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ALG consideration of SIP
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Abstract

SIP protocol is widely used in IP communication applications, e.g. VoIP, IM. However, the SIP communications need to do NAT traversal when NAT existed inside the network. ALG can be found as one of NAT traversal solutions. This document addresses the ALG solution for SIP NAT traversal.

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1. Introduction

SIP protocol is widely used in IP communication applications, e.g. VoIP, IMS. However, the SIP communications need to do NAT traversal when NAT existed inside the network. Multiple NAT traversal solutions have been proposed to IETF, for example ICE and ALG. Although ICE mechanism is an advanced NAT traversal mechanism for SIP applications, it is impossible to know if the applications running on the host implement this advanced NAT traversal mechanism. Thus, ALG for SIP protocol is still necessary.

This document addresses the general ALG solution of SIP protocol for NAT traversal. The scope of this document is focus on ALG located in IP address translator, included same IP family translation and different IP family translation.

2. 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 [RFC2119].

3. Outline of ALG for SIP communication

In this section we outline the ALGs for SIP communication.

The whole SIP communication procedure is described in section 4 of [RFC 3261] in details.

There are two SIP signaling messages include IP address during the communication: INVITE and 200. If the SIP communication needs to traverse the NAT, these two messages need to do ALG if there is no ICE provided.

4. SIP ALG

The following figure illustrates an example where SIP Phone A locates in a private network and uses an NAT device between the private network and public network.

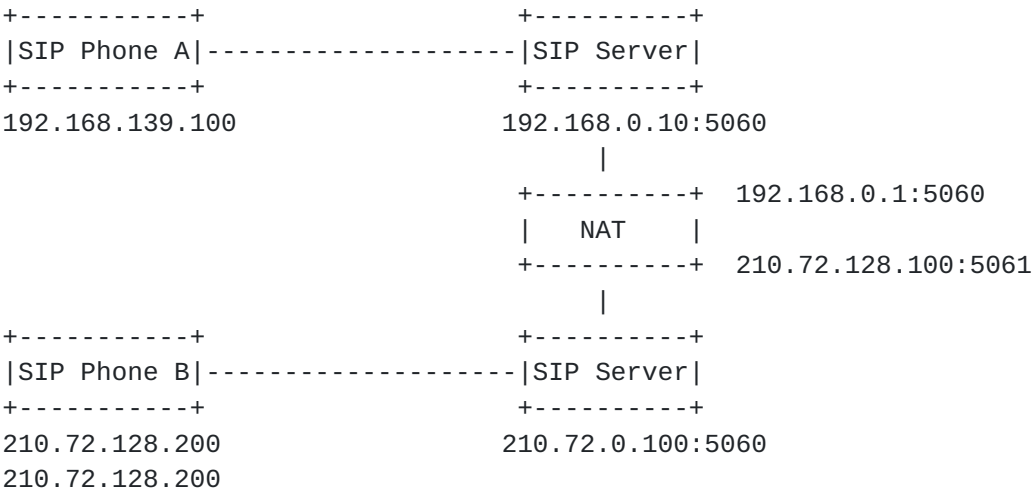

Figure 1 SIP architecture with NAT

In the above figure, Phone A with UID:3100 initiates a session with B.

NAT device's SIP ALG works as a SIP proxy, it behaves like SIP entity between the SIP servers in the private network and in the public network. The SIP ALG function in the NAT device translates the corresponding section of SIP message and creates an SIP-ALG mapping table. The SIP-ALG mapping table is used during the sip session and will be deleted when the session is terminated. The SIP-ALG mapping table uses Call-ID as index. The call-ID could remain unchanged or changed during the translation. The SIP-ALG mapping table contains the following section:

Call-ID_IN

Call_-D_OUT

Vias.IN

Vias.OUT

From.IN

From.OUT

To.IN

To.OUT

Contact.IN

Contact.OUT

SDP.oField.IP_IN

SDP.oField.IP.OUT

SDP.cField.IP_IN

SDP.cField.IP_OUT

SDP.mField.port.IN

SDP.mField.port.OUT

Time_count

The translation algorithm is as follows:

When the SIP ALG function identifies the SIP messages that need to be translated, it performs the following function:

Translate the IP address/domain name in the SIP request message into the SIP server's IP address that locates in the public network.

Record the Via section to the SIP-ALG mapping table's Vias_IN entry and translates the proxy's private IP address and port number to its corresponding public IP address and port number.

Record From section to the SIP-ALG mapping table's From_IN entry and translates the UE's private IP address and port number to its corresponding public IP address and port number.

Record To section to the SIP-ALG mapping table's To_IN entry.

Record Call-ID to the SIP-ALG mapping table's Call-ID_IN section and generates a new Call-ID and create a Call-ID_OUT entry in the mapping table.

Record the Contact section to the SIP-ALG mapping table's Contact_IN entry and translates the UE's private IP address and port number to its corresponding public IP address and port number.

Translates SDP section's o and c section's IP address into corresponding public IP address. m section's port number to public port number. Then creates SDP_oField_IP_IN, SDP_cField_IP_IN, SDP_mField_port_IN entries.

NAT devices forwards the translated SIP message to the next SIP server.

Clear the timeout_Count section of the SIP-ALG mapping table.

When translates the incoming SIP message that comes from the public network. SIP-ALG function in the NAT device should first query the SIP-ALG mapping table using Call-ID as index to see if there is an mapping entry exists. If there is a mapping entry exists, then translates the Via/Contact section of the SIP message and the m section of the SDP message using the SIP-ALG mapping table. Then forward the translated SIP message to the corresponding SIP entity.

As an example, the NAT device should create the following mapping information:

Call_ID_IN 1234@192.168.139.100

Call_ID_OUT 5678@210.72.128.100

Vias_IN SIP/2.0/UDP 192.168.0.10:5060 SIP/2.0/UDP 192.168.139.100: 5060

VIas_OUT 192.168.139.100:5060

From_IN 3100@192.168.139.100:5060

From_OUT 0247654321@210.72.128.100:5061

To_IN 02412345678@192.168.0.10

To_OUT 02412345678@210.72.0.100:5060

Contact_IN 192.168.139.100:5060

Contact_OUT 02412345678@210.72.128.200 5060

SDP_oFiled_IP_IN 192.168.139.100

SDP_oFiled_IP_OUT 210.72.128.200

SDP_mField_port_IN: 3456

SDP_mFild_prot_OUT 7890

Timeout_Count 0

5. Deployment Considerations

SIP ALG always located in the IP address translator.

Most SIP networks deploy SBCs to assist with NAT traversal, SIP ALG functionality need to be implemented inside SBC.

If there is no SBC present during SIP communication, NAT is the right position to implement ALG in the network side.

If the host based translation is provided, ALG need to be implemented in the host side (SIP endpoint) if there is no other advanced NAT traversal solution support such as ICE.

6. Security Considerations

TBD

7. IANA Considerations

None

8. Acknowledgments

TBD

9. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

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