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G. Camarillo
O. Novo
Ericsson
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Traversal Using Relay NAT (TURN) Extension for IPv4/IPv6 transition
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Abstract

This document defines the Traversal Using Relay NAT (TURN) REQUESTED-ADDRESS-TYPE attribute, which allows a client to explicitly request the address type the TURN server will allocate (e.g., an IPv4-only node may request the TURN server to allocate an IPv6 address). This document also registers the IPv6 address type.

Internet-Draft TURN Extension for IPv4/IPv6 transition February 2006

Table of Contents

1.	Introduction	3
2.	Terminology	3
3.	Overview of Operation	3
4.	Client Behavior	3
4.1.	Allocating a Binding	4
4.2.	Refreshing a Binding	5
5.	Server Behavior	5
5.1.	Allocate Request	5
6.	IANA Considerations	6
7.	Acknowledgements	6
8.	References	6
8.1.	Normative References	6
8.2.	Informative References	7
	Authors' Addresses	8
	Intellectual Property and Copyright Statements	9

Internet-Draft TURN Extension for IPv4/IPv6 transition February 2006

1. Introduction

Traversal Using Relay NAT (TURN) is a protocol that allows for an element behind a NAT or firewall to receive incoming data over TCP or UDP connections. It is most useful for elements behind symmetric NATs or firewalls that wish to be on the receiving end of a connection to a single peer.

This document defines the REQUESTED-ADDRESS-TYPE attribute, which is an extension to TURN that allows a client to explicitly request the address type the TURN server will allocate (e.g., an IPv4-only node may request the TURN server to allocate an IPv6 address).

This document also registers the IPv6 address type, which is initially intended to be used in MAPPED-ADDRESS and in REQUESTED-ADDRESS-TYPE attributes.

2. 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 [RFC-2119](#) [[1](#)] and indicate requirement levels for compliant TURN implementations.

3. Overview of Operation

When a user wishes a TURN server to allocate an address of a specific type, it sends an Allocate Request to the TURN server with a REQUESTED-ADDRESS-TYPE attribute. TURN can run over UDP and TCP, as it allows for a client to request address/port pairs for receiving both UDP and TCP.

Assuming the request is authenticated and has not been tampered with, the TURN server allocates a transport address of the type indicated

in the REQUESTED-ADDRESS-TYPE attribute. This address is called the allocated transport address.

The TURN server returns the allocated address in the response to the Allocate Request. This response contains a MAPPED-ADDRESS attribute indicating the mapped IP address and port that the server assigned to the client.

4. Client Behavior

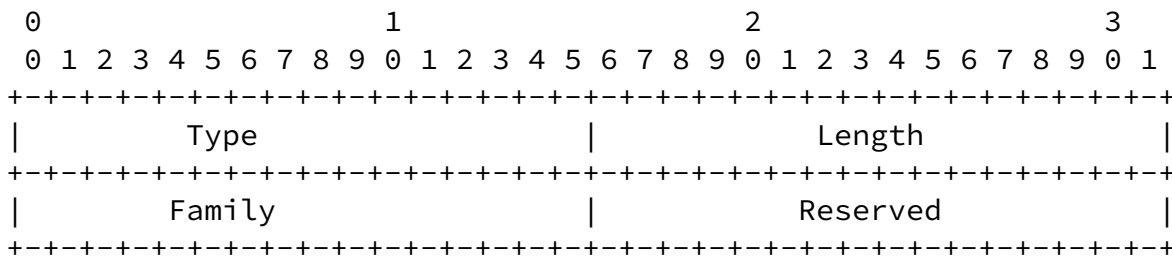
The client behavior specified here affects the transport processing

defined in [Section 8](#) of TURN [2].

4.1. Allocating a Binding

A client that wishes to obtain a transport address of a specific address type includes the REQUESTED-ADDRESS-TYPE attribute in the Allocate Request that sends to the TURN server. The mechanisms to formulate an Allocate Request are described in Section 8.3 of [2].

The REQUESTED-ADDRESS-TYPE attribute is used by clients to request the allocation of a specific address type from a server. The following is the format of the REQUESTED-ADDRESS-TYPE attribute. Note that attributes in TURN are TLV (Type-Length-Value) encoded, with a 16 bit type, a 16 bit length, and a variable-length value.



Type: the type of the REQUESTED-ADDRESS-TYPE mandatory-to-understand attribute is 0x0017. As it is explained in [3], a server cannot process a message with a mandatory-to-understand attributes unless it understands the mandatory attribute.

Length: this 16-bit field contains the length of the attribute in bytes. The length of this attribute is 8 bytes.

Family: there are two values defined for this field: 0x01 for IPv4 addresses and 0x02 for IPv6 addresses.

Reserved: at this point, the 16 bits in the reserved field SHOULD be set to zero by the client and MUST be ignored by the server.

Table 1 indicates in which TURN messages can be present the REQUEST-ADDRESS-TYPE attribute. An 0 indicates that inclusion of the attribute in the message is optional and N/A means that the attribute is not applicable to that message type.

Att.	Binding Req.	Binding Resp.	Binding Error Resp.	Shared Secret Req.	Shared Secret Resp.	Shared Secret Error Resp.

REQUESTED-ADDRESS-TYPE	0	N/A	N/A	N/A	N/A	N/A
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Table 1: Summary of the REQUESTED-ADDRESS-TYPE Attribute

[4.2.](#) Refreshing a Binding

To perform a binding refresh, the client generates an Allocate Request as described in the previous section. The client includes the same REQUESTED-ADDRESS-TYPE attribute as it included in its initial Allocate Request.

If the Allocate Response contains the same transport address as previously obtained, the binding has been refreshed. If, however, the response was an Allocate Error Response with an ERROR-CODE indicating a 430 response, it means that the binding has expired at the server. Other response codes do not imply that the binding has been expired, just that the refresh has failed.

[5.](#) Server Behavior

The server behavior specified here affects the transport processing

defined in [Section 7.2](#) of TURN [2].

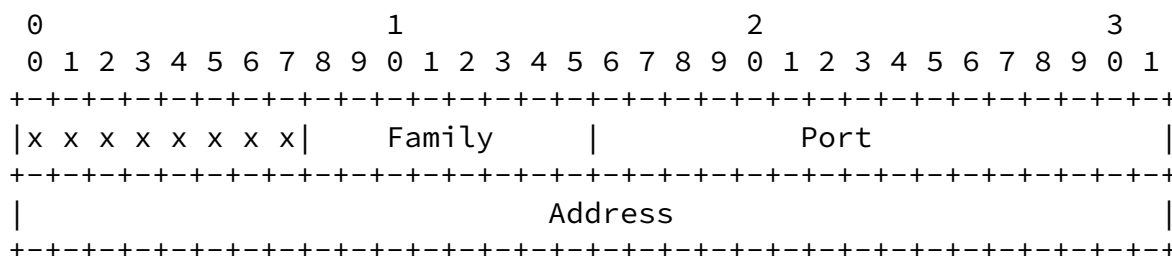
5.1. Allocate Request

Assuming the request is authenticated and has not been tampered with, the TURN server processes the request. If the server does not understand the REQUESTED-ADDRESS-TYPE attribute, it MUST generate an Allocate Error Response, and it MUST include an ERROR-CODE attribute with response code 420 (Unknown Attribute). This response MUST contain an UNKNOWN-ATTRIBUTE attribute listing the unknown REQUESTED-ADDRESS-TYPE attribute.

If the server can successfully process the request, it allocates a transport address to the TURN client, called the allocated transport address, and returns it in the response to the Allocate Request.

As is explained in [2], the Allocate Response contains the same transaction ID contained in the Allocate Request. The server adds a MAPPED-ADDRESS attribute to the Allocate Response and sets it to the allocated transport address.

The MAPPED-ADDRESS attribute indicates the mapped IP address and port. It consists of an eight bit address family, and a sixteen bit port, followed by a variable length value representing the IP address.



STUN [3] defines the 0x01 family type address value for the MAPPED-ADDRESS attribute. The first 8 bits of the MAPPED-ADDRESS are ignored, for the purposes of aligning parameters on natural boundaries. The value of the Address field is 4 bytes (32 bits) long for the IPv4 family type address.

This document defines the IPv6 family type address with the value

0x02. The value of the Address field is 16 bytes (128 bits) long for the IPv6 address. The fact that the length of this type of address is 16 bytes guarantees the alignment of the attribute on word boundaries.

[6.](#) IANA Considerations

This document defines the REQUESTED-ADDRESS-TYPE attribute, which the IANA has added to the TURN attribute registry defined in TURN [[2](#)].

Editor's note: the TURN spec does not create this registry yet. It needs to create it.

This document also defines the address family tag "0x002" which IANA has added to the registry defined in STUN [[3](#)].

Editor's note: the specs of STUN and TURN do not create any registry for this yet.

[7.](#) Acknowledgements

[8.](#) References

[8.1.](#) Normative References

- [1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.

[8.2.](#) Informative References

- [2] Rosenberg, J., "Traversal Using Relay NAT (TURN)", [draft-rosenberg-midcom-turn-08](#) (work in progress), September 2005.
- [3] Rosenberg, J., "Simple Traversal of UDP Through Network Address Translators (NAT) (STUN)", [draft-ietf-behave-rfc3489bis-02](#) (work

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Gonzalo Camarillo
Ericsson
Hirsalantie 11
Jorvas 02420
Finland

Email: Gonzalo.Camarillo@ericsson.com

Oscar Novo
Ericsson
Hirsalantie 11
Jorvas 02420
Finland

Email: Oscar.Novo@ericsson.com

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Camarillo & Novo

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[Page 9]