groups both methods of SIP server location into a single field. This approach is defined in the following sections.

## 4 SIP server option

This option specifies one or more fields containing location information for the SIP servers. The fields that can be carried in this option are described in the sections that follow.

The code for this option is TBD, and its maximum length is 255 octets.

```
  Code  Len      Sub-Options
+-----+-----+-----+-----+-----+-----+--
| TBD |  n  | s1  | s2  | s3  | s4  |   ...
+-----+-----+-----+-----+-----+-----+--
```

The `Len' field specifies the total number of octets contained in all sub-options.

Each sub-option will contain a sub-code followed by a length that specifies the number of octets containing configuration information within the sub-option.

```
  Sub   Sub
  Code  Len    configuration information
+-----+-----+-----+-----+-----+-----+-----+--
|  x  |  n  | c1  | c2  | c3  | c4  | c5  |  ...
+-----+-----+-----+-----+-----+-----+-----+--
```

### 4.1 DNS name sub-option

This sub-option specifies the DNS [5] name of the SIP server The client SHOULD first use this string to send an SRV query to the DNS server. If the client is not SRV-cognizant OR the SRV query fails, the client sends the same string in an A record query. The sub-code for this sub-option is 1. The length of the DNS name string is specified in `Sub Len'. The maximum length of this string is 253 octets and minimum length is 1 octet.

```
  Sub   Sub
  Code  Len      DNS name of SIP server
+-----+-----+-----+-----+-----+-----+-----+--
|  1  |  n  | s1  | s2  | s3  | s4  | s5  |  ...
+-----+-----+-----+-----+-----+-----+-----+--
```

Clients SHOULD use this method to locate the SIP server. The reason to list the SRV string and use DNS to resolve the address is that load sharing can be implemented more readily by an SRV-cognizant client.

### 4.2 IP address sub-option

This sub-option specifies the list of IP addresses indicating SIP servers available to the client. The list SHOULD only be used if the client does not implement DNS (as in the case of some emebedded systems) OR if the DNS server is not responding. We duplicate relevant parts of the SRV record [6] in this sub-option. Each item of the list consists of 6 fields which are described below:

1. prio: This is a 16 bit field which indicates the priority of this target host. A client MUST attempt to contact the target host with the lowest-numbered priority it can reach; target hosts with the same priority SHOULD be tried in a round-robin fashion starting with a randomly chosen address. The range of priorities is 0-65535.

2. wt: This is a 16 bit field used by the load balancing mechanism. When selecting a target host among those that have the same priority, the chance of trying this one first SHOULD be proportional to its weight. The range of this number is 1-65535. Domain administrators are urged to use Weight 0 when there isn't any load balancing to do, to make

the sub-option easier to read for humans (less noisy).

3. port: This is a 16 bit field indicating the port on this target SIP server. The range is 0-65535. This is often 5060 - as specified in the IANA Assigned Numbers, but need not be.

4. prot: This is an 8 bit field indicating the protocol used by the SIP server. This can be either TCP or UDP. The IANA assigned number for TCP (6) and UDP (17) are used here.

5. pad: This is an 8 bit field introduced to ensure that the suboption data is alligned with a 32 bit boundary. This makes it easier for the client to process the data.

6. IP address: This is a 32 bit field indicating the IP address of the SIP server.

The sub-code for this sub-option is 2. The minimum length of this sub-option is 12 octets and the length MUST be a multiple of 12. The maximum length of this sub-option is 252 octets.

```
         Sub   Sub
         Code  Len    Sub-option data 1    Sub-option data 2
       +-----+-----+-----+-----+-----+--   --+-----+-----+--
       |  2  |  n  | i1  | i2  | i3  |  ...  | i13 | i14 |  ...
       +-----+-----+-----+-----+-----+--   --+-----+-----+--
```

The sub-option data is as follows:

```
    0                   1                   2                   3
    0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |             prio              |              wt               |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |             port              |     prot      |     pad       |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
   |                          IP address                           |
   +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

## 5 Multiple sub-options

More than one sub-option MAY be returned by the DHCP server. More than one of any sub-option types MAY be present. This permits the

client to select the sub-option that suits its capabilities (DNS-SRV, DNS-A, or no DNS capability).

## 6 Security Consideration

There are no security considerations beyond those described in RFC 2132.

## 7 Acknowledgements

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## 8 Authors' Addresses

Gautam Nair
Dept. of Computer Science
Columbia University 1214 Amsterdam Avenue, MC 0401
New York, NY 10027
USA
electronic mail: gnair@cs.columbia.edu

Henning Schulzrinne
Dept. of Computer Science
Columbia University 1214 Amsterdam Avenue, MC 0401
New York, NY 10027
USA
electronic mail: schulzrinne@cs.columbia.edu

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