

I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Series H

Supplement 10

(05/2008)

SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Proxy-aided NAT/FW traversal scheme for ITU-T H.323 multimedia systems

ITU-T H-series Recommendations – Supplement 10



International
Telecommunication
Union

Documents
Document Sharing Hub

ITU-T H-SERIES RECOMMENDATIONS
AUDIOVISUAL AND MULTIMEDIA SYSTEMS

CHARACTERISTICS OF VISUAL TELEPHONE SYSTEMS	H.100–H.199
INFRASTRUCTURE OF AUDIOVISUAL SERVICES	
General	H.200–H.219
Transmission multiplexing and synchronization	H.220–H.229
Systems aspects	H.230–H.239
Communication procedures	H.240–H.259
Coding of moving video	H.260–H.279
Related systems aspects	H.280–H.299
Systems and terminal equipment for audiovisual services	H.300–H.349
Directory services architecture for audiovisual and multimedia services	H.350–H.359
Quality of service architecture for audiovisual and multimedia services	H.360–H.369
Supplementary services for multimedia	H.450–H.499
MOBILITY AND COLLABORATION PROCEDURES	
Overview of Mobility and Collaboration, definitions, protocols and procedures	H.500–H.509
Mobility for H-Series multimedia systems and services	H.510–H.519
Mobile multimedia collaboration applications and services	H.520–H.529
Security for mobile multimedia systems and services	H.530–H.539
Security for mobile multimedia collaboration applications and services	H.540–H.549
Mobility interworking procedures	H.550–H.559
Mobile multimedia collaboration inter-working procedures	H.560–H.569
BROADBAND, TRIPLE-PLAY AND ADVANCED MULTIMEDIA SERVICES	
Broadband multimedia services over VDSL	H.610–H.619
Advanced multimedia services and applications	H.620–H.629
IPTV MULTIMEDIA SERVICES AND APPLICATIONS FOR IPTV	
General aspects	H.700–H.719
IPTV terminal devices	H.720–H.729
IPTV middleware	H.730–H.739
IPTV application event handling	H.740–H.749
IPTV metadata	H.750–H.759
IPTV multimedia application frameworks	H.760–H.769
IPTV service discovery up to consumption	H.770–H.779

For further details, please refer to the list of ITU-T Recommendations.

Supplement 10 to ITU-T H-series Recommendations

Proxy-aided NAT/FW traversal scheme for ITU-T H.323 multimedia systems

Summary

Supplement 10 to ITU-T H-series Recommendations describes a proxy-aided network address translation/firewall (NAT/FW) traversal mechanism in the ITU-T H.323 multimedia system. The proxy described in this supplement implements the ITU-T H.323 applications NAT/FW traversal by way of translating the address, ports and the related contents in the payloads and/or in the Internet Protocol (IP) headers, in which the ITU-T H.323 protocol remains intact. In addition, the proxy can also facilitate the real-time transport protocol/real-time transport control protocol (RTP/RTCP) media flows traverse the NAT/FW among the entities in communication.

Source

Supplement 10 to ITU-T H-series Recommendations was agreed on 2 May 2008 by ITU-T Study Group 16 (2005-2008).

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this publication, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this publication is voluntary. However, the publication may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the publication is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the publication is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this publication may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the publication development process.

As of the date of approval of this publication, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this publication. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2009

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

CONTENTS

Page

1	Scope	1
2	References.....	1
3	Definitions	2
3.1	Terms defined elsewhere	2
3.2	Terms defined in this supplement.....	2
4	Abbreviations and acronyms	3
5	Overview	3
6	General architecture.....	4
6.1	General function description	4
6.2	Network locations.....	6
6.3	General description of the ITU-T H.323 parameter translations.....	7
7	ITU-T H.323 NAT/FW traversal with proxy in the private network	7
7.1	General description.....	7
7.2	Call flows of the ITU-T H.323 NAT/FW traversal with proxy in the private network.....	8
8	ITU-T H.323 NAT/FW traversal with proxy on the edge of private and public networks.....	16
8.1	General description.....	16
8.2	Call flows of the ITU-T H.323 NAT/FW traversal with proxy on the edge of private and public networks	16
9	Security considerations.....	22

Supplement 10 to ITU-T H-series Recommendations

Proxy-aided NAT/FW traversal scheme for ITU-T H.323 multimedia systems

1 Scope

This supplement describes a proxy-aided NAT/FW traversal mechanism as a NAT traversal solution for ITU-T H.323 multimedia systems. A proxy is a logical functional entity with one or more addresses in one or more realms. It provides translation of the IP header as well as the translation of ports and addresses in the message payloads. A proxy is logically located on the edge of different realms, while it can be physically deployed in many different places in the network (private or public).

The scheme described in this supplement addresses end-to-end ITU-T H.323 communications and does not address ITU-T H.323 functionalities above the transport level. The method described in this supplement is complementary to other NAT/FW traversal solutions, such as those described in the ITU-T H.460-series Recommendations. The proxy-aided NAT/FW traversal scheme highlights potential issues with deploying those ITU-T H.323 NAT/FW traversal solutions and describes how those solutions are applied in such cases.

2 References

- [ITU-T H.225.0] Recommendation ITU-T H.225.0 (2006), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.
<<http://www.itu.int/rec/T-REC-H.225.0>>
- [ITU-T H.245] Recommendation ITU-T H.245 (2006), *Control protocol for multimedia communication*.
<<http://www.itu.int/rec/T-REC-H.245>>
- [ITU-T H.323] Recommendation ITU-T H.323 (2006), *Packet-based multimedia communications systems*.
<<http://www.itu.int/rec/T-REC-H.323>>
- [ITU-T H.460.17] Recommendation ITU-T H.460.17 (2005), *Using H.225.0 call signalling connection as transport for H.323 RAS messages*.
<<http://www.itu.int/rec/T-REC-H.460.17>>
- [ITU-T H.460.18] Recommendation ITU-T H.460.18 (2005), *Traversal of H.323 signalling across network address translators and firewalls*.
<<http://www.itu.int/rec/T-REC-H.460.18>>
- [ITU-T H.460.19] Recommendation ITU-T H.460.19 (2005), *Traversal of H.323 Media across network address translators and firewalls*.
<<http://www.itu.int/rec/T-REC-H.460.19>>
- [IETF RFC 2663] IETF RFC 2663 (1999), *IP Network Address Translator (NAT) Terminology and Considerations*.
<<http://www.ietf.org/rfc/rfc2663.txt>>
- [IETF RFC 3022] IETF RFC 3022 (2001), *Traditional IP Network Address Translator (Traditional NAT)*.
<<http://www.ietf.org/rfc/rfc3022.txt>>
- [IETF RFC 3103] IETF RFC 3103 (2001), *Realm Specific IP: Protocol Specification*.
<<http://www.ietf.org/rfc/rfc3103.txt>>

- [IETF RFC 3304] IETF RFC 3304 (2002), *Middlebox Communications (midcom) Protocol Requirements*.
<<http://www.ietf.org/rfc/rfc3304.txt>>
- [IETF RFC 3489] IETF RFC 3489 (2003), *STUN - Simple Traversal of User Datagram Protocol (UDP) Through Network Address Translators (NATs)*.
<<http://www.ietf.org/rfc/rfc3489.txt>>

3 Definitions

3.1 Terms defined elsewhere

This supplement uses the following terms defined elsewhere:

3.1.1 gatekeeper (GK) [ITU-T H.323]: The gatekeeper (GK) is an ITU-T H.323 entity on the network that provides address translation and controls access to the network for ITU-T H.323 terminals, gateways and MCUs. The gatekeeper may also provide other services to the terminals, gateways and MCUs such as bandwidth management and locating Gateways.

3.1.2 network address translation (NAT) [IETF RFC 2663]: Network address translations (NATs) provide the address or port mapping between the public network and the private network. NAT allows hosts in a private network to transparently communicate with destinations in an external network and vice versa.

3.1.3 static network address translation [IETF RFC 2663]: It refers to the NATs configured with static address assignment, namely, there is one-to-one address mapping for hosts between a private network address and an external network address for the lifetime of NAT operation.

3.1.4 dynamic network address translation [IETF RFC 2663]: It refers to the NATs configured with dynamic address assignment, namely, external addresses are assigned to private network hosts or vice versa, dynamically based on usage requirements and session flow determined heuristically by NAT. When the last session using an address binding is terminated, NAT would free the binding so that the global address could be recycled for later use.

3.1.5 realm [IETF RFC 2663]: An address realm is a network domain in which the network addresses are uniquely assigned to entities such that datagrams can be routed to them. Routing protocols used within the network domain are responsible for finding routes to entities given their network addresses. Note that this Supplement is limited to describing NAT in the IPv4 environment and does not address the use of NAT in other types of environment (e.g., IPv6 environments).

3.1.6 zone [ITU-T H.323]: A zone is the collection of all terminals (Tx), gateways (GW), and multipoint control units (MCUs) managed by a single gatekeeper (GK). A zone includes at least one terminal, and may or may not include gateways or MCUs. A zone has one and only one gatekeeper. A zone may be independent of network topology and may be comprised of multiple network segments which are connected using routers (R) or other devices.

3.2 Terms defined in this supplement

This supplement defines the following term:

3.2.1 proxy: A proxy is the functional entity which can aid the ITU-T H.323 multimedia applications in traversing the NAT/FW installations. It can identify and then translate all the ITU-T H.323 signalling messages (based on TCP or UDP) by modifying the address-related contents in the ITU-T H.323 application-specific payloads and/or in the IP headers to be valid in the address realm, into which the messages are routed. After this, the proxy will forward these messages to their destinations. Besides the signalling messages processing, the proxy can also facilitate the RTP/RTCP media flow among the entities in communication.

4 Abbreviations and acronyms

This supplement uses the following abbreviations and acronyms:

ACF	Admission Confirm
ALG	Application Level Gateway
ARJ	Admission Reject
ARQ	Admission Request
DoS	Denial of Service
FW	Firewall
GCF	Gatekeeper Confirmation
GK	Gatekeeper
GRJ	Gatekeeper Reject
GRQ	Gatekeeper Request
GW	Gateway
IP	Internet Protocol
IPSec	Internet Protocol Security
MPF	Media Proxy Function
NAT	Network Address Translator
OLC	openLogicalChannel message [ITU-T H.245]
RAS	Registration, Admission and Status
RCF	Registration Confirmation
RRJ	Registration Reject
RRQ	Registration Request
RSIP	Realm Specific Internet Protocol
RTP	Real-time Transport Protocol
RTCP	Real-time Transport Control Protocol
SINN	Server Involvement in NAT Navigation
SPF	Signalling Proxy Function
STUN	Simple Traversal of UDP over NATs
TCP	Transmission Control Protocol
TE	Terminal
UDP	User Datagram Protocol
URQ	Unregistration Request

5 Overview

Network address translators (NATs) provide a lot of benefits to solving the problems of the exhaustion of IPv4 addresses and have been widely deployed during the past decade. However, the presence of NATs can hamper many existing IP applications and then create problems for some multimedia services based on some certain protocols, which cannot naturally traverse the NATs