TTC標準
Standard

JJ-90.32

Common interconnection interface for SIP domain name resolution based on DNS (English Edition)

Version 2.0

May 23, 2019

THE TELECOMMUNICATION TECHNOLOGY COMMITTEE

Introduction

This document provides the TTC original Standard formulated by TTC signaling working group. The working group translated JJ-90.32 Japanese version 1.0. (August 29, 2018) into English, and issued JJ-90.32 English version on August 29, 2018.

In case of dispute, the original to be referred is the Japanese edition of the text.

CONTENTS

<Reference Information>

1. Relationship to International Recommendations

This Standard is specified with reference to the international standards documents listed as Normative references.

2. Change history

Edition and Version	Date of issue	Contents of changes
English Edition, Version 1.0	August 29, 2018	Published
English Edition, Version 2.0	May 23, 2019	Mandating the usage of UDP.

3. References

3.1. Normative references

The following documents are normative references, referenced in this Standard.

[RFC 1035] "DOMAIN NAMES – IMPLEMENTATION AND SPECIFICATION", TTC standard JF-IETF-RFC1035 Version 1, The Telecommunication Technology Committee, May 2015.

[RFC 2474] "Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers", TTC standard JF-IETF-RFC2474 Version 1, The Telecommunication Technology Committee, May 2009.

[RFC 2597] "Assured Forwarding PHB Group", TTC standard JF-IETF-RFC2597 Version 1, The Telecommunication Technology Committee, May 2010.

[RFC 2782] "A DNS RR for specifying the location of services (DNS SRV)", TTC standard JF-IETF-RFC2782 Version 1, The Telecommunication Technology Committee, August 2018.

[RFC 3263] "Session Initiation Protocol (SIP): Locating SIP Servers", TTC standard JF-IETF-RFC3263 Version 1, The Telecommunication Technology Committee, May 2009.

[RFC 3403] "Dynamic Delegation Discovery System (DDDS) Part Three: The Domain Name System (DNS) Database", TTC standard JF-IETF-RFC3403 Version 1, The Telecommunication Technology Committee, May 2015.

[RFC 3596] "DNS Extensions to Support IP Version 6", TTC standard JF-IETF-RFC3596 Version 1, The Telecommunication Technology Committee, August 2018.

[RFC 6891] "Extension Mechanisms for DNS (EDNS(0))", TTC standard JF-IETF-RFC6891 Version 1, The Telecommunication Technology Committee, May 2015.

3.2. Non-normative references

The following documents are non-normative references, referenced in this Standard.

[RFC 6724] "Default Address Selection for Internet Protocol Version 6 (IPv6)", TTC standard JF-IETF-RFC6724 Version 1, The Telecommunication Technology Committee, August 2018.

[IR.34] "Guidelines for IPX Provider networks (Previously Inter-Service Provider IP Backbone Guidelines)", GSMA IR.34 Version 13.0, October 2016.

[IR.67] "DNS and ENUM Guidelines for Service Providers and GRX and IPX Providers", GSMA IR.67 Version 14.0, November 2016.

4. Industrial Property

The status of the "IPR Licensing Statement" submission is provided on the TTC web site.

5. Responsible Working Group

Signalling Working Group

1. Overview

1.1. Scope

This Standard specifies the DNS interface between domestic IMS networks to acquire and choose the IP address of the IBCF (Interconnection Border Control Function) acting as a border SIP gateway in the destination IMS network from the SIP domain name of the IMS network.

1.2. Objective

The purpose of this Standard is to improve telecommunications carrier's inter-connectivity by unifying the domestic telecommunications carrier's interpretations about the specifications of the DNS interface to acquire and choose the IP address of the IBCF in the destination IMS network from the SIP domain name of the IMS network.

1.3. Contents

To properly handle the IP address of the IBCF in a destination IMS network acquisition from the SIP domain name of the IMS network by using DNS, this Standard specifies the following mandatory items with which the domestic telecommunication carriers should comply. Regarding the items of the inter-operator agreement, each item number of an inter-operator agreement is enclosed with "{" and "}".

(1) Architecture for DNS interface between IMS networks to resolve a SIP domain name (Clause 3)

a) Architecture for DNS interface between IMS networks (Subclause 3.1)

b) Selection of destination DNS server (Subclause 3.2)

c) Selection of destination IBCF (Subclause 3.3)

(2) Architecture for Carrier ENUM interface

a) Layer 3 (Subclause 4.1)

b) Layer 4 (Subclause 4.2)

c) DNS (Subclause 4.3)

- Format of DNS messages (Subclause 4.3.1)
- Common operation of DNS (Subclause 4.3.2)
- NAPTR resource record (Subclause 4.3.3)
- SRV resource record (Subclause 4.3.4)
- A record (Subclause 4.3.5)
- AAAA record (Subclause 4.3.6)

(3) Sequence and message encoding examples (Appendix i)

2. Terminologies and abbreviations

2.1. Terminologies

The terms used in this Standard complies with the terms used in normative references.

2.2. Abbreviations

The abbreviations used in this Standard are as shown below.

DNS	Domain Name System
DSCP	Differentiated Services Code Point
FQDN	Fully Qualified Domain Name
IBCF	Interconnection Border Control Function
IMS	IP Multimedia Subsystem
IPv4	Internet Protocol Version 4
PHB	Per Hop Behavior
SIP	Session Initiation Protocol
UDP	User Datagram Protocol

3. Architecture

This clause specifies the architecture for inter-operator DNS interface to resolve a SIP domain name.

3.1. Architecture for inter-operator DNS

This Standard applies the architecture that an originating IMS network sends a query to a DNS server in a terminating IMS network of the destination SIP domain for resolution of the SIP domain name, as shown in Figure 3.1-1.
If the inter-operator DNS interface is applied for resolving SIP domain name, the operator who deploys a DNS server needs to inform the IP address (list) of DNS server(s) to the peer operator of the IMS inter-connection beforehand, since root DNS is not applied in the Standard. {Item 1}

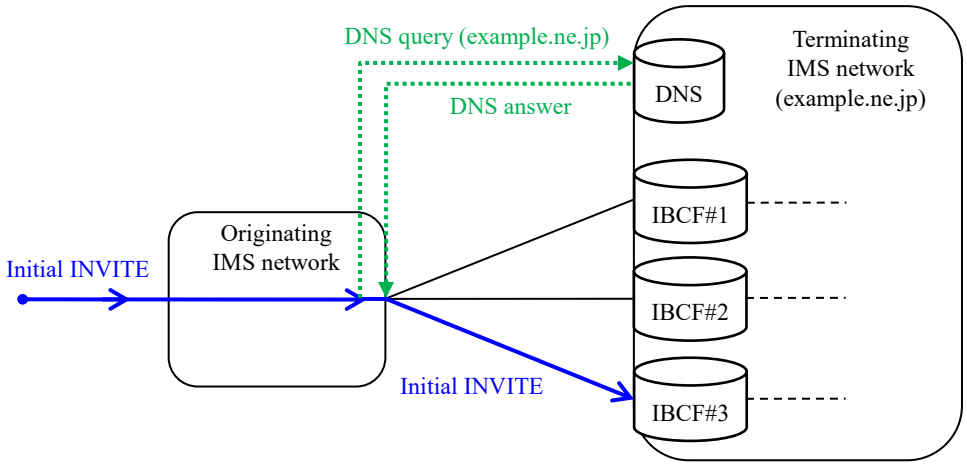


Figure 3.1-1/JJ-90.32: Architecture for inter-operator DNS

This Standard applies "3-steps approach" (retrieves NAPTR resource record(s), retrieves SRV resource record(s), and retrieves A/AAAA resource record(s)) as shown in Figure 3.1-2 in order to acquire IP address (list) of the connecting IBCF(s) from destination SIP domain name, as same as [IR.67].

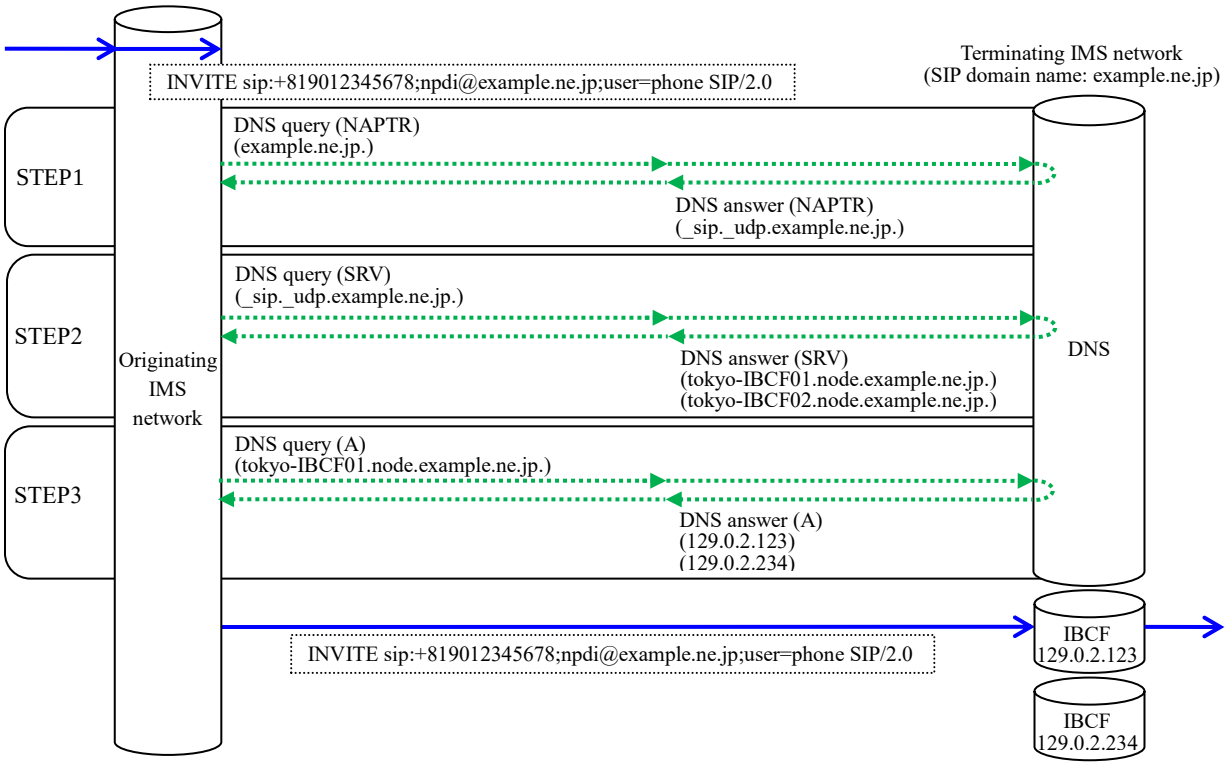


Figure 3.1-2/JJ-90.32: Procedure for resolving SIP domain name using inter-operator DNS

3.2. Selection of connecting DNS server

If there are multiple IP addresses of DNS servers in a terminating IMS network, an originating IMS network may decide the method to select the connecting DNS server (e.g., priority connection, round-robin connection, multicasting) based on the originating IMS operator policy.

3.3. Selection of connecting IBCF

This Subclause specifies the method to select a resource record when an originating IMS network receives same type of multiple records in each step of SIP domain name resolution using inter-operator DNS.

3.3.1. STEP 1: NAPTR resource record

When an originating IMS network obtains the multiple NAPTR resource records corresponding to a query of a destination SIP domain name, the originating IMS network shall select a NAPTR resource record to use, based on the ORDER field value and PREFERENCE field value in the received NAPTR records, according to the rule described in [RFC 3403].

NOTE: The conditions to send back NAPTR resource record(s) at a DNS server are specified in Subclause 4.3.3 of this Standard.

3.3.2. STEP 2: SRV resource record

When an originating IMS network obtains the multiple SRV resource records corresponding to a query of the REPLACEMENT field value in the NAPTR resource record selected at STEP 1, the originating IMS network shall select a FQDN to be connected to, based on the Priority field value and Weight field value in the received SRV records, according to the rule described in [RFC 2782].

NOTE: The conditions to send back SRV resource record(s) at a DNS server are specified in Subclause 4.3.4 of this Standard.

3.3.3. STEP 3: A/AAAA resource record

The method to select a IP address (e.g., selecting topmost record, using round-robin) when an originating IMS network obtains the multiple A or AAAA records corresponding to a query of the FQDN selected at STEP 2 is determined based on inter-operator agreements. {Item 2}

NOTE 1: The conditions to send back A/AAAA record(s) at a DNS server are specified in Subclause 4.3.5 and Subclause 4.3.6 of this Standard.

NOTE 2: The recommended method to select an IPv6 address is specified in [RFC 6724].

3.4. Procedure when expiring DNS timer / receiving DNS error

When there are multiple IP addresses of DNS servers in a connecting IMS network, an originating IMS network can send the DNS query to other DNS server, if the timer configured in the originating IMS network expires or the originating IMS network receives an DNS error message in which RCODE field of header section is set to the value other than 0.

4. Specifications of the interface between operator's networks

This Clause specifies the interface between operator's networks to resolve a SIP domain name using inter-operator DNS.

4.1. Layer 3

IPv4 is applied as the IP version for sending and receiving of ENUM messages in this Standard.

4.1.1. DSCP values over the inter-connection interface

The DSCP value (see [RFC 2474]) shall be set as described in Table 4.1.1-1 for the packets of DNS, as same as [IR.34].

Table 4.1.1-1 / JJ-90.32: DSCP value setting over the inter-connection interface

Protocol	IP Transport	
	PHB	DSCP
ENUM/DNS	AF31 (NOTE 1)	011010 (NOTE 1)
NOTE 1: The element conforms to [RFC 2597].		

NOTE 2: It should be noted that the DSCP value defined in this subclause needs to be set despite the priority of call (e.g., call from priority users, emergency call).

4.2. Layer 4

UDP is applied as the transport layer protocol for sending and receiving of DNS messages in this Standard.

The operator who deploys DNS server(s) shall inform a DNS query listening port number(s) of the DNS server(s) to the peer operator of IMS inter-connection beforehand. {Item 3}.

4.3. DNS

This subclause specifies the inter-operator DNS interface specifications based on [RFC 1035], [RFC 2782], [RFC 3263], [RFC 3403], [RFC 3596] and [RFC 6891].

4.3.1. DNS message format

The DNS message format complies with Subclause 4.1 in [RFC 1035].

A DNS message consists of header section, query section, answer section, authority section and additional information section. Table 4.3.1-1 shows the setting conditions for DNS query/answer. In the following, the setting value of each field is specified.

Table 4.3.1-1 / JJ-90.32: Conditions of DNS message settings

	DNS query	**DNS answer**
Header section	Mandatory to set	Mandatory to set
Query section	Mandatory to set	Mandatory to set
Answer section	No setting	Mandatory to set
Authority section	No setting	Optional to set
Additional information section	Mandatory to set (NOTE)	Mandatory to set (NOTE)
NOTE: Set the OPT Pseudo resource record as specified in Subclause 4.3.2 of this Standard.		

4.3.1.1. Header section

Figure 4.3.1.1-1 shows the format of header section and Table 4.3.1.1-1 shows the specifications in this Standard for setting of each field in the header section.

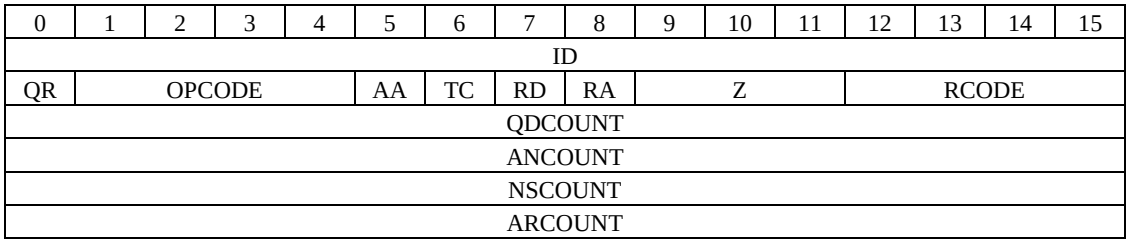


Figure 4.3.1.1-1 / JJ-90.32: Format of the header section

Table 4.3.1.1-1 / JJ-90.32: Setting value for each field in the header section

Field name	Definition	Setting value
ID	Identifier for query	Complying with Subclause 4.1.1 in [RFC 1035].
QR	Message type	Complying with Subclause 4.1.1 in [RFC 1035].
OPCODE	Query type	Complying with Subclause 4.1.1 in [RFC 1035].
AA	Identifier to prove direct response from authority server	Complying with Subclause 4.1.1 in [RFC 1035].
TC	Identifier to indicate whether truncation of data size is performed or not	Complying with Subclause 4.1.1 in [RFC 1035].
RD	Request of recursive query	Complying with Subclause 4.3.2.1 in this Standard.
RA	Identifier to indicate the availability of recursive query	Complying with Subclause 4.1.1 in [RFC 1035].
Z	Spare (reserved for future use)	Complying with Subclause 4.1.1 in [RFC 1035].
RCODE	Response Code	Complying with Subclause 4.1.1 in [RFC 1035].
QDCOUNT	The number of entries in the query part	Complying with Subclause 4.1.1 in [RFC 1035].
ANCOUNT	The number of resource records in the answer section	Complying with Subclause 4.1.1 in [RFC 1035].
NSCOUNT	The number of resource records in the authority section	Complying with Subclause 4.1.1 in [RFC 1035].
ARCOUNT	The number of resource records in the additional information section	Complying with Subclause 4.1.1 in [RFC 1035].

4.3.1.2. Query section

Figure 4.3.1.2-1 shows the format of the query section and Table 4.3.1.2-1 shows the specifications in this Standard for setting of each field in the query section.

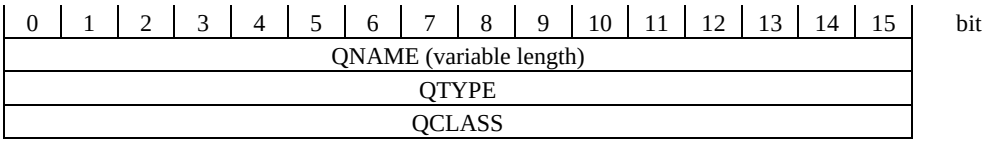


Figure 4.3.1.2-1 / JJ-90.32: Format of the query section

Table 4.3.1.2-1 / JJ-90.32: Setting value for each field in the query section

Field name	Definition	Setting value
QNAME	Domain name to which a query is sent	Complying with Subclause 4.3.3, Subclause 4.3.4, Subclause 4.3.5 and Subclause 4.3.6 in this Standard.
QTYPE	Query type	Complying with Subclause 4.3.3, Subclause 4.3.4, Subclause 4.3.5 and Subclause 4.3.6 in this Standard.
QCLASS	Query class	Set to "1".

4.3.1.3. Query section / authority section / additional information section

Figure 4.3.1.3-1 shows the format of the resource records which are used in the answer section, the authority section and the additional information section. Table 4.3.1.3-1 shows the specifications in this Standard for setting of each field in the resource record.

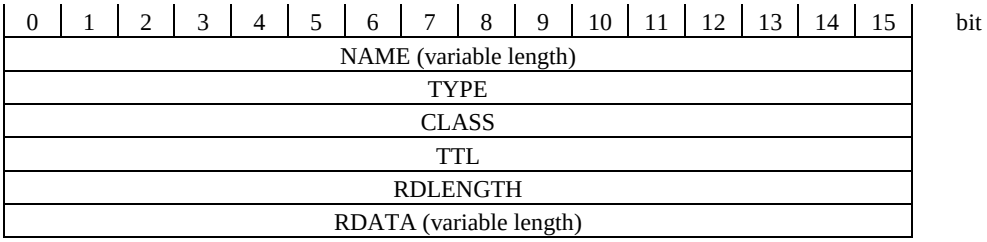


Figure 4.3.1.3-1 / JJ-90.32: Format of the resource records

Table 4.3.1.3-1 / JJ-90.32: Setting value for each field in the resource record format

Field name	Definition	Setting value
NAME	Name of domain pertained to	Complying with Subclause 4.1.3 in [RFC 1035].
TYPE	Meaning of the information in RDATA field	Complying with Subclause 4.1.3 in [RFC 1035].
CLASS	Class of the information in RDATA field	Complying with Subclause 4.1.3 in [RFC 1035].
TTL	Period of time in which resource record can be cached.	Complying with Subclause 4.1.3 in [RFC 1035].
RDLENGTH	Length in octets of RDATA field	Complying with Subclause 4.1.3 in [RFC 1035].
RDATA	Resource data whose format is specified in TYPE field and CLASS field	Complying with Subclause 4.1.3 in [RFC 1035].

4.3.2. Common procedure of DNS

In this Standard, EDNS0 defined in [RFC 6891] shall be supported at the ENUM interface then an OPT Pseudo resource record shall be set in the additional information section, and each field of the OPT Pseudo resource record shall be set complying with Table 4.3.2-1. The requestor's deliverable UDP payload size and responder's deliverable UDP payload size shall be set in the CLASS field of the OPT Pseudo resource record by octet unit. In this Standard, the CLASS field value of the OPT Pseudo resource record shall be equal to 4096.

Table 4.3.2-1 / JJ-90.32: Setting value for each field in the OPT Pseudo resource record format

Field name	Definition	Setting value
NAME	Route domain	Complying with [RFC 6891].
TYPE	Type of resource record	Complying with [RFC 6891].
CLASS	requestor's UDP payload size	Set to "4096".
TTL	extended RCODE and flags	Complying with [RFC 6891].
RDLENGTH	length of all RDATA	Complying with [RFC 6891].
RDATA	Extended contents in case of option is used	Complying with [RFC 6891].

4.3.2.1. DNS query

"Recursive query" shall be used for DNS query in this Standard. Therefore, the recursive desired (RD) field of the header section in the DNS query shall be set to 0. In addition, the response code (RCODE) field of the header section in DNS query shall be set to 0.

4.3.2.2. DNS answer

UDP payload size of a DNS answer shall not exceed 4096 octets.

In the case of a normal response, the RCODE field of the header section in the DNS answer shall be set to 0.

In the case of an error response, the RCODE field of the header section in the DNS answer shall be set to a value other than 0 as specified in Subclause 4.1.1 of [RFC 1035].

Table 4.3.2.2-1 / JJ-90.32: Definitions of RCODE field

Value	Definition	
0	No error condition	-
1 (NOTE 1)	Format error	The name server was unable to interpret the query
2	Server failure	The name server was unable to process this query due to a problem with the DNS server
3 (NOTE 1)	Name error	The resource record corresponding to the domain name referenced in the query does not exist
4 (NOTE 1)	Not implemented	The name server does not support the requested kind of query
5 (NOTE 1)	Refused	The DNS server refuses to perform the specified operation for policy reasons
NOTE 1: The value can be set due to implementation error at the IBCF/DNS server or configuration error; however, it is not expected to be set the value in normal operation. NOTE 2: This table describes the RCODE values defined in [RFC 1035].		

4.3.3. NAPTR resource record

The QTYPE field of query section in DNS query/answer and TYPE field of answer section in the DNS answer shall be set to 35 according to Subclause 4.2 of [RFC 3403].

4.3.3.1. DNS query

The QNAME field of query section shall be set to a SIP domain name.

4.3.3.2. DNS answer

The NAPTR resource record format set to RDATA field of answer section shall comply with Subclause 4.1 of [RFC 3403].

Figure 4.3.3.2-1 shows the NAPTR resource record format, and Table 4.3.3.2-1 shows the specifications in this Standard for setting of each field in the NAPTR resource record.

TTL value of NAPTR resource record is determined based on inter-operator agreements. {Item 4}

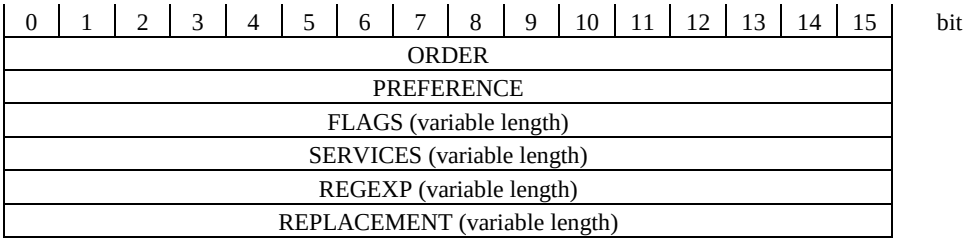


Figure 4.3.3.2-1 / JJ-90.32: Format of NAPTR resource record

Table 4.3.3.2-1 / JJ-90.32: Setting value for each field in the NAPTR resource record

Field name	Definition	Setting value
ORDER	Order of processes in the case that multiple NAPTR resource records exist	Complying with Subclause 4.3.3.2.1 in this Standard.
PREFERENCE	Priority of the processes for NAPTR resource records in which ORDER field's value is the same	Complying with Subclause 4.3.3.2.2 in this Standard.
FLAGS	Specifying the behaviors for the resource record	Complying with Subclause 4.3.3.2.3 in this Standard.
SERVICES	Specifying the services which are the target of resource records	Complying with Subclause 4.3.3.2.4 in this Standard.
REGEXP	This is separated by delimiter (delim-char part) to specify the conversion rules (ere part) based on POSIX expanded regular expression and the strings which are the target of the conversion	No settings.
REPLACEMENT	Domain name used for the DNS query in the next step (SRV resource record)	Complying with Subclause 4.3.3.2.5 in this Standard.

4.3.3.2.1. ORDER field

In this Standard, the ORDER field value shall be set according to [RFC 3403].

4.3.3.2.2. PREFERENCE field

In this Standard, the PREFERENCE field value shall be set according to [RFC 3403].

4.3.3.2.3. FLAGS field

In this Standard, the FLAGS field value shall be set to "s" which represents that the final result is the value obtained by querying a label of REPLACEMENT field using SRV resource record. Note that "s" is case-insensitive.

4.3.3.2.4. SERVICES field

In this Standard, the "SIP+D2U" or "SIP+D2T" defined in [RFC 3263] are allowed to be set.

A DNS server shall send a NAPTR resource record corresponding to the transport protocol (UDP) used between IMS networks. Therefore, the DNS server sends back the NAPTR resource record in which the SERVICE field is set to "SIP+D2U".

4.3.3.2.5. REPLACEMENT field

The REPLACEMENT field shall be set in accordance with [RFC 3263]. In addition, "_sip" shall be set as a service identifier, in this Standard. An example of the REPLACEMENT field is shown as follows:

_sip._udp.example.ne.jp.

4.3.4. SRV resource record

The QTYPE field of the query section in the DNS query/answer and the TYPE field of the answer section in the DNS answer shall be set to 33 according to Subclause 4.2 of [RFC 2782].

4.3.4.1. DNS query

The QNAME field of the query section shall be set to a value of the REPLACEMENT field in the selected NAPTR resource record.

4.3.4.2. DNS answer

The SRV resource record format set to the RDATA field of the answer section shall comply with [RFC 2782].

Figure 4.3.4.2-1 shows the SRV resource record format, and Table 4.3.4.2-1 shows the specifications in this Standard for setting of each field i in the SRV resource record.

The TTL value of SRV resource record and the maximum number of the SRV records are determined based on inter-operator agreements. {Item 5, Item 6}

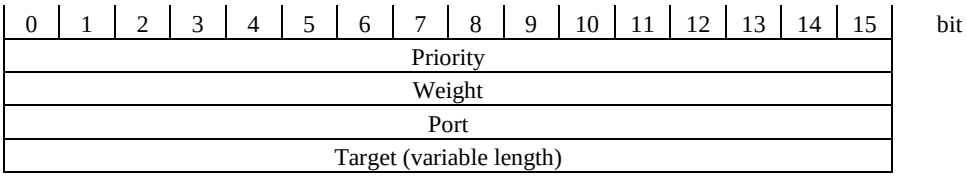


Figure 4.3.4.2-1 / JJ-90.32: Format of SRV resource record

Table 4.3.4.2-1 / JJ-90.32: Setting value for each field in the SRV resource record

Field name	Definition	Setting value
Priority	The priority of this target host	Complying with Subclause 4.3.4.2.1 in this Standard.
Weight	The weight field specifies a relative weight for entries with the same priority	Complying with Subclause 4.3.4.2.2 in this Standard.
Port	The port on this target host of this service	Complying with Subclause 4.3.4.2.3 in this Standard.
Target	The domain name of the target host	Complying with Subclause 4.3.4.2.4 in this Standard.

4.3.4.2.1. Priority field

The Priority field value shall be set within the range 0-65535 according to [RFC 2783].

4.3.4.2.2. Weight field

The Weight field value shall be set within the range 0-65535 according to [RFC 2783].

4.3.4.2.3. Port field

The Target field shall be set the port number for the SIP message determined in the inter-operator agreement.

4.3.4.2.4. Target field

The Port field shall be set to an FQDN including a SIP domain name.

4.3.5. A record

An originating IMS network may query an A record only when IPv4 is applied for SIP interconnection between IMS operators.

The QTYPE field of the query section in the DNS query/answer and the TYPE field of the answer section in the DNS answer shall be set to 1 according to [RFC 1035].

The TTL value of A record is determined based on inter-operator agreements. {Item 7}

NOTE: This Standard does not specify the reverse lookup from IPv4 address to FQDN.

4.3.6. AAAA record

An originating IMS network may query an AAAA record only when IPv6 is applied for SIP interconnection between IMS operators.

The QTYPE field of the query section in the DNS query/answer and the TYPE field of the answer section in the DNS answer shall be set to 28 according to [RFC 3596].

TTL value of AAAA record is determined based on inter-operator agreements. {Item 8}

NOTE: This Standard does not specify the reverse lookup from IPv6 address to FQDN.

Appendix i (Informative):
Sequence and message encoding examples

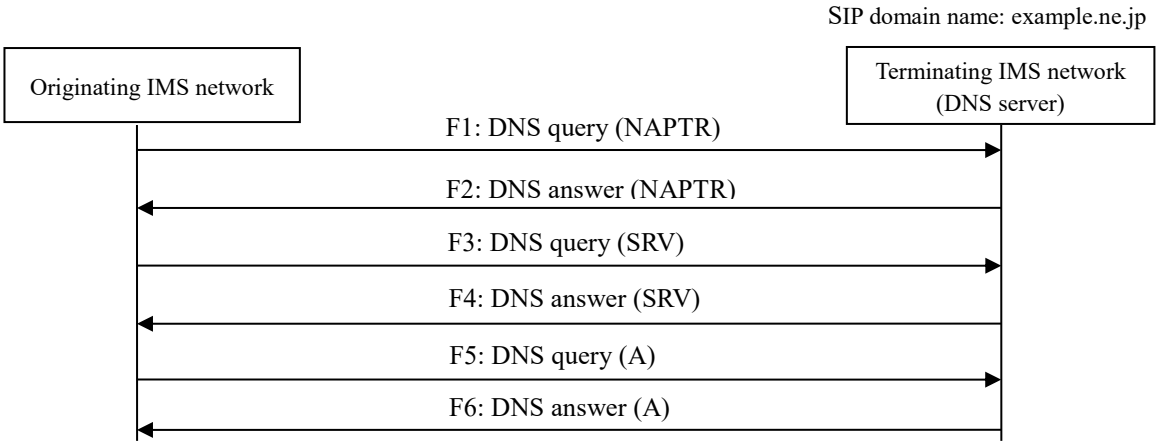
i.1. General

This appendix describes examples of general sequence and messages encoding for SIP domain name resolution using inter-operator DNS.

The examples of sequence and message encoding described in this appendix are just referential information for implementation.

i.2. Sequence and message encoding example

In this example, an originating IMS network queries a SIP domain name of a terminating IMS network (example.ne.jp) to a DNS server in the terminating IMS network, and finally obtains two IPv4 address (129.0.2.123, 129.0.2.234).



Appendix Figure i.2-1/JJ-90.32: Message flow for SIP domain name resolution using inter-operator DNS

F1: DNS Query (NAPTR)

	Field name		Setting value
Header section	ID		1
	QR		0
	OPCODE		0
	AA		0
	TC		0
	RD		0
	RA		0
	Z		0
	RCODE		0
	QDCOUNT		1
	ANCOUNT		0
	NSCOUNT		0
	ARCOUNT		1
Query section	QNAME		example.ne.jp.
	QTYPE		35
	QCLASS		1
Additional information section	NAME		0
	TYPE		41
	CLASS		4096
	TTL	EXTENDED-RCODE	0
		VERSION	0
		DO	0
		Z	0
	RDLENGTH		0
	RDATA		No settings

F2: DNS Answer (NAPTR)

	Field name		Setting value
Header section	ID		1
	QR		1
	OPCODE		0
	AA		1
	TC		0
	RD		0
	RA		0
	Z		0
	RCODE		0
	QDCOUNT		1
	ANCOUNT		1
	NSCOUNT		1
	ARCOUNT		2
Query section	QNAME		example.ne.jp.
	QTYPE		35
	QCLASS		1
Answer section	NAME		example.ne.jp.
	TYPE		35
	CLASS		1
	TTL		86400
	RDLENGTH		The length of octet in RDATA field is set to this field
	RDATA	ORDER	100
		PREFERENCE	50
		FLAGS	s
		SERVICES	SIP+D2U
		REGEXP	No setting
		REPLACEMENT	_sip._udp.example.ne.jp.
Authority section	NAME		example.ne.jp.
	TYPE		2
	CLASS		1
	TTL		86400
	RDLENGTH		17
	RDATA		ns.example.ne.jp.
Additional information section	NAME		ns.example.ne.jp.
	TYPE		1
	CLASS		1
	TTL		86400
	RDLENGTH		4
	RDATA		129.0.2.10
Additional information section	NAME		0
	TYPE		41
	CLASS		4096
	TTL	EXTENDED-RCODE	0
		VERSION	0
		DO	0
		Z	0
	RDLENGTH		0
	RDATA		No settings

F3: DNS Query (SRV)

	Field name		Setting value
Header section	ID		1
	QR		0
	OPCODE		0
	AA		0
	TC		0
	RD		0
	RA		0
	Z		0
	RCODE		0
	QDCOUNT		1
	ANCOUNT		0
	NSCOUNT		0
	ARCOUNT		1
Query section	QNAME		_sip._udp.example.ne.jp.
	QTYPE		33
	QCLASS		1
Additional information section	NAME		0
	TYPE		41
	CLASS		4096
	TTL	EXTENDED-RCODE	0
		VERSION	0
		DO	0
		Z	0
	RDLENGTH		0
	RDATA		No settings

F4: DNS Answer (SRV)

	Field name		Setting value
Header section	ID		1
	QR		1
	OPCODE		0
	AA		1
	TC		0
	RD		0
	RA		0
	Z		0
	RCODE		0
	QDCOUNT		1
	ANCOUNT		2
	NSCOUNT		1
	ARCOUNT		2
Query section	QNAME		_sip._udp.example.ne.jp.
	QTYPE		33
	QCLASS		1
Answer section	NAME		_sip._udp.example.ne.jp.
	TYPE		33
	CLASS		1
	TTL		3600
	RDLENGTH		The length of octet in RDATA field is set to this field
	RDATA	Priority	0
		Weight	0
		Port	5060
		Target	tokyo-IBCF01.node.example.ne.jp.
Authority section	NAME		_sip._udp.example.ne.jp.
	TYPE		2
	CLASS		1
	TTL		86400
	RDLENGTH		17
	RDATA		ns.example.ne.jp.
Additional information section	NAME		ns.example.ne.jp.
	TYPE		1
	CLASS		1
	TTL		86400
	RDLENGTH		4
	RDATA		129.0.2.10
Additional information section	NAME		0
	TYPE		41
	CLASS		4096
	TTL	EXTENDED-RCODE	0
		VERSION	0
		DO	0
		Z	0
	RDLENGTH		0
	RDATA		No settings

F3: DNS Query (A)

	Field name		Setting value
Header section	ID		1
	QR		0
	OPCODE		0
	AA		0
	TC		0
	RD		0
	RA		0
	Z		0
	RCODE		0
	QDCOUNT		1
	ANCOUNT		0
	NSCOUNT		0
	ARCOUNT		1
Query section	QNAME		tokyo-IBCF01.node.example.ne.jp.
	QTYPE		1
	QCLASS		1
Additional information section	NAME		0
	TYPE		41
	CLASS		4096
	TTL	EXTENDED-RCODE	0
		VERSION	0
		DO	0
		Z	0
	RDLENGTH		0
	RDATA		No settings

F6: DNS Answer (A)

	Field name		Setting value
Header section	ID		1
	QR		1
	OPCODE		0
	AA		1
	TC		0
	RD		0
	RA		0
	Z		0
	RCODE		0
	QDCOUNT		1
	ANCOUNT		2
	NSCOUNT		1
	ARCOUNT		2
Query section	QNAME		tokyo-IBCF01.node.example.ne.jp.
	QTYPE		1
	QCLASS		1
Answer section	NAME		tokyo-IBCF01.node.example.ne.jp.
	TYPE		1
	CLASS		1
	TTL		3600
	RDLENGTH		4
	RDATA		129.0.2.123
Answer section	NAME		tokyo-IBCF01.node.example.ne.jp.
	TYPE		1
	CLASS		1
	TTL		3600
	RDLENGTH		4
	RDATA		129.0.2.234
Authority section	NAME		example.ne.jp.
	TYPE		2
	CLASS		1
	TTL		86400
	RDLENGTH		17
	RDATA		ns.example.ne.jp.
Additional information section	NAME		ns.example.ne.jp.
	TYPE		1
	CLASS		1
	TTL		86400
	RDLENGTH		4
	RDATA		129.0.2.10
Additional information section	NAME		0
	TYPE		41
	CLASS		4096
	TTL	EXTENDED-RCODE	0
		VERSION	0
		DO	0
		Z	0
	RDLENGTH		0
	RDATA		No settings