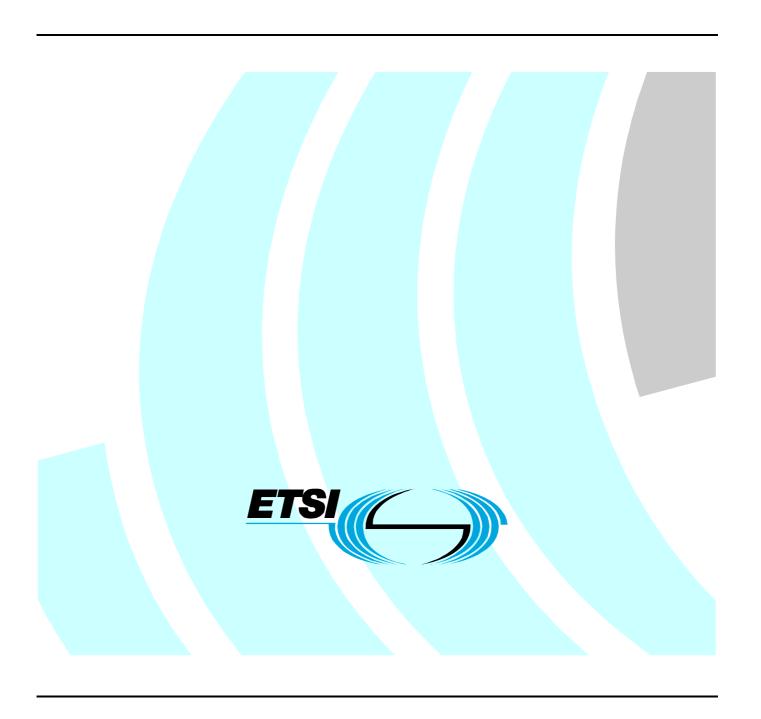
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Technical Specification

Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT): IPv4 to IPv6 Transitioning; Interoperability Test Suite



Reference DTS/MTS-IPT-022-IPV6-TrsITS

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Methods for Testing and Specification (MTS).

Introduction

IPv6 is the next generation Internet. It gives vastly increased address space and true end-to-end communication. It has improved security and mobility features and allows 'plug-and-play' connection to the network. The complexity of implementing IPv6 technology and the relative openness of IETF standards means that wide-ranging and effective testing of IPv6 products will be one of the key factors in ensuring the deployment, interoperability, security and reliability of the IPv6 infrastructure.

The present document specifies interoperability tests for IPv4 to IPv6 Transitioning. The test suite results from and analysis of RFC 2529 [4], RFC 2765 [5], RFC 2766 [6], RFC 3056 [7], RFC 3596 [8], RFC 4213 [9] and RFC 4214 [10], the extraction of the requirements contained in these documents, and a selection of the requirements which could be tested by interoperability means.

The methodology and framework used to analyse the RFCs, to extract the requirements, write the Test Purposes, and the test descriptions is described in TS 102 351 [1]. The reader is strongly encouraged to read TS 102 351 [1] in order to make the best usage of the present document.

1 Scope

The present document specifies the interoperability Test Descriptions (TDs) with integrated Test Purposes (TPs) for the selected IPv4 to IPv6 TRansitioning standards. The TDs are presented in the tabular form specified in TS 102 424 [11] and the TPs are defined using the TPLan notation also described in ES 202 553 [2].

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1]	ETSI TS 102 351: "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT); IPv6 Testing: Methodology and Framework".
[2]	ETSI ES 202 553: "Methods for Testing and Specification (MTS); TPLan: A notation for expressing test Purposes".
[3]	ETSI TS 102 599 "Methods for Testing and Specification (MTS); Internet Protocol Testing (IPT): IPv6 to IPv4 Transitioning; Requirements Catalogue".
[4]	IETF RFC 2529: "Transmission of IPv6 over IPv4 Domains without Explicit Tunnels".
[5]	IETF RFC 2765: "Stateless IP/ICMP Translation Algorithm (SIIT)".
[6]	IETF RFC 2766: "Network Address Translation - Protocol Translation (NAT-PT)".
[7]	IETF RFC 3056: "Connection of IPv6 Domains via IPv4 Clouds".
[8]	IETF RFC 3596: "DNS Extensions to support IP Version 6".
[9]	IETF RFC 4213: "Basic Transition Mechanisms for IPv6 Hosts and Routers".

- [10] IETF RFC 4214: "Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)".
- [11] ETSI TS 102 424: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements of the NGN network to support Emergency Communication from Citizen to Authority".

3 Abbreviations

3.1 Abbreviations

For the purposes of the present document, the following abbreviations apply:

EUT Equipment Under Test
MTU Maximum Transmission Unit
PMTU Path MTU

QE Qualified Equipment
TP Test Purpose
TD Test Description
TPLan Test Purpose Language
TSS Test Suite Structure

4 IPv6 Security Interoperability Test Specification

4.1 Test Descriptions

The IPv6 Security Interoperability Test Descriptions (TDs) defined in the following clauses are derived from the Test Purposes (TPs) specified in annex B.

Test Description presentation and concepts are explained in TS 102 351 [1].

Requirements referred to within the Test Description (example: RQ_003_1016) are all contained in TS 102 599 [3], the IPv6 to IPv4 Transitioning "Requirements catalogue".

4.1.1 Index of test grouping

In the present document, tests have been grouped according to the original RFC from which they were extracted.

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NOTE:	Test Descriptions covering requirements coming from more than one group are repeated in the relevant groups.	ıt

4.1.2 Test Descriptions

Group 1: RFC2529 - Transmission of IPv6 over IPv4 Domains without Explicit Tunnels

Test Description					
Identifier:	TD_TRA_1009_01	Test Purpose:	TP_TRA_10	09_01	
Summary:	"A 6over4 node builds a link-local address for an IPv4 virtual interface using the interface IPv4				
	address"				
Roles:	6over4_Node	Configuration:	CF_TRA_01		
References:	RQ_003_1009, RQ_003_1012, RQ_0	03_1016			
to the	a packet indicating that a respo link_local_address of EUT } tes receipt of the response from	-			
Step	Test Se	quence		Verdi	ict
				Pass	Fail
1	Cause QE1 to send an Echo Request	to the link-local address	s of EUT.		
2	Check: does QE1 receive an Echo Re	ply from EUT		Yes	No
Observations:			•		

	T	est Description				
Identifier:	dentifier: TD_TRA_1027_01 Test Purpose: TP_TRA_1027_01					
Summary:						
Roles:	6over4_Router	Configuration:	CF_TRA_1	3		
References:	RQ_003_1027					
ensure that { when { QE1 sends a packet indicating that a response is requested						
when { QE1 sends to the then { QE1 indica } Pre-test conditions:	e all_nodes_multicast_add:	ress } nse from EUT }				
when { QE1 sends to the then { QE1 indica }	e all_nodes_multicast_add:	ress }		Verd	lict	
when { QE1 sends to the then { QE1 indica } Pre-test conditions:	e all_nodes_multicast_add:	ress } nse from EUT }		Verd Pass	lict Fail	
when { QE1 sends to the then { QE1 indica } Pre-test conditions:	e all_nodes_multicast_addrates receipt of the respon	ress } nse from EUT }	ticast-address.			
when { QE1 sends to the then { QE1 indica } Pre-test conditions:	e all_nodes_multicast_addrates receipt of the respon	Test Sequence D Request to the all-nodes-multiple of the sequence of the sequ	ticast-address.			

	Т	est Description			
Identifier:	TD_TRA_1027_02				
Summary:	"A 6over4 router must join the	ne all-routers multicast address"			
Roles:	6over4_Router	Configuration: CF_TRA	A_13		
References:	RQ_003_1027				
to the then { QE1 indicat	packet indicating that all_routers_multicast_aces receipt of the respon				
Pre-test conditions:			1		
Step		Test Sequence	Verd	lict	
			Pass	Fail	
1	Cause QE1 to send an Ech	Request to the all-routers-multicast-addres	is.		
2	Check: does QE1 receive a	n Echo Reply from EUT.	Yes	No	
Observations:	Do not forget to put the virtu	al ethernet interface in the ping query.	•		

	Te	st Description			
Identifier:	TD_TRA_1027_03	Test Purpose:	: TP_TRA_1027_03		
Summary:	"A 6over4 router must join the	solicited-node multicast add	ress correspondi	ng to its IPv6	
	address"	<u></u>			
Roles:	6over4_Router	Configuration:	CF_TRA_1	3	
References:	RQ_003_1027				
to the then { QE1 indica } Pre-test conditions:	a packet indicating that a solicited_node_multicast_tes receipt of the respons	address of EUT } e from EUT }		Vord	
Step		Test Sequence		Verd	
				Pass	ict Fail
1	Cause QE1 to send an Echo address of the EUT.	Request to the solicited-node	-multicast-	Pass	
1 2			-multicast-	Pass Yes	

Group 2: RFC2765 - Stateless IP/ICMP Translation Algorithm (SIIT)

Group 2.1: Translating from IPv4 to IPv6

Test Description					
dentifier: TD_TRA_3003_01 Test Purpose: TP_TRA_3003_01					
Summary:	Summary: "When the IPv4 Sender does not perform PMTU discovery, the translator shall fragment the IPv4				
	packet so that it fits in 1280 by	ytes IPv6"		_	
Roles:	SIIT_Translator	Configuration:	CF_TRA_02		
References:	RQ_003_3003				
ensure that { when { QE1 sends indicated then { QE1 indicated } } Pre-test conditions:	<pre>when { QE1 sends a packet of length 1500</pre>				
Step		Test Sequence		Verd	ict
				Pass	Fail
1	Cause QE1 to send an Echo	Request of length 1500 to QE	2		
2	2 Check: does QE1 receive an Echo Reply from QE2 YES 1			NO	
Observations:				•	

```
Test Description
Identifier:
                       TD_TRA_3014_01
                                                        Test Purpose:
                                                                               TP_TRA_3014_01
Summary:
                       "The SIIT_Tranlator must copy the TTL value from IPv4 header s to the Hop Limit in the resulting
                       IPv6 header s. During translation, the translator shall decrement the TTL value or IPv6 Hop Limit"
                                                        Configuration:
                                                                               CF_TRA_02
Roles:
                       SIIT_Translator
References:
                      RQ_003_3014, RQ_003_3015
with
ensure that {
  when \{ QE1 sends a packet indicating that a response is requested
               and indicating TTL of 4
               to QE2 }
  then { QE1 indicates receipt of the response from QE2 }
  when { QE1 sends a packet indicating that a response is requested
               and indicating TTL of 3
               to QE2 }
  then { QE1 receives no response from QE2 }
 Pre-test conditions:
        Step
                                                 Test Sequence
                                                                                                 Verdict
                                                                                             Pass
                                                                                                        Fail
                       Cause QE1 to send an Echo Request indicating TTL of 4 to QE2
                       Check: does QE1 receive an Echo Reply from QE2
          2
                                                                                              YES
                                                                                                        NO
                       Cause QE1 to send an Echo Request indicating TTL of 3 to QE2
          3
                       Check: does QE1 receive an Echo Reply from QE2
                                                                                              NO
                                                                                                        YES
          4
    Observations:
```

Test Description					
Identifier:	TD_TRA_3016_01	Test Purpose:	TP_TRA_3016_01		
Summary:	"As part of forwarding the packet, if the translator has decremented the IPV4 TTL (before translation) it shall not decrement the IPv6 Hop Limit (After translation). The SIIT_Transmust not decrement 2 times."				
Roles:	SIIT_Translator	Configuration:	CF_TRA_02		
References:	RQ_003_3016				
and in to QE2 then { QE1 receiv when { QE1 sends and in to QE2 then { QE1 indica when { QE1 sends and in to QE2	es no response from QE2 } a packet indicating that dicating TTL of 4 } tes receipt of the respon a packet indicating that dicating TTL of 5	a response is requested se from QE2 } a response is requested			
Pre-test conditions:		Tast Saguence	Verdict		

Pre-test conditions:				
Step	Test Sequence		Verdict	
		Pass	Fail	
1	Cause QE1 to send an Echo Request indicating TTL of 3 to QE2			
2	Check: does QE1 receive an Echo Reply from QE2	NO	YES	
3	Cause QE1 to send an Echo Request indicating TTL of 4 to QE2			
4	Check: does QE1 receive an Echo Reply from QE2	YES	NO	
5	Cause QE1 to send an Echo Request indicating TTL of 5 to QE2			
6	Check: does QE1 receive an Echo Reply from QE2	YES	NO	
Observations:		•		

YES NO

Test Description					
Identifier:	TD_TRA_3017_01	Test Purpose:	TP_TRA_3017_01		
Summary: "As part of decrementing the TTL value, the SIIT_Translator needs to check for zero and present, send the ICMPv4 ttl exceeded error"					
Roles:	SIIT_Translator	Configuration:	CF_TRA_02		
References:	RQ_003_3017				
and ind to QE2 then { QE1 indicat when { QE1 sends a and ind to QE2	es receipt of the response for packet indicating that a relicating TTL of 2	rom QE2 }			
Step	Test	Sequence	Verdict		

Pre-test conditions:			
Step	Test Sequence	Verdict	
		Pass	Fail
1	Cause QE1 to send an Echo Request indicating TTL of 4 to QE2		
2	Check: does QE1 receive an Echo Reply from QE2	YES	NO
3	Cause QE1 to send an Echo Request indicating TTL of 2 to QE2		
4	Check: does EUT indicate Time_Exceeded to QE1	YES	NO
Observations:	Check TP_TRA_3017_01, last "then" is perform by EUT.		

	Те	est Description			
Identifier:	TD_TRA_3018_01	Test Purpose:	TP_TRA_30	18_01	
Summary:	•	v6, the IPv6 source Address ar er 32bits (IPv4 Source or Desti -translated"			bits
Roles:	SIIT_Translator	Configuration:	CF_TRA_02		
References:	RQ_003_3018, RQ_003_30	19			
to QE2 then { QE1 indicat }	a packet indicating that } tes receipt of the respon				
Pre-test conditions:					
Step		Test Sequence		Verdi	ct
				Pass	Fail
1	Cause QE1 to send an Echo	Request to QE2			

Check: does QE1 receive an Echo Reply from QE2

2 Observations:

Test Description				
Identifier:	TD_TRA_3037_01	Test Purpose:	TP_TRA_3037_01	
Summary:	"A SIIT_Translator must be able to	translate ICMPv4 Echo	Requests to ICMPv6 Echo	
	Requests, by changing the type an	d adjusting the checksu	ım"	
Roles:	SIIT_Translator	Configuration:	CF_TRA_02	
References:	RQ_003_3034, RQ_003_3037, RC	2_003_3038		
with { } ensure that { when { QE1 sends an Echo_Request to QE2 } then { QE1 indicates receipt of an Echo_Reply from QE2 } }				

Pre-test conditions:			
Step	Test Sequence	Verdi	ct
		Pass	Fail
1	Cause QE1 to send an Echo Request to QE2		
2	Check: does QE1 receive an Echo Reply from QE2	YES	NO
Observations:			•

Test Description					
Identifier:	TD_TRA_3039_01	Test Purpose:	TP_TRA_30	39_01	
Summary:	"A SIIT_Translator must be able to translate ICMPv4 Echo Replies to ICMPv6 Echo Replies, by				
		anging the type and adjusting the checksum"			
Roles:	SIIT_Translator	Configuration:	CF_TRA_02	<u> </u>	
References:	RQ_003_3034, RQ_003_3	039, RQ_003_3040			
then { QE2 indicat } Pre-test conditions:	an Echo_Request to QE1] tes receipt of an Echo_E	Reply from QE1 }			
Step		Test Sequence		Verdi	ct
				Pass	Fail
1	Cause QE2 to send an Ech	no Request to QE1			
2	Check: does QE2 receive a	an Echo Reply from QE1		YES	NO
Observations:					

<u></u>					
	Test Description				
Identifier:	TD_TRA_3051_01	3051_01			
Summary:	"A SIIT_Translator must translate ICMPv4 Destination Unreachable (net unreachable)				
	messages to ICMPv6 Destination Unreachable (no route to destination) m	essages"			
Roles:	SIIT Translator Configuration: CF TRA	02			
References:	RQ 003 3051				
	ured with no route for IPv4 mapped packets				
}					
ensure that {					
	a packet indicating that a response is requested				
to QE1	,				
then { QE2 indica	tes that QE1 is not reachable }				
}					
Pre-test conditions:	QE3 is configured with no route for IPv4_mapped_packets				
Step	Test Sequence	Verdi	ct		
		Pass	Fail		
1	Cause QE2 to send an Echo Request to QE1				
2	2 Check: does QE3 indicate Destination Unreachable (net unreachable) to		NO		
	QE2				
Observations:	Check TP_TRA_3051_01, last "then" is perform by QE3.				

	Test Descrip	otion			
Identifier:	TD_TRA_3053_01				
Summary:	"A SIIT_Translator must translate ICMPv4 Destination Unreachable (port unreachable) messages to ICMPv6 Destination Unreachable (port unreachable) messages"				
Roles:	SIIT_Translator	Configuration:	CF_TRA_02		
References:	RQ_003_3053				
	UDP_packet to QE1 on UDP_port_80 tes that the port is not reachable QE1 is configured not to listen on UDP.	}			
Step	Test Seq	uence		Verdi	ct
				Pass	Fail
1	Cause QE2 to send an UDP_packet to	QE1 on UDP_port_	80		
2	Check: does QE3 indicate Destination Unreachable (port unreachable) to QE2		YES	NO	
Observations:	What is the best option to cause QE2 s	ends a UDP_packet	t to QE1 on UDP_	port_80?	

```
Test Description
Identifier:
                     TD_TRA_3057_01
                                                    Test Purpose:
                                                                         TP_TRA_3057_01
Summary:
                     "A SIIT_Translator must translate ICMPv4 Destination Unreachable (administratively
                     prohibited) messages to ICMPv6 Destination Unreachable (administratively prohibited)
                     messages"
                     SIIT_Translator
Roles:
                                                    Configuration:
                                                                         CF_TRA_02
References:
                     RQ_003_3057
         QE3 configured to block packets from QE2
with
ensure that {
  to QE1 }
  then { QE2 indicates that communication with QE1
              is administratively prohibited }
 Pre-test conditions: QE3 is configured to block packets from QE2 to QE1
                                             Test Sequence
                                                                                         Verdict
       Step
                                                                                       Pass
                                                                                                Fail
                     Cause QE2 to send an Echo Request to QE1
         1
         2
                     Check: does QE3 indicate communication with QE1 is administratively
                                                                                       YES
                                                                                                NO
                     prohibited to QE2
                     Check TP_TRA_3057_01, last "then" is perform by QE3.
Observations:
```

	Test Description				
Identifier:	TD_TRA_3059_01	Test Purpose:	TP_TRA_3059_01		
Summary:	"A SIIT_Translator must tra	nslate ICMPv4 Time Exceeded n	nessages to ICMPv6 Time		
	Exceeded messages"				
Roles:	SIIT_Translator	Configuration:	CF_TRA_02		
References:	RQ_003_3059, RQ_003_30	060			
with {					
ensure that {					
when { QE2 sends a packet indicating that a response is requested and indicating TTL of 4 to OE1 }					
then { QE2 indicat	es receipt of the respo	nse from QE1 }			
when { QE2 sends a packet indicating that a response is requested and indicating TTL of 3 to QE1 }					
then { QE2 indicates Time_Exceeded } } Pre-test conditions:					

Pre-test conditions:			
Step	Test Sequence	Verdict	
		Pass	Fail
1	Cause QE2 to send an Echo Request indicating TTL of 4 to QE1		
2	Check: does QE2 receive an Echo Reply from QE1	YES	NO
3	Cause QE2 to send an Echo Request indicating TTL of 3 to QE1		
4	Check: does QE3 indicate Time_Exceeded to QE2	YES	NO
Observations:	Check TP_TRA_3059_01, last "then" is perform by QE3.		•

Test Description						
Identifier:	TD_TRA_3063_01	Test Purpose:	TP_TRA_306	63_01		
Summary:		SIIT_Translator must translate IPv4 packets with an IPv4 address compatible with the pool				
	of IPv4_Translated Address of IPv6	Nodes"				
Roles:	SIIT_Translator	Configuration:	CF_TRA_02			
References:	RQ_003_3063					
<pre>with { } ensure that { when { QE2 sends a packet indicating that a response is requested</pre>						
Pre-test conditions:	=			., .,	_	
Step	l est S	equence		Verdic		
				Pass	Fail	
1	Cause QE2 to send an Echo Reque	st to QE1				
2	Check: does QE2 receive an Echo F	Reply from QE1		YES	NO	
Observations:		·				

Test Description					
Identifier:	TD_TRA_3064_01	Test Purpose:	TP_TRA_3	064_01	
Summary:	"A SIIT_Translator must translate ICMPv4 Destination Unreachable (host unreachable)				
-	messages to ICMPv6 Destination Ur	reachable (no route to	o destination) me	ssages"	
Roles:	SIIT_Translator	Configuration:	CF_TRA_0)2	
References:	RQ_003_3064				
to QE1	a packet indicating that a responsible packet indicating that a responsible packet and the packet and the packet is not reachable and the packet is not reachable.	-			
Pre-test conditions:	QE1 is disconnected from the Netwo			-	
Step	Test S	equence		Verdi	ct
				Pass	Fail
1	Cause QE2 to send an Echo Reques	st to QE1			
2	Check: does QE3 indicate QE1 is ur	neck: does QE3 indicate QE1 is unreachable to QE2		YES	NO
Observations:	Check TP_TRA_3064_01, last "then	" is perform by QE3.	•	•	

Group 2.2: Translating from IPv6 to IPv4

Test Description					
Identifier:	TD_TRA_3080_01	Test Purpose:	TP_TRA_30	80_01	
Summary:	"The SIIT_Tranlator must copy the Ho	op Limit from IPv6 heade	er s to the TTL	value in the	
	resulting IPv4 header s. During transl	ation, the translator shal	I decrement the	e IPv4 TTL v	alue or
	IPv6 Hop Limit"				
Roles:	SIIT_Translator	Configuration:	CF_TRA_02	2	
References:	RQ_003_3080, RQ_003_3081				
with {					
}					
ensure that {					
	a packet indicating that a respondicating TTL of 4	nse is requested			
to OE1					
. ~	; ces receipt of the response from	OE1 }			
	a packet indicating that a respon				
	licating TTL of 3	-			
to QE1	}				
then { QE2 receive	es no response from QE1 }				
}					
Pre-test conditions:					
Step	Test Se	quence		Verdi	
				Pass	Fail
1	Cause QE2 to send an Echo Request	t indicating TTL of 4 to 0	QE1		
2	Check: does QE2 receive an Echo Re			YES	NO
3	Cause QE2 to send an Echo Request	t indicating TTL of 3 to 0	QE1		
4	Check: does QE2 receive an Echo Re	eply from QE1		NO	YES
Observations:				·	

Test Description						
Identific	er:	TD_TRA_3082_01	Test Purpose:	TP_TRA_3082_01		
Summa	ary:	"As part of forwarding the	packet, if the translator has decrem	nented the IPv6 Hop Limit (before		
		translation) it shall not ded	crement the IPv4 TTL (After translat	tion). The SIIT_Translator must not		
		decrement 2 times."				
Roles:		SIIT_Translator	Configuration:	CF_TRA_02		
Referer	nces:	RQ_003_3082				
with {				_		
ensure	that J					
when	{ QEZ	sends a packet indicating that and indicating TTL of 3	at a response is requested			
		to QE1 }				
then	{ OE2	receives no response from QE1	L }			
when		sends a packet indicating that				
		and indicating TTL of 4				
		to QE1 }				
then		indicates receipt of the resp				
when	{ QE2	sends a packet indicating that	at a response is requested			
		and indicating TTL of 5				
then	\ OE2	to QE1 } indicates receipt of the resp	onse from OF1 \			
}	l Apr	indicates receipt of the rest	DOUBE IIOM OFT }			

Pre-test conditions:				
Step	Test Sequence	Verdi	Verdict	
-		Pass	Fail	
1	Cause QE2 to send an Echo Request indicating TTL of 3 to QE1			
2	Check: does QE2 receive an Echo Reply from QE1	NO	YES	
3	Cause QE2 to send an Echo Request indicating TTL of 4 to QE1			
4	Check: does QE2 receive an Echo Reply from QE1	YES	YES	
5	Cause QE2 to send an Echo Request indicating TTL of 5 to QE1			
6	Check: does QE2 receive an Echo Reply from QE1	YES	NO	
Observations:				

YES

YES

NO

NO

	Test Description						
Identifier:	TD_TRA_3083_01	Test Purpose:	TP_TRA_30	83_01			
Summary:		TTL value, the SIIT_Translator r	needs to check t	for zero and	if		
	present, send the ICMPv6 tt	l exceeded error"					
Roles:	SIIT_Translator	Configuration:	CF_TRA_02				
References:	RQ_003_3083						
with { }							
ensure that {							
when { QE2 sends a	a packet indicating that	a response is requested					
and in	dicating TTL of 4						
to QE1							
	tes receipt of the respor						
	a packet indicating that	a response is requested					
	dicating TTL of 2						
to QE1							
then { QE2 indicated a larger than { QE2 indicated a larger than a large	tes Time_Exceeded }						
Pre-test conditions:							
Step		Test Sequence		Verdic	ot .		
		-		Pass	Fail		
1	Cause QE2 to send an Echo	Request indicating TTL of 4 to	QE1				
2	Check: does QE2 receive ar			YES	NO		
_	1						

Cause QE2 to send an Echo Request indicating TTL of 2 to QE1

Check: does EUT indicate Time_Exceeded to QE2

Check TP_TRA_3083_01, last "then" is perform by EUT.

3 4

Observations:

2 Observations:

	Tes	t Description					
Identifier:	TD_TRA_3086_01	Test Purpose:	TP_TRA_30	086_01			
Summary:	"When translating Ipv6 to Ipv2 respectively) shall be the low-Address respectively)"						
Roles:	SIIT_Translator	Configuration:	CF_TRA_02	2			
References:	RQ_003_3086, RQ_003_308	7					
to QE2	a packet indicating that a } tes receipt of the respons	-					
Pre-test conditions:	Pre-test conditions:						
Step		Test Sequence		Verdict			
				Pass	Fail		

Check: does QE2 receive an Echo Reply from QE1 Y
Check TP_TRA_3083_01, the translation is from IPv6 to IPv4 (from QE2 to QE1)

Cause QE2 to send an Echo Request to QE1

Yes

No

```
Test Description
Identifier:
                      TD_TRA_3093_01
                                                      Test Purpose:
                                                                            TP_TRA_3093_01
Summary:
                      "A SIIT_Translator must not translate packets with a non-zero Segments Left Field in the
                      Routing header"
                      SIIT_Translator
                                                      Configuration:
                                                                            CF_TRA_02
Roles:
References:
                     RQ_003_3093
with
ensure that {
    when { QE2 sends a packet with 0 route segments
              indicating that a response is requested
              to QE1 }
    then { QE2 indicates receipt of the response }
    when { QE2 sends a packet with 2 route segments
              indicating that a response is requested
              to QE1 }
    then { QE2 receives no response from QE1 }
```

Pre-test conditions:				
Step	Test Sequence		Verdict	
		Pass	Fail	
1	Cause QE2 to send an Echo Request indicating 0 in the Segments Left Field in the Routing header to QE1			
2	Check: does QE2 receive an Echo Reply from QE1	YES	NO	
3	Cause QE2 to send an Echo Request indicating 2 in the Segments Left Field in the Routing header to QE1			
4	Check: does QE2 receive an Echo Reply from QE1	NO	YES	
Observations:				

Test Description						
Identifier:	TD_TRA_3104_01	Test Purpose:	TP_TRA_31	04_01		
Summary:	Summary: "A SIIT_Translator must be able to translate ICMPv6 Echo Requests to ICMPv4 Echo					
	Requests, by changing the type and a	djusting the checksum"				
Roles:	SIIT_Translator	Configuration:	CF_TRA_02	<u> </u>		
References:	RQ_003_3101, RQ_003_3104, RQ_0	03_3105				
then { QE2 indicat }	an Echo_Request to QE1 } es receipt of an Echo_Reply from	n QE1 }				
Pre-test conditions:						
Step	Step Test Sequence			Verdict		
				Pass	Fail	
1	Cause QE2 to send an Echo Request	to QE1	•			

Check: does QE2 receive an Echo Reply from QE1

Observations:

Test Description					
Identifier:	TD_TRA_3106_01	Test Purpose:	TP_TRA_3106_01		
Summary:	"A SIIT_Translator must be able to tra		lies to ICMPv4 Echo Replies, by		
	changing the type and adjusting the c	hecksum"			
Roles:	SIIT_Translator	Configuration:	CF_TRA_02		
References:	RQ_003_3101, RQ_003_3106, RQ_0	03_3107			
with { } ensure that { when { QE1 sends an Echo_Request to QE2 } then { QE1 indicates receipt of an Echo_Reply from QE2 } }					
Pre-test conditions:					

Pre-test conditions:			
Step	Test Sequence	Verdict	
		Pass	Fail
1	Cause QE1 to send an Echo Request to QE2		
2	Check: does QE1 receive an Echo Reply from QE2	Yes	No
Observations:			

	Test Description					
Identifier:	TD_TRA_3118_01	Test Purpose:	P_TRA_3	3118_01		
Summary:	"A SIIT_Translator must translate ICM	Pv6 Destination Unreachab	ole (no rou	ite to destina	tion)	
	messages to ICMPv4 Destination Unreachable (host unreachable) messages"					
Roles:	SIIT_Translator	Configuration:	CF_TRA_0)2		
References:	RQ_003_3117, RQ_003_3118					
ensure that { when { QE1 sends a to QE2 then { QE1 indicat} } Pre-test conditions:	<pre>when { QE1 sends a packet indicating that a response is requested</pre>					
Step	Test Sequence		Verdict			
				Pass	Fail	
1	Cause QE1 to send an Echo Request	to QE2				
2	Check: does QE4 indicate Destination QE1	Unreachable (net unreach	able) to	Yes	No	
Observations:	QE4 will perform an ICMPv6 error me	ssage indicating Destination	n Unreach	able.		

	Test Description						
Identifier:	TD_TRA_3119_01 Test Purpose: TP_TRA_3	119_01					
Summary:	,	A SIIT_Translator must translate ICMPv6 Destination Unreachable (administratively prohibited)					
Roles:	SIIT_Translator Configuration: CF_TRA_0	2					
References:	RQ_003_3117, RQ_003_3119						
to QE2 then { QE1 indica	a packet indicating that a response is requested } tes that communication with QE2 inistratively prohibited } QE4 is configured to block packets from QE1						
Step	Test Sequence	Verdi	ct				
-	·	Pass	Fail				
1	Cause QE1 to send an Echo Request to QE2						
2	Check: does QE4 indicate that communication with QE2 is administratively prohibited		No				
Observations:	QE4 will perform an ICMPv6 error message (1/1)						

Test Description						
Identifier:	TD_TRA_3121_01	Test Purpose:	TP_TRA_3	121_01		
Summary:	"A SIIT_Translator must transla messages to ICMPv4 Destinati				ole)	
Roles:	SIIT_Translator	Configuration:	CF_TRA_0	2		
References:	RQ_003_3117, RQ_003_3121	·				
to QE2 then { QE1 indica }	tes that QE2 is not reachab	le }				
Pre-test conditions:	QE2 is disconnected from the N			T		
Step	Т	est Sequence		Verdict		
				Pass	Fail	
1	Cause QE1 to send an Echo R	equest to QE2				
2	Check: does QE2 indicate that	Q1 is unreachable.		Yes	No	
Observations:	Next receiving the echo reques	t from QE2, QE4 will perfor	m an ICMPv6 err	or message	(1/0).	

	Test Descr	iption			
Identifier:	TD_TRA_3122_01	<u> </u>	ΓΡ_TRA	3122_01	
Summary:	"A SIIT_Translator must translate ICM messages to ICMPv4 Destination Unr	Pv6 Destination Unreacha	ble	(port unreach	nable)
Roles:			CF TRA		
References:	RQ 003 3117, RQ 003 3122	Comigaration:	<u> </u>	_02	
ensure that { when { QE1 sends a UDP_packet to QE2 on UDP_port_80 } then { QE1 indicates that the port is not reachable } } Pre-test conditions: QE2 is configured not to listen on UDP_port_80.					
Step	Test Se			Verd	ict
		•		Pass	Fail
1	Cause QE1 to send an UDP_packet to	QE1 on UDP_port_80			
2	Check: does QE1 receive an echo rep	ly from QE2.		No	Yes
3	Check: does QE4 indicate Destination QE1.	Unreachable (port Unreac	hable) to	Yes	No
Observations:	Next receiving the echo request from	QE2, QE4 will perform an I	CMPv6 e	rror message	(1/4).

	Test Descr	iption			
Identifier:	TD_TRA_3123_01		P_TRA_	3123_01	
Summary:	"A SIIT_Translator must translate ICM		ages to IC	CMPv4 Destina	ation
	Unreachable (don't fragment (DF) bit	sent and fragmentation requ	uired) me	essages"	
Roles:	SIIT_Translator	Configuration:	CF_TRA_	_02	
References:	RQ_003_3123				
indicate to QE2 then { QE1 indicate }	packet length 1400 ing that a response is requested } es that fragmentation is needed				
Pre-test conditions:				1	
Step	Test Se	quence		Verdi	
				Pass	Fail
1	Cause QE1 to send an Echo Request	of length 1400 to QE2.			
2	Check: does QE1 receive an Echo Re	ply from QE2		No	Yes
3	Check: does QE1 indicates that a frag	mentation is needed. (Due	to packe	t Yes	No
	too big)				
Observations:					

Test Description					
Identifier: TD_TRA_3125_01 Test Purpose: TP_TRA_3125_01					
Summary:	"A SIIT_Translator must translate ICMPv6 Time Exceeded messages to ICMPv4 Time Exceeded messages"				
Roles:	SIIT_Translator	Configuration:	CF_TRA_02		
References:	RQ_003_3125				
and indicated to QE2 then { QE1 indicated when { QE1 sends and indicated to QE2	ces receipt of the response from a packet indicating that a respordicating TTL of 3	QE2 }			

Pre-test conditions:				
Step	Test Sequence	Verd	Verdict	
		Pass	Fail	
1	Cause QE1 to send an Echo Request with a TTL of 4 to QE2			
2	Check: does QE1 receive an Echo Reply from QE2	Yes	No	
3	Cause QE1 to send an Echo Request with a TTL of 3 to QE2			
4	Check: does QE1 receive an Echo Reply from QE2	No	Yes	
5	Check: does QE1 indicates that time has been exceeded	Yes	No	
Observations:		•	•	

	Te	est Description			
Identifier:	TD_TRA_3130_01	Test Purpose:	TP_TRA_3130_01		
Summary:	"A SIIT_Translator must tran packets"	nslate IPv6 packets with an IPv4	I-mapped destina	ation to IPv4	
Roles:	SIIT_Translator	Configuration:	CF_TRA_02)	
References:	RQ_003_3130	<u> </u>			
to QE1 then { QE2 indicat	a packet indicating that } ces receipt of the respon				
Pre-test conditions:					
Step		Test Sequence		Verdic	ct
				Pass	Fail
1	Cause QE2 to send an Echo	Request to QE1			

Step	Test Sequence	Verdi	Verdict	
		Pass Fai		
1	Cause QE2 to send an Echo Request to QE1			
2	Check: does QE2 receive an Echo Reply from QE1	Yes	No	
Observations:				

Group 3: RFC2766 - Network Address Translation - Protocol Translation (NAT-PT)

Group 3.1: DNS-ALG Operation

	Test Descr	iption			
Identifier:	TD_TRA_6018_01	Test Purpose:	TP_TRA_60	18_01	
Summary:	"The DNS-ALG on the NAT-PT device				nto
	the V6 domain by replacing the string	"IN-ADDR.ARPA" with the	e string "IP6.	ARPA" in	
	"Node address to Node name query r	equests"	_		
Roles:	NAT-PT_Router	Configuration:	CF_TRA_03	3	
References:	RQ_003_6003, RQ_003_6018, RQ_0	03_6019			
with { EUT confi	gured 'as Bi-Directional-NAT-PT	with DNS-ALG'			
and QE3 confi	gured with at least 1 AAAA_reco	rd for QE1			
}					
ensure that {	DED DVG 0 5 074 1 072	1			
	s a PTR_DNS_Query for QE1 to QE3 cates receipt of all the A record				
}	saces receipt of all the A_record	IS TOT QET TOM QES }			
Pre-test conditions:	QE3 is configured to have one AAAA	Record concerning QE1			
Step	Test Se	quence		Verdi	ct
				Pass	Fail
1	Cause QE2 to send a PTR DNS quer	y to concerning the addres	ss of QE1		
	to QE3	•			
2	Check: Does QE2 indicates the name	of QE1 as a result of this	query?	YES	NO
Observations:					

Group 3.2: Traditional NAT-PT Operation

	Test Descr	iption			
Identifier:	TD_TRA_6003_01	Test Purpose:	TP_TRA_60	03_01	
Summary:	addresses in DNS Queries and respon	With Bi-Directional-NAT-PT implemented, the DNS-ALG MUST be capable of translating V6 ddresses in DNS Queries and responses into their V4-address bindings, and vice versa, as NS packets traverse between V6 and V4 realms"			
Roles:	NAT-PT_Router	Configuration:	CF_TRA_03	3	
References:	RQ_003_6003				
and QE4 confi } ensure that { when { QE1 sends to th then { EUT trans	gured 'as Bi-Directional-NAT-PT gured with 1 A_record for QE2 a packet indicating that a resp. e fully_qualified_domain_name of lates the needed DNS packets 1 receives the response from QE2	conse is requested E QE2 } i.e. Change the query	type from	AAAA to A	
Pre-test conditions:	QE4 is configured with one A record for				
Step	Step Test Sequence			Verdic	ct
				Pass	Fail
1	Cause QE1 to send an Echo Request QE2	to the fully qualified doma	ain name of		
2	Check: does QE1 receive Echo Reply	from QE2		YES	NO
Observations:					

	Test Description					
Identifier:	TD_TRA_6003_02 Test Purpose: TP_TRA_60	03_02				
Summary:	"With Bi-Directional-NAT-PT implemented, the DNS-ALG MUST be capable	h Bi-Directional-NAT-PT implemented, the DNS-ALG MUST be capable of translating V6				
	addresses in DNS Queries and responses into their V4-address bindings, an	resses in DNS Queries and responses into their V4-address bindings, and vice versa, as				
	DNS packets traverse between V6 and V4 realms"	S packets traverse between V6 and V4 realms"				
Roles:	NAT-PT_Router Configuration: CF_TRA_03	}				
References:	RQ_003_6003, RQ_003_6017, RQ_003_6020, RQ_003_6022, RQ_003_60.	23				
	with { EUT configured 'as Bi-Directional-NAT-PT with DNS-ALG'					
and QE3 confi	and QE3 configured with 1 AAAA_record for QE1					
}						
ensure that { when { OE2 sends	a packet indicating that a response is requested					
	ne fully qualified domain name of QE1 }					
	slates the needed DNS packets					
`	Change the query type from A to AAAA, the response type from AAAA	A to A,				
and V4	to or from V6 addresses					
before QF	22 receives the response from QE1}					
}						
Pre-test conditions:	QE3 is configured with one AAAA record for QE1.					
Step	Test Sequence	Verdi	ct			
		Pass	Fail			
1	Cause QE2 to send an Echo Request to the fully qualified domain name of					
	QE1					
2	Check: does QE2 receives Echo Reply from QE1	YES	NO			
Observations:						

			Test Desc	ription	
Identifier:		TD_TRA	_6006_01	Test Purpose:	TP_TRA_6006_01
Summary:		and the N			a session initialization packet ut the related session, the packet
Roles:		NAT-PT_		Configuration:	CF_TRA_04
References:		RQ_003_	6006		
<pre>with { } ensure that {</pre>					
		ndicatin	t not indicating a ses g that a response is r		
then { EU }	T silen	tly disc	ards the packet}		

Pre-test conditions:				
Step	Test Sequence		Verdict	
		Pass	Fail	
1	Cause QE1 to initiate a TCP connection with QE2 (using telnet for example)			
2	Check: Is the connection established successfully?	YES	NO	
3	Restart EUT			
4	Wait for EUT to be ready			
5	Check: Is the connection between QE1 and QE2 still functional?	NO	YES	
Observations:				

```
Test Description
Identifier:
                        TD_TRA_6007_01
                                                           Test Purpose:
                                                                                   TP_TRA_6007_01
                        "In basic NAT-PT implementation, if the outgoing packet is a session initialization packet,
Summary:
                        the NAT-PT SHALL locally allocate an address from its pool of addresses"
                                                           Configuration:
                                                                                   CF_TRA_04
                        NAT-PT_Router
Roles:
References:
                       RQ_003_6007, RQ_003_6008
with
ensure that {
  when { QE1 sends a IPv6_packet indicating a session_initialisation
                 and indicating that a response is requested
                  to QE2 }
             EUT translates the IPv6_packet to an IPv4_packet before QE1 receives the response from QE2}
  then {
 Pre-test conditions:
                                                   Test Sequence
                                                                                                     Verdict
        Step
                                                                                                  Pass
                                                                                                            Fail
          1
                        Cause QE1 to send an Echo Request to QE2
          2
                        Check: does QE1 receive an Echo Reply from QE2
                                                                                                  YES
                                                                                                            NO
    Observations:
```

	Test Desci	ription				
Identifier:	TD_TRA_6011_01	Test Purpose:	TP_TRA_60	TP_TRA_6011_01		
Summary:		basic NAT-PT implementation, the NAT-PT SHALL determine and then translate the urning packets belonging to the same session"				
Roles:	NAT-PT_Router	Configuration:	CF_TRA_04			
References:	RQ_003_6011, RQ_003_6012	_003_6011, RQ_003_6012				
to QE then { EUT trans before QE }	s a packet indicating that a res 22 } slates IPv6_packets to and from 21 receives the response from QE	IPv4_packets				
Pre-test conditions:	Took Se			Verdic	-4	
Step	lest Se	quence			Fail	
1	Cause OF1 to send on February	t to OF2		Pass	FdII	
1	Cause QE1 to send an Echo Reques Check: does QE1 receive an Echo Ro			YES	NO	
Observations:	Check, does QE i feceive an Echo Ri	spiy itom QE2		163	INO	

		Test Description				
Identifier:	TD_TRA_6014_01	Test Purpose:	TP_TRA_60	14_01		
Summary:		Vith a NAPT-PT between IPv6 and IPv4 realms, on receipt of a return IPv4 packet, the APT-PT SHALL, on recognition of the TCP port, translated the packet back to V6"				
Roles:	NAT-PT_Router	Configuration:	CF_TRA_04			
References:	RQ_003_6014					
to Q then { EUT tran			ested			
Step		Test Sequence		Verdi	ct	
-		•		Pass	Fail	
1	Cause QE1 to establish a example)	Cause QE1 to establish a TCP connection with QE2 (using telnet for example)				
2	Check: Is the connection e	established successfully ?		YES	NO	

Group 3.3: Protocol Translation Details

	Test Descri	ption			
Identifier:	TD_TRA_6032_01	Test Purpose:	TP_TRA_	6032_01	
Summary:	"NAT-PT SHOULD translate all IP/ICN	MP headers from v4 to v6	in order to	make end-to-	end
	IPv4 to IPv6 communication possible.	With the exception of the	Source Ad	ddress and	
	Destination Address, the translation S	HALL be as specified in			
Roles:	NAT-PT_Router	Configuration:	CF_TRA_	_04	
References:	RQ_003_6032, RQ_003_6035, RQ_0	03_6036, RQ_003_6037			
then { EUT trans before QE }	a packet indicating that a resp lates the needed packets 2 receives the response from QE1	-	QE1 }		
Pre-test conditions:	T10			1 1/2	•
Step	Test Sec	quence		Verd	
				Pass	Fail
1	Cause QE2 to send an Echo Request	to QE1			
2	Check: Does QE2 receive an Echo Re	ply from QE1		YES	NO
Observations:					

	Test Desci	ription			
Identifier:	TD_TRA_6032_02	Test Purpose:	TP_TRA_60	32_02	
Summary:	NAT-PT SHOULD translate all IP/ICMP headers from v4 to v6 in order to make end-to-end				
	IPv4 to IPv6 communication possible Destination Address, the translation S	•	Source Addi	ess and	
Roles:	NAT-PT_Router	Configuration:	CF_TRA_11		
References:	RQ_003_6032, RQ_003_6035, RQ_0	003_6036, RQ_003_6037	. – –		
then { EUT trans	s a packet indicating that a resultates the needed ICMP_packets 4 indicates that QE2 is not real	chable to QE1}	QE2 }		
Step	ŭ	quence		Verdi	ct
		4		Pass	Fail
1	Cause QE1 to send an Echo Reques	t to QE2			
2	Check: Does QE1 receive an Echo R	eply from QE2 ?		NO	YES
3	Check: Does QE1 indicates that QE2	is not reachable?	•	YES	NO
Observations:			•	•	

Test Description							
Identifier:	TD_TRA_6033_01	TD_TRA_6033_01 Test Purpose: TP_TRA_6033_01					
Summary:	"NAT-PT SHOULD translate all IP/ICMP headers from v6 to v4 in order to make end-to-end						
	IPv6 to IPv4 communication	possible. With the exception of t	he Source Add	ress and			
	Destination Address, the tra	nslation SHALL be as specified in	n SIIT (RFC 27	65 [5]). This	test is		
	for ping packets.						
Roles:	NAT-PT_Router	Configuration:	CF_TRA_04	4			
References:	RQ_003_6033, RQ_003_60	38, RQ_003_6039, RQ_003_604	40				
with { }							
ensure that {			_				
	1 3	at a response is requested t	O QE2 }				
`	slates the needed packets Il receives the response						
}	i receives the response	IIOM QE2}					
Pre-test conditions:							
Step		Test Sequence		Verdi	ct		
				Pass	Fail		
1	Cause QE1 to send an Echo	Request to QE2					
2	Check: Does QE1 receive a	n Echo Reply from QE2?		YES	NO		
Observations:							

Test Description						
Identifier:	TD_TRA_6033_02 Test Purpose:	TP_TRA_60	033_02			
Summary:	"NAT-PT SHOULD translate all IP/ICMP headers from v6 to v4 in order to make end-to-end					
	IPv6 to IPv4 communication possible. With the exception of the Source Address and					
	Destination Address, the translation SHALL be as specified in					
Roles:	NAT-PT_Router Configuration:	CF_TRA_11				
References:	RQ_003_6032, RQ_003_6038, RQ_003_6039, RQ_003_6040					
with { QE3 configured	with no route to Network_A					
}						
ensure that {		1				
	a packet indicating that a response is requested to lates the needed ICMP packets	GEI }				
	3 indicates that QE1 is not reachable to QE2					
}	is indicates that ghi is not reachable to ghz					
Pre-test conditions:	QE3 is configured with no route to Network A					
Step	Test Sequence		Verdi	ct		
			Pass	Fail		
1	Cause QE2 to send an Echo Request to QE1					
2	Check: Does QE2 receive an Echo Reply from QE1?		NO	YES		
3	Check: Does QE2 indicates that QE1 is not reachable?		YES	NO		
Observations:						

	Test I	Description			
Identifier:	TD_TRA_6041_01	Test Purpose:	TP_TRA_60	041_01	
Summary:	"The UDP checksums, when is saddress change from v4 to v6"	set to a non-zero value, SH	OULD be recalcu	ulated to refl	ect the
Roles:	NAT-PT_Router	Configuration:	CF_TRA_04	4	
References:	RQ_003_6041	· -			
then { EUT tran before Q }	s a UDP_packet indicating th slates the needed packets E2 receives the response fro	among them, the UDP of	•		
Pre-test conditions:					
		_			
Step	Te	st Sequence		Verd	ict
	Те	st Sequence		Verdi Pass	ict Fail
	Te Cause QE2 to send a UDP pack		n for example)		
		et to QE1 (using tracepath	n for example)		

	To	est Description			
ldentifier:	TD_TRA_6042_01	Test Purpose:	TP_TRA_0	6042_01	
Summary:	"The TCP checksum SHOU	LD be recalculated to reflect the	e address chan	ge from v4 to	v6"
Roles:	NAT-PT_Router	Configuration:	CF_TRA_	04	
References:	RQ_003_6042				
ensure that {					
then { EUT tran before Q }		g that a response is reque s among them, the TCP from QE1}			
then { EUT tran before Q } Pre-test conditions:	slates the needed packets	s among them, the TCP from QE1}			ict
then { EUT tran before Q }	slates the needed packets	s among them, the TCP		Verd Pass	
then { EUT tran before Q } Pre-test conditions:	slates the needed packets E2 receives the response	s among them, the TCP from QE1}	checksum	Verd	
then { EUT tran before Q } Pre-test conditions:	slates the needed packets E2 receives the response Cause QE2 to establish a To	rest Sequence CP connection with QE1 (using	checksum	Verd	ict Fail

Test Description						
Identifier:	TD_TRA_6046_01	Test Purpose:	TP_TRA_604	16_01		
Summary:	The UDP checksums, when is set to a non-zero value, SHOULD be recalculated to reflect the					
	address change from v6 to v4"					
Roles:	NAT-PT_Router	Configuration:	CF_TRA_04			
References:	RQ_003_6046					
then { EUT trans	s a UDP_packet indicating that a slates the needed packets amo 22 receives the response from QE	ng them, the UDP chec				
Step	Test Se	equence		Verdi	ct	
		•		Pass	Fail	
1	Cause QE1 to send a UDP packet to	QE2 (using tracepath6 fo	r example)			
2	Check: Does QE2 receive a correct re	esponse ?		YES	NO	
Observations:						

	Test Description							
Identifier:	TD_TRA_6047_01	Test Purpose:	TP_TRA_60	47_01				
Summary:	"The TCP checksum SHOULD be rec	The TCP checksum SHOULD be recalculated to reflect the address change from v6 to v4"						
Roles:	NAT-PT_Router	Configuration:	CF_TRA_04					
References:	RQ_003_6047							
then { EUT trans before QE }	s a TCP_packet indicating that a slates the needed packets amo I receives the response from QE:	ong them, the TCP chec						
Pre-test conditions:								
Step	Test Se	quence		Verdi				
				Pass	Fail			
1	Cause QE1 to establish a TCP conne example)	ction with QE2 (using teln	et for					
2	Check: is the connection established	successfully?	<u> </u>	YES	NO			
Observations:			•					

Group 4: RFC3056 - Connection of IPv6 Domains via IPv4 Clouds

Group 4.1: Address Selection

	Test Descr	iption			
Identifier:	TD_TRA_0005_01	Test Purpose:	TP_TRA_00	05_01	
Summary:	"A 6to4 host having only one 6to4 add	dress communicating with	other 6to4 ho	st having or	ne 6to4
	and one native addresses should use	the 6to4 addresses"			
Roles:	6to4_Host	Configuration:	CF_TRA_05		
References:	RQ_003_0005				
	gured with 1 6to4_address				
	gured with no IPv6_native_address	5			
	gured with 1 6to4_address				
	gured with 1 IPv6_native_address				
	gured with 1 AAAA_record for the		of QE1		
and QE3 config	gured with 1 AAAA_record for the	6to4_address of QE1			
ensure that {					
	a packet indicating that a resp	nonge is requested			
	ne fully qualified domain name of				
	ves all the AAAA records for QE				
	the packet to the 6to4 address				
	TT receives the response from QE				
}	-	,			
Pre-test conditions:	EUT is configured with one 6to4 addre	ess.			
	EUT is configured with NO IPv6 native	e address.			
	QE1 is configured with one 6to4 addre	ess.			
	QE1 is configured with one IPv6 nativ				
	QE3 is configured with one AAAA rec		dress of QE1		
	QE3 is configured with one AAAA rec				
Step	Test Se			Verdic	ct
•		•		Pass	Fail
1	Cause EUT to send an Echo Request	to the fully qualified doma	ain name of		
	QE1	, ,			
2	Check: Does EUT receive an Echo Ro	eply from QE1		YES	NO
Observations:				•	

	Test Desci	ription			
Identifier:	TD_TRA_0005_02	Test Purpose:	TP_TRA_0005	5_02	
Summary:	"A 6to4 host having one 6to4 and one having only one 6to4 address should		unicating with ot	her 6to4 h	ost
Roles:	6to4 Host	Configuration:	CF_TRA_06		
References:	RQ_003_0005	<u> </u>	· – –		
and EUT config and QE2 config and QE2 config } ensure that { when { EUT sends to then } then { EUT sends before EUT	gured with 1 6to4_address gured with 1 IPv6_native_address gured with 1 6to4_address gured with no IPv6_native_addres s a packet indicating that a res ne 6to4_address of QE2 s the packet from its 6to4_addre JT receives the response from QE	s ponse is requested ss 2 }			
Pre-test conditions:	EUT is configured with one 6to4 addr EUT is configured with one IPv6 nativ QE2 is configured with one 6to4 addr QE2 is configured with NO IPv6 nativ QE2 is unable to communicate with the	re address. ess. e address. ne IPv6 native address of	EUT.		
Step	Test Se	equence		Verdi	
				Pass	Fail
1	Cause EUT to send an Echo Reques		E2	\((= 0	
2	Check: Does EUT receive an Echo R	eply from QE2 ?		YES	NO
Observations:					

Test Description					
Identifier:	TD_TRA_0007_01	Test Purpose:	TP_TRA_000	7_01	
Summary:	"A 6to4 host having one 6to4 and one				
	having one 6to4 and one native addre	esses should use both na	tive or both 6to4	4 addresse	s"
Roles:	6to4_Host	Configuration:	CF_TRA_06		
References:	RQ_003_0007				
and EUT configured and QE2 confi	gured with 1 6to4_address gured with 1 IPv6_native_address gured with 1 6to4_address gured with 1 IPv6_native_address gured with 1 IPv6_native_address a a packet indicating that a resp de 6to4_address of QE2 at the packet from its 6to4_address Treceives the response from QE	ss			
Pre-test conditions:	EUT is configured with one 6to4 addr EUT is configured with one IPv6 nativ QE2 is configured with one 6to4 addr QE2 is configured with one IPv6 nativ QE2 is unable to communicate with the	re address. ess. re address.	EUT.		
Step	Test Se	quence		Verdic	et
-				Pass	Fail
1	Cause EUT to send an Echo Request	t to the 6to4 address of Q	E2		
2	Check: Does EUT receive an Echo R	eply from QE2		YES	NO
Observations:			<u> </u>		

Test Description					
Identifier:	TD_TRA_0007_02	Test Purpose:	TP_TRA_000	7_02	
Summary:	"A 6to4 host having one 6to4 and one	native addresses commu	nication with c	other 6to4 h	ost
	having one 6to4 and one native addre		ve or both 6to	4 addresse	s"
Roles:	6to4_Host	Configuration:	CF_TRA_12		
References:	RQ_003_0007				
and EUT config and QE2 config and QE2 config } ensure that { when { EUT sends to th } then { EUT sends	gured with 1 6to4_address gured with 1 IPv6_native_address gured with 1 6to4_address gured with 1 IPv6_native_address gured with 1 IPv6_native_address a packet indicating that a resp ne IPv6_native_address of QE2 s the packet from its IPv6_native Treceives the response from QE	e_address			
Pre-test conditions:	EUT is configured with one 6to4 addreuT is configured with one IPv6 nativ QE2 is configured with one 6to4 addreuE2 is configured with one IPv6 nativ QE2 is unable to communicate with the	e address. ess. e address. e 6to4 address of EUT.			
Step	Test Se	quence		Verdi	
				Pass	Fail
1	Cause EUT to send an Echo Request		s of QE2		
2	Check: Does EUT receive an Echo Ro	eply from QE2		YES	NO
Observations:					

Group 4.2: Encapsulation in IPv4

	Test Description				
Identifier:	TD_TRA_0011_01	Test Purpose:	TP_TRA_00	011_01	
Summary:	"The IPv4 packet body encapsulates	the IPv6 header and paylo	ad"		
Roles:	6to4_Router	Configuration:	CF_TRA_0	6	
References:	RQ_003_0011	2_003_0011			
	gured with 1 6to4_address				
and QE2 config	gured with 1 6to4_address				
ensure that {					
	<pre>when { QE1 sends a packet indicating that a response is requested</pre>				
	sulates the QE1 packet into an 3				
before QE	Il receives the response from QE	2}			
Pre-test conditions:	QE1 is configured with one 6to4 addre	ess.			
	QE2 is configured with one 6to4 address	ess.			
Step	Test Se	quence		Verdi	ct
				Pass	Fail
1	Cause QE1 to send an Echo Request to QE2				
2	Check: Does QE1 receive an Echo Reply from QE2? YES NO		NO		
Observations: QE5 is a pure IPv4 router and ensures that communication between EUT and QE6 is encapsulated into an IPv4 packet					

Group 4.3: Maximum Transmission Unit

	Test Description				
Identifier:	TD_TRA_0012_01	Test Purpose:	TP_TRA_00)12_01	
Summary:	"The IPv4 "do not fragment" bit SHOL	ILD NOT be set in the enc	apsulating IF	Pv4 header"	
Roles:	6to4_Router	_Router Configuration: CF_TRA_06			
References:	RQ_003_0012				
with { EUT configured not to perform IPv4_PMTU_Discovery and QE1 configured with 1 6to4_address and QE2 configured with 1 6to4_address and the PMTU of Network_D is lower than the IPv6_packets MTU } ensure that { when { QE1 sends an IPv6_packet indicating that a response is requested to the 6to4_address of QE2 } then { EUT encapsulates the QE1 IPv6_packet into an IPv4_packet containing do_not_fragment_bit indicating false before QE1 receives the response from QE2}					
Pre-test conditions:	MTU on Network D is set to 1300.				
01	EUT is configured not to perform IPv4	, ,		\/!!	
Step	lest Se	quence		Verdi	
	0 054:	(1 11 14 100 1 050		Pass	Fail
1	1 Cause QE1 to send an Echo Request of length 1400 to QE2				
2		Check: does QE1 receive a response from QE2? YES		NO	
3	Check: does QE1 indicates "Packet to	oo Big"		NO	YES
Observations:					

Group 5: RFC3596 - DNS Extensions to Support IP Version 6

	Test Descr	iption			
Identifier:	TD_TRA_5005_01	Test Purpose:	TP_TRA_	5005_01	
Summary:	"A DNSv6 server must return all AAA	DNSv6 server must return all AAAA records concerning a domain name when it receives a			
	AAAA query"				
Roles:	DNSv6_Server	Configuration:	CF_TRA_	07	
References:	RQ_003_5005				
ensure that { when { QE1 sends a then { QE1 indicat} } Pre-test conditions:	A AAAA_DNS_Query for QE2 to EUT tes receipt of all the AAAA_reco:	} rds for QE2 from EUT] records for QE2.	}		
Step	Test Se	Test Sequence		Verd	ict
				Pass	Fail
1	Cause QE1 to send a DNS query for interrogating DNS name Servers (dig)		for		
2	Check: does QE1 give information ab QE2	out all the AAAA_records	concerning	g Yes	No
Observations:					

Group 6: RFC4213 - Basic Transition Mechanisms for IPv6 Hosts and Routers

	Test Description				
Identifier:	TD_TRA_4004_01	04_01			
Summary:	"An IPv6/IPv4 node must be able to deal with both A records and AAAA reco	in IPv6/IPv4 node must be able to deal with both A records and AAAA records"			
Roles:	IPv6/IPv4_Node Configuration: CF_TRA_08				
References:	RQ_003_4004				
and QE1 confident and EUT confident and EUT confident and EUT is a confident and EUT is and EUT is and EUT is and EUT is a confident and EUT incomplete and EUT incom	gured with at least 1 AAAA_record for QE2 gured with at least 1 A_record for QE2 gured to use QE1 as DNS_Server requested to send an IPv6_packet dicating that a response is requested QE2 requested to send an IPv4_packet dicating that a response is requested QE2 } dicates receipt of IPv6_response from QE2 dicates receipt of IPv4 response from QE2				
Pre-test conditions:	QE1 is configured with at least 1 AAAA_record for QE2. QE1 is configured with at least 1 A_record for QE2. Lastly EUT is configured to use QE1 as DNS_Server.				
Step	Test Sequence	Verdic	ct		
		Pass	Fail		
1	Cause EUT to send an ICMPv6 Echo Request to QE2 using its hostname.				
2	Check: Does EUT receive an ICMPv6 Echo Reply from QE2.	Yes	No		
3	Cause EUT to send an ICMPv4 Echo Request to QE2 using its hostname.				
4	Check: Does EUT receive an ICMPv4 Echo Reply from QE2.	Yes	No		
Observations:					

	Test Descr	iption			
Identifier:	TD_TRA_4047_01	Test Purpose:	TP_TRA_	_4047_01	
Summary:	"An IPv6/IPv4_Node must be able to	IPv6/IPv4_Node must be able to decapsulate IPv6 in IPv4 packets"			
Roles:	IPv6/IPv4_Node	Pv6/IPv4 Node Configuration: CF_TRA_09			
References:	RQ_003_4047	Q 003_4047			
<pre>with { EUT configured to establish a static_tunnel to network_A via QE1 and QE1 configured to establish a static_tunnel to network_B via EUT } ensure that { when { QE2 sends a packet indicating that a response is requested</pre>					
Pre-test conditions:	Pre-test conditions: EUT is configured to establish a static_tunnel to network_A via QE1. QE1 is configured to establish a static_tunnel to network_B via EUT.				
Step	Test Sequence Verdict			ict	
-		•		Pass	Fail
1	Cause QE2 to send an Echo Request	to QE3			
2	Check: does QE2 receive an Echo Re	ply from QE3		Yes	No
Observations:					•

	Test Descr	iption			
Identifier:	TD_TRA_4048_01	Test Purpose:	TP_TRA_4	1048_01	
Summary:	"An IPv6/IPv4_Node acting as a deca	psulator must check that	the source o	of a received	
	encapsulated packet is the address o	f the encapsulator"			
Roles:	IPv6/IPv4_Node	Configuration:	CF_TRA_0	09	
References:	RQ_003_4048				
and QE1 confidence and QE1 confidence and QE2 confidence and QE2 sends and QE3	<pre>with { EUT configured to establish a static_tunnel to network_A via QE4 and QE1 configured to establish a static_tunnel to network_B via EUT } ensure that { when { QE2 sends a packet indicating that a response is requested</pre>				
Step	QE1 is configured to establish a static	guence	EU1.	Verdi	ct
Otep	Test de	quence		Pass	Fail
1	Cause OF2 to send an Echo Regues	to OE3		1 433	ı an
2	Cause QE2 to send an Echo Request to QE3 Check: does QE2 receive an Echo Reply from QE3. No		Yes		
Observations:	Check. does QL2 receive all Echo Ne	ppy from QLO.		140	1 63

	Те	st Description			-
Identifier:	TD_TRA_4055_01	TD_TRA_4055_01			
Summary:	"An IPv6/IPv4_Node acting a	is a decapsulator must be able	to reassembl	le an IPv4 pack	et of
	size 1500"	_ '			
Roles:	IPv6/IPv4_Node	Configuration:	CF_TRA	_09	
References:	RQ_003_4055, RQ_003_405	57			
and QE1 configure and QE1 configure that { when { QE2 sends a indicate to QE3 then { QE2 indicate}	gured to establish a stat a packet of length 1500 ting that a response is r	-			
Pre-test conditions: EUT is configured to establish a static_tunnel to network_A via QE1. QE1 is configured to establish a static_tunnel to network_B via EUT.					
Step		Test Sequence		Verdi	ict
				Pass	Fail
1	Cause QE2 to send an Echo	Request of length 1500 to QE3	}		
2	Check: does QE2 receive an	heck: does QE2 receive an Echo Reply from QE3 Yes		No	
Observations:					

```
Test Description
Identifier:
                        TD_TRA_4064_01
                                                           Test Purpose:
                                                                                   TP_TRA_4064_01
Summary:
                        "An IPv6/IPv4_Node acting as a decapsulator must be decrement the hop limit of forwarded
                        packets by one"
                        IPv6/IPv4_Node
                                                                                    CF_TRA_09
Roles:
                                                           Configuration:
References:
                       RQ_003_4064
       EUT configured to establish a static_tunnel to network A via QE1 and QE1 configured to establish a static_tunnel to network_B via EUT
ensure that {
 when { QE2 sends a packet indicating that a response is requested
               and indicating TTL of 3
               to OE3 }
         { QE2 indicates receipt of the response from QE3 }
  then
         { QE2 sends a packet indicating that a response is requested
  when
               and indicating TTL of 2
               to QE3 }
  then { QE2 receives no response from QE3 }
 Pre-test conditions:
                       EUT is configured to establish a static_tunnel to network_A via QE1.
                        QE1 is configured to establish a static_tunnel to network_B via EUT.
        Step
                                                                                                     Verdict
                                                   Test Sequence
                                                                                                   Pass
                                                                                                             Fail
                        Cause QE2 to send an Echo Request indicating TTL of 3 to QE3.
                        Check: does QE2 receive an Echo Reply from QE3
          2
                                                                                                    Yes
                                                                                                              No
                        Cause QE2 to send an Echo Request indicating TTL of 2 to QE3.
          3
                        Check: does QE2 receive an Echo Reply from QE2.
          4
                                                                                                    No
                                                                                                             Yes
    Observations:
```

	Те	est Description			
Identifier:	TD_TRA_4071_01	Test Purpose:	TP_TRA_40	71_01	
Summary:	"An IPv6/IPv4_Node builds a address"	a link-local address for its tunne	el interface using t	he interface	Pv4
Roles:	IPv6/IPv4_Node	Configuration:	CF_TRA_09		
References:	RQ_003_4071, RQ_003_40	73, RQ_003_4074			
to the then { QE1 indica} Pre-test conditions:		IT } use from EUT} sh a static_tunnel to network_A sh a static_tunnel to network_E		···········	
Step		Test Sequence		Verdi	<u>ct</u>
				Pass	Fail
1	Cause QE1 to send an Echo	Request to the link-local addr	ess of EUT.		
2	Check: does QE1 receive an	Echo Reply from EUT.		Yes	No
Observations:					

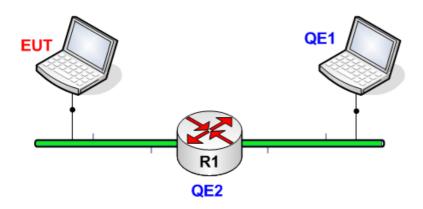
Group 7: RFC 4214 - Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)

		Test Description			
Identifier:	TD_TRA_2009_01	Test Purpose:	P_TRA_20	009_01	
Summary:	"An ISATAP_Node builds	An ISATAP_Node builds a link-local address for its ISATAP interface using IPv4 address from			
	its locator set"		·		
Roles:	ISATAP_Node	Configuration: C	F_TRA_10)	
References:	RQ_003_2009	<u> </u>			
to the	a packet indicating that ISATAP_link_local_address receipt of the resp				
Step		Test Sequence		Verd	ct
•		·		Pass	Fail
1	Cause QE1 to send an Eco of EUT.	ho Request to the ISATAP_link_local_a	ddress		
2	Check: does QE1 receive	an Echo Reply from EUT.		Yes	No
Observations:				•	•

	Test Description					
Identifier:	TD_TRA_2018_01	Test Purpose:	TP_TRA_2	018_01		
Summary:	"An advertising ISATAP_route	er only send unicast router adv	vertisements"			
Roles:	ISATAP_Node	Configuration:	CF_TRA_1	0		
References:	RQ_003_2018					
ensure that { when { QE1 sends a then { QE1 ind	<pre>when { QEI sends a Router_Solicitation to EUT } then { QE1 indicates receipt of a Router_Advertisement from EUT</pre>					
Step		Test Sequence		Verd	ict	
		•		Pass	Fail	
1	Cause QE1 to send a Router	Solicitation to EUT				
2	Check: does QE1 receive a R	outer_Advertisement from EU	JT.	Yes	No	
3	Check: does QE2 receive a R	outer_Advertisement from EU	JT.	No	Yes	
Observations:		<u> </u>		<u> </u>		

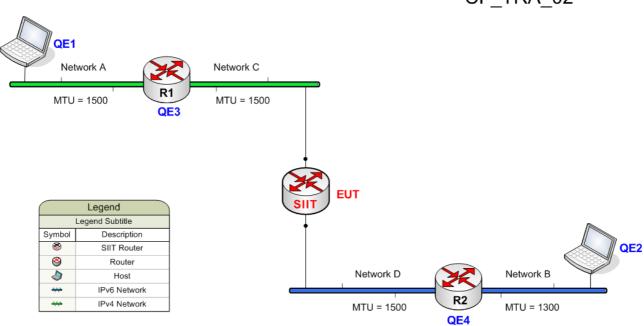
Annex A (informative): Interoperability Testing Configurations

The following architectural configurations are referenced in the IPv4 to IPv6 Transitioning Interoperability Test Descriptions specified in the present document. They are intended to give a general rather than specific view of the possible roles of the EUT and its associated QE(s) and the relationships between them.

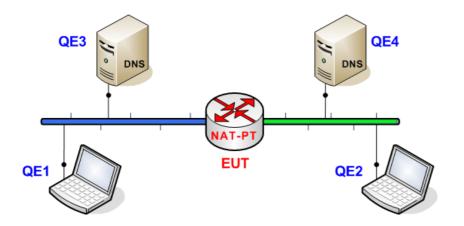


Legend		
Legend Subtitle		
Symbol	Description	
8	IPv4 Multicast Router	
٥	6over4 Host	
**	IPv4 Network	

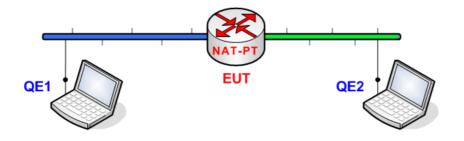
CF_TRA_02



CF_TRA_03

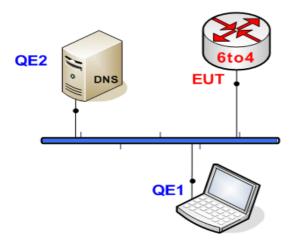


Legend				
L	Legend Subtitle			
Symbol	Description			
8	NAT-PT Router			
i i	DNS Server			
>	Host			
++-	IPv6 Network			
	IPv4 Network			

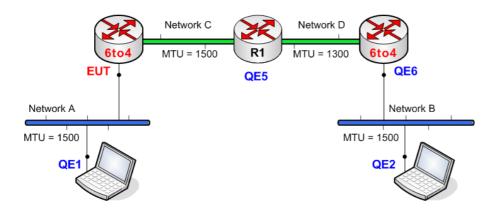


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Legend Subtitle		
Symbol	Description	
8	NAT-PT Router	
4	DNS Server	
***	IPv6 Network	
***	IPv4 Network	

CF_TRA_05

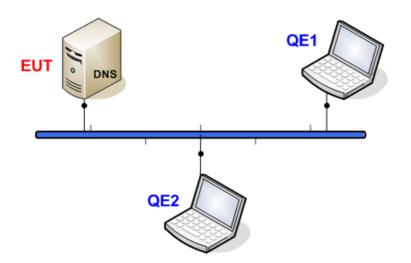


Legend		
Legend Subtitle		
Symbol	Description	
8	6to4 Router	
(i)	DNS Server	
>	Host	
***	IPv6 Network	

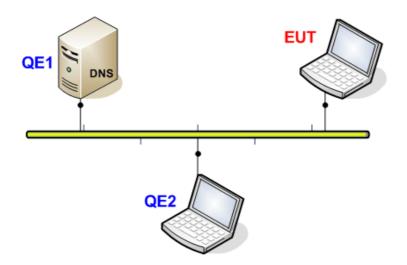


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Legend Subtitle		
Symbol	Description	
8	6to4 Router	
8	Router	
٥	Host	
***	IPv6 Network	
++	IPv4 Network	

CF_TRA_07



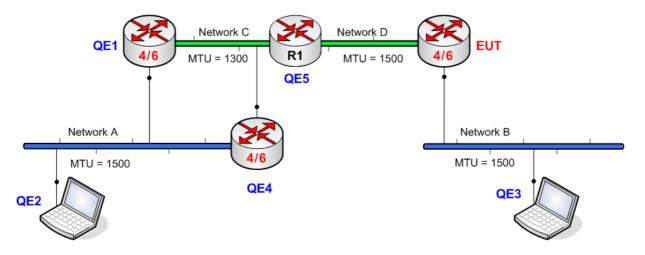
Legend		
Legend Subtitle		
Symbol	Description	
1	IPv6 DNS Server	
4	IPv6 Host	
***	IPv6 Network	



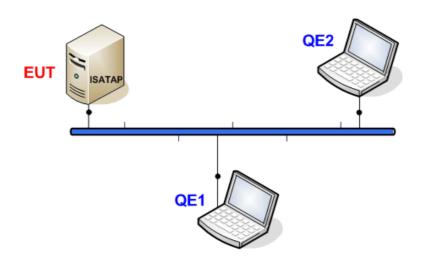
Legend		
Legend Subtitle		
Symbol	Description	
1	IPv4/IPv6 DNS Server	
٥	IPv4/IPv6 Host	
#	IPv4/IPv6 Network	

CF_TRA_09

Legend		
Legend Subtitle		
Symbol	Description	
8	Dual Stack Router	
8	Router	
>	Host	
	IPv6 Network	
	IPv4 Network	



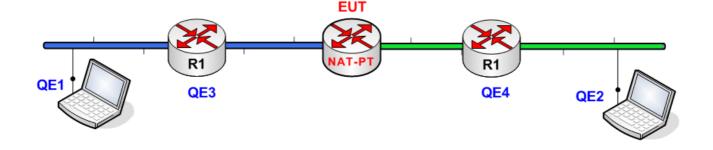
CF_TRA_10



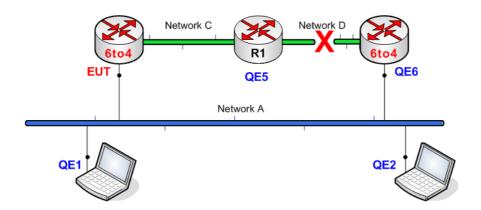
Legend		
Legend Subtitle		
Symbol	Description	
(i)	ISATAP Node	
4	Host	
***	IPv6 Network	

Legend		
Legend Subtitle		
Symbol	Description	
8	NAT-PT Router	
8	Router	
4	Host	
***	IPv6 Network	
	IPv4 Network	

CF_TRA_11

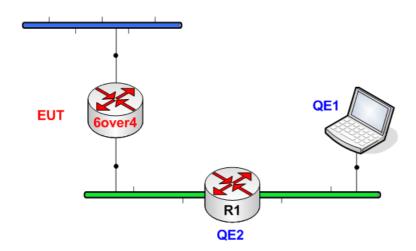


CF_TRA_12



Legend		
Legend Subtitle		
Description		
6to4 Router		
Router		
Host		
IPv6 Network		
IPv4 Network		

CF_TRA_13



Legend		
Legend Subtitle		
Symbol	Description	
8	6over4 Router	
8	IPv4 Multicast Router	
٥	6over4 Host	
***	IPv6 Network	
***	IPv4 Network	

Annex B (informative): IPv6 Interoperability Test Purposes

The Test Suite Structure is based on the IPv4 to IPv6 Transitioning RFCs and the IPv6 Requirements Catalogue nodes. It is defined by the groups within the following TPLan specification of test purposes. The numbering is not contiguous so that new TPs can be added at a later date without the need to completely renumber the TSS groups.

```
: TRA
Title : 'IPv6 TRANSITION Test Purposes'
Version: 1.0
Date : 13.04.2007
Author : 'STF276 - Task 4'
--***Cross references***
-- Requirements
xref RQ_003 { RFC2529,
               RFC2766,
               RFC3056,
               RFC3596,
               RFC4213,
               RFC4214 }
-- Configurations
xref CF_TRA_00 {Configs_IOP_TRANS.pdf}
xref CF_TRA_01 {Configs_IOP_TRANS.pdf}
xref CF_TRA_02 {Configs_IOP_TRANS.pdf}
xref CF_TRA_03 {Configs_IOP_TRANS.pdf}
--***Definitions***
-- Primary Configuration Entities
def entity EUT
def entity QE1
def entity QE2
def entity QE3
def entity QE4
---- Supplementary entities
def entity DNS
def entity DNS_Server
def entity Network A
def entity Network B
def entity Network_D
def entity static tunnel
def entity PMTU
def entity route
def entity segments
def entity port
def entity UDP_port_80
def entity session initialisation
-- Messages
def event packets { packet }
def event IPv4_packets { IPv4_packet }
def event IPv6_packets { IPv6_packet }
def event ICMP_packets
def event IPv4_Translated_packets
def event IPv4_Mapped_packets
def event UDP_packet
def event TCP_packet
def event Router_Solicitation
def event Router Advertisement
def event Echo Reply
def event Echo_Request
def event response
def event IPv4_response
```

def event IPv6 response

```
def event AAAA_DNS_Query
def event PTR DNS Query
def event IPv4_PMTU_Discovery
 - Keywords - Preconditions
def word configured
def word disconnected
def word listen
def word use
-- Values
def value link_local_address
def value IPv6_native_address
def value 6to4_address
def value ISATAP_link_local_address
def value all_nodes_multicast_address
def value all_routers_multicast_address
def value solicited node multicast address
def value do not fragment bit
def value TTL
def value length
def value MTU
def value A_records { A_record }
def value AAAA_records { AAAA_record }
def value fully_qualified_domain_name
def value false
-- Keywords - Actions
def word establish
def word requested
def context {is ~requested to}
def word send
def word translates
def word block
def word perform
-- Keywords - Responses
def word silently
def word discards
def word encapsulates
def word indicates
def word receipt
def context {~indicates ~receipt}
def context {sends [no] ~response}
def context {receipt of [the] ~response}
def context {~silently ~discards}
def word reachable
def word communication
def word administratively
def word prohibited
def context {~administratively ~prohibited}
def word fragmentation
def word needed
def context {~fragmentation is needed}
def word Time Exceeded
-- Keywords - Glue
def word at
def word for
def word lower
def word least
def word than
def word all
def word via
def word on
def word into
def word its
--* RFC2529 - Transmission of IPv6 over IPv4 Domains without Explicit Tunnels
Group 1 'RFC2529 - Transmission of IPv6 over IPv4 Domains
                    without Explicit Tunnels'
TP id : TP_TRA_1009_01
```

```
summary : 'A 6over4 node builds a link-local address for an IPv4 virtual
          interface using the interface IPv4 address'
RQ ref : RQ_003_1009, RQ_003_1012, RQ_003_1016
      : 6over4_node
Role
config : CF_TRA_01
TD ref : TD TRA 1009 01
with {
ensure that {
 when { QE1 sends a packet indicating that a response is requested
            to the link_local_address of EUT }
 then { QE1 indicates receipt of the response from EUT}
--xxxxxxxxxxxxxxxx
TP id : TP_TRA_1027_01
summary : 'A 6over4 router must join the all-nodes multicast address'
RQ ref : RQ 003 1027
Role
       : 6over4 router
config : CF_TRA_13
TD ref : TD_TRA_1027_01
with {
ensure that {
 when \{ QE1 sends a packet indicating that a response is requested
             to the all_nodes_multicast_address }
 then { QE1 indicates receipt of the response from EUT }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 1027 02
summary : 'A 6over4 router must join the all-routers multicast address'
RQ ref : RQ_003_1027
       : 6over4_router
config : CF TRA 13
TD ref : TD_TRA_1027_02
with {
ensure that {
 when \{ QE1 sends a packet indicating that a response is requested
             to the all routers multicast address }
 then { QE1 indicates receipt of the response from EUT }
--xxxxxxxxxxxxxxxxxx--
TP id : TP_TRA_1027_03
summary : 'A 6over4 router must join the solicited-node multicast address
         corresponding to its IPv6 address'
RQ ref : RQ_003_1027
Role : 6over4_router
config : CF TRA 13
TD ref : TD TRA 1027 03
with {
ensure that {
 when { QE1 sends a packet indicating that a response is requested
             to the solicited node multicast address of EUT }
 then { QE1 indicates receipt of the response from EUT }
End Group 1
 _*************
--* RFC2765 - Stateless IP/ICMP Translation Algorithm (SIIT)
Group 2 'RFC2765 - Stateless IP/ICMP Translation Algorithm (SIIT)'
Group 2.1 'Translating from IPv4 to IPv6'
TP id : TP TRA 3003 01
summary : 'When the IPv4 Sender does not perform PMTU discovery, the translator
          shall fragment the IPv4 packet so that it fits in 1280 bytes IPv6'
RQ ref : RQ_003_3003
```

```
Role
      : SIIT_Translator
config : CF_TRA_02
TD ref : TD_TRA_3003_01
            EUT configured not to use PMTU on Network A
with {
ensure that {
 when { QE1 sends a packet of length 1500
              indicating that a response is requested to QE2 }
  then { QE1 indicates receipt of the response from QE2 }
--xxxxxxxxxxxxxxxxxx--
TP id : TP TRA 3014 01
summary : 'The SIIT_Tranlator must copy the TTL value from IPv4 header s to the
          Hop Limit in the resulting IPv6 header s. During translation, the
           translator shall decrement the TTL value or IPv6 Hop Limit'
RQ ref : RQ 003 3014, RQ 003 3015
       : SIIT Translator
config : CF_TRA_02
TD ref : TD_TRA_3014_01
with {
ensure that {
  when { QE1 sends a packet indicating that a response is requested
              and indicating TTL of 4
              to QE2 }
  then { QE1 indicates receipt of the response from QE2 }
  when { QE1 sends a packet indicating that a response is requested
              and indicating TTL of 3
              to OE2 }
  then { QE1 receives no response from QE2 }
--xxxxxxxxxxxxxxxxxx--
TP id : TP TRA 3016 01
summary : 'As part of forwarding the packet, if the translator has decremented the
           IPV4 TTL (before translation) it shall not decrement the IPv6 Hop Limit
           (After translation). The SIIT_Translator must not decrement 2 times.'
RQ ref : RQ 003 3016
       : SIIT Translator
Role
config : CF_TRA_02
TD ref : TD_TRA_3016_01
with {
ensure that {
  when { QE1 sends a packet indicating that a response is requested
              and indicating TTL of 3
              to QE2 }
  then { QE1 receives no response from QE2 }
       { QE1 sends a packet indicating that a response is requested
  when
              and indicating TTL of 4
  then { QE1 indicates receipt of the response from QE2 }
       { QE1 sends a packet indicating that a response is requested
  when
              and indicating TTL of 5
              to OE2 }
  then { QE1 indicates receipt of the response from QE2 }
--xxxxxxxxxxxxxxxxx
TP id : TP_TRA_3017_01 summary : 'As part of decrementing the TTL value, the SIIT_Translator needs to check for zero
          and if present, send the ICMPv4 ttl exceeded error'
RQ ref : RQ_003_3017
       : SIIT Translator
config : CF_TRA_02
TD ref
       : TD_TRA_3017_01
with {
ensure that {
  when { QE1 sends a packet indicating that a response is requested
              and indicating TTL of 4
              to QE2 }
  then
        { QE1 indicates receipt of the response from QE2 }
  when { QE1 sends a packet indicating that a response is requested
```

```
and indicating TTL of 2
              to QE2 }
  then { QE1 indicates Time Exceeded }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 3018 01
summary : 'When translating IPv4 to IPv6, the IPv6 source Address
           and Destination field shall be constructed with the low-order 32bits
          (IPv4 Source or Destination) and the high-order 96bits (IPv4-mapped prefix
          or IPv4-translated prefix respectively)'
RQ ref : RQ_003_3018, RQ_003_3019
Role
       : SIIT Translator
config : CF_TRA_02
TD ref : TD_TRA_3018_01
with {
ensure that {
 when { QE1 sends a packet indicating that a response is requested
             to OE2 }
 then { QE1 indicates receipt of the response }
--xxxxxxxxxxxxxxxxxx
TP id : TP_TRA_3037_01
summary : 'A SIIT_Translator must be able to translate ICMPv4 Echo Requests
          to ICMPv6 Echo Requests, by changing the type and adjusting the
          checksum'
RQ ref : RQ 003 3037, RQ 003 3034, RQ 003 3038
Role
       : SIIT Translator
config : CF TRA 02
TD ref : TD_TRA_3037_01
with {
ensure that {
 when { QE1 sends an Echo_Request to QE2 }
  then { QE1 indicates receipt of an Echo_Reply from QE2 }
--xxxxxxxxxxxxxxxxxx--
TP id : TP_TRA_3039_01
summary : 'A SIIT_Translator must be able to translate ICMPv4 Echo Replies
          to ICMPv6 Echo Replies, by changing the type and adjusting the
          checksum'
RQ ref : RQ_003_3039, RQ_003_3034, RQ_003_3040
       : SIIT Translator
Role
config : CF_TRA_02
TD ref : TD_TRA_3039_01
with {
ensure that {
 when { QE2 sends an Echo Request to QE1 }
  then { QE2 indicates receipt of an Echo Reply from QE1 }
--xxxxxxxxxxxxxxx--
TP id : TP_TRA_3051_01
summary : 'A SIIT_Translator must translate ICMPv4 Destination Unreachable
          (net unreachable) messages to ICMPv6 Destination Unreachable
          (no route to destination) messages'
RQ ref : RQ 003 3051
       : SIIT Translator
Role
config
       : CF_TRA_02
TD ref : TD TRA 3051 01
        QE3 configured with no route for IPv4_mapped_packets
with {
ensure that {
 when { QE2 sends a packet indicating that a response is requested
             to OE1 }
  then { QE2 indicates that QE1 is not reachable }
--xxxxxxxxxxxxxxxxxx--
```

```
TP id : TP_TRA_3053_01
summary : 'A SIIT Translator must translate ICMPv4 Destination Unreachable
           (port unreachable) messages to ICMPv6 Destination Unreachable
           (port unreachable) messages'
RQ ref : RQ 003 3053
       : SIIT Translator
config : CF_TRA_02
TD ref : TD TRA 3053 01
        QE1 configured not to listen on UDP_port_80
with {
ensure that {
  when { QE2 sends a UDP packet to QE1 on UDP_port_80 } then { QE2 indicates that the port is not reachable }
--xxxxxxxxxxxxxxxxxx--
TP id : TP_TRA_3057_01
summary : 'A SIIT Translator must translate ICMPv4 Destination Unreachable
           (administratively prohibited) messages to ICMPv6 Destination
           Unreachable (administratively prohibited) messages'
RQ ref : RQ_003_3057
        : SIIT_Translator
config : CF_TRA_02
TD ref : TD_TRA_3057_01
        QE3 configured to block packets from QE2
with {
ensure that {
 when { QE2 sends a packet indicating that a response is requested
              to OE1 }
  then { QE2 indicates that communication with QE1
              is administratively prohibited }
}
--xxxxxxxxxxxxxxxxxx--
TP id : TP TRA 3059 01
summary : 'A SIIT Translator must translate ICMPv4 Time Exceeded messages
           to ICMPv6 Time Exceeded messages'
RQ ref : RQ_003_3059, RQ_003_3060
       : SIIT Translator
config : CF TRA 02
TD ref : TD TRA 3059 01
with {
ensure that {
  when { QE2 sends a packet indicating that a response is requested
              and indicating TTL of 4
              to QE1 }
  then { QE2 indicates receipt of the response from QE1 }
  when { QE2 sends a packet indicating that a response is requested
              and indicating TTL of 3
              to QE1 }
  then { QE2 indicates Time Exceeded }
}
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 3063 01
summary : 'A SIIT Translator must translate IPv4 packets with an IPv4 address compatible
          with the pool of IPv4 Translated Address of IPv6 Nodes'
RQ ref : RQ_003_3063
       : SIIT Translator
config : CF_TRA_02
TD ref : TD_TRA_3063_01
with {
ensure that {
  when { QE2 sends a packet indicating that a response is requested
              to OE1
  then { QE2 indicates receipt of the response }
}
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 3064 01
summary : 'A SIIT Translator must translate ICMPv4 Destination Unreachable
           (host unreachable) messages to ICMPv6 Destination Unreachable
```

```
(no route to destination) messages'
RQ ref : RQ 003 3064
       : SIIT Translator
Role
config : CF_TRA_02
TD ref
       : TD_TRA_3064_01
        QE1 disconnected
with {
ensure that {
 when { QE2 sends a packet indicating that a response is requested
             to QE1 }
  then { QE2 indicates that QE1 is not reachable }
End Group 2.1
Group 2.2 'Translating from IPv6 to IPv4'
TP id : TP TRA 3080 01
summary : 'The SIIT Tranlator must copy the Hop Limit from IPv6 header s to the
          TTL value in the resulting IPv4 header s. During translation, the
           translator shall decrement the IPv4 TTL value or IPv6 Hop Limit'
RQ ref : RQ_003_3080, RQ_003_3081
       : SIIT_Translator
       : CF TRA 02
config
       : TD TRA 3080 01
TD ref
with {
ensure that {
 when { QE2 sends a packet indicating that a response is requested
             and indicating TTL of 4
             to OE1 }
  then { QE2 indicates receipt of the response from QE1 }
  when { QE2 sends a packet indicating that a response is requested
             and indicating TTL of 3
             to QE1 }
  then { QE2 receives no response from QE1 }
--xxxxxxxxxxxxxxxxx--
       : TP TRA 3082 01
summary: 'As part of forwarding the packet, if the translator has decremented the
           IPv6 Hop Limit (before translation) it shall not decrement the IPv4 TTL
           (After translation). The SIIT_Translator must not decrement 2 times.'
RQ ref : RQ_003_3082
Role
       : SIIT_Translator
       : CF_TRA 02
config
TD ref : TD_TRA_3082_01
with {
ensure that {
  when { QE2 sends a packet indicating that a response is requested
             and indicating TTL of 3
             to OE1 }
  then { QE2 receives no response from QE1 }
       { QE2 sends a packet indicating that a response is requested
  when
             and indicating TTL of 4
              to OE1 }
  then
        { QE2 indicates receipt of the response from QE1 }
        { QE2 sends a packet indicating that a response is requested
  when
             and indicating TTL of 5
              to QE1 }
  then { QE2 indicates receipt of the response from QE1 }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 3083 01
summary : 'As part of decrementing the TTL value, the SIIT_Translator needs to check for zero
          and if present, send the ICMPv6 ttl exceeded error'
RQ ref : RQ 003 3083
       : SIIT Translator
config : CF TRA 02
TD ref : TD_TRA_3083_01
with {
ensure that {
  when { QE2 sends a packet indicating that a response is requested
```

```
and indicating TTL of 4
             to QE1 }
 then { QE2 indicates receipt of the response from QE1 }
       { QE2 sends a packet indicating that a response is requested
 when
             and indicating TTL of 2
             to QE1 }
 then { QE2 indicates Time Exceeded }
--xxxxxxxxxxxxxxxxx
TP id : TP TRA 3086 01
summary : 'When translating Ipv6 to Ipv4, the resulting IPv4 Source Address
          (or Destination Address respectively) shall be the low-order 32 bits
          of the IPv6 Source Address (or the IPv6 Destination Address respectively)'
RQ ref : RQ_003_3086, RQ_003_3087
       : SIIT_Translator
Role
config : CF TRA 02
TD ref : TD TRA 3086 01
with {
ensure that {
 when { QE1 sends a packet indicating that a response is requested
             to QE2 }
 then { OE1 indicates receipt of the response }
--xxxxxxxxxxxxxxxxxx--
TP id : TP_TRA_3093_01
summary: 'A SIIT Translator must not translate packets with a non-zero Segments Left Field
          in the Routing header'
RQ ref : RQ 003 3093
       : SIIT Translator
Role
config : CF_TRA_02
TD ref : TD_TRA_3093_01
with {
ensure that {
   when { QE2 sends a packet with 0 route segments
             indicating that a response is requested
             to OE1 }
         { QE2 indicates receipt of the response }
   then
   when
         { QE2 sends a packet with 2 route segments
             indicating that a response is requested
             to QE1 }
   then { QE2 receives no response from QE1 }
}
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 3104 01
summary : 'A SIIT Translator must be able to translate ICMPv6 Echo Requests
          to ICMPv4 Echo Requests, by changing the type and adjusting the
          checksum
RQ ref : RQ_003_3104, RQ_003_3101, RQ_003_3105
Role
       : SIIT_Translator
config : CF_TRA_02
TD ref : TD_TRA_3104_01
with {
ensure that {
 when { QE2 sends an Echo_Request to QE1 }
 then { QE2 indicates receipt of an Echo Reply from QE1 }
--xxxxxxxxxxxxxxxxx--
TP id : TP_TRA_3106_01
summary : 'A SIIT_Translator must be able to translate ICMPv6 Echo Replies
          to ICMPv4 Echo Replies, by changing the type and adjusting the
          checksum'
RQ ref : RQ_003_3106, RQ_003_3101, RQ_003_3107
       : SIIT_Translator
Role
config
       : CF TRA 02
       : TD TRA 3106 01
TD ref
with {
```

```
ensure that {
  when { QE1 sends an Echo_Request to QE2 }
  then { QE1 indicates receipt of an Echo_Reply from QE2 }
--xxxxxxxxxxxxxxxxxx--
TP id : TP TRA 3118 01
summary : 'A SIIT_Translator must translate ICMPv6 Destination Unreachable
           (no route to destination) messages to ICMPv4 Destination Unreachable
           (host unreachable) messages'
RQ ref : RQ_003_3118, RQ_003_3117
        : SIIT Translator
Role
config : CF_TRA_02
TD ref
       : TD_TRA_3118_01
         QE4 configured with no route for IPv4_Translated_packets
with {
ensure that {
  when { QE1 sends a packet indicating that a response is requested
              to QE2 }
  then { QE1 indicates that QE2 is not reachable }
--xxxxxxxxxxxxxxxx--
TP id : TP_TRA_3119_01
summary : 'A SIIT_Translator must translate ICMPv6 Destination Unreachable
           (administratively prohibited) messages to ICMPv4 Destination
          Unreachable (administratively prohibited) messages'
RQ ref : RQ_003_3119, RQ_003_3117
        : SIIT Translator
Role
config : CF_TRA_02
TD ref : TD_TRA_3119_01
         QE4 configured to block packets from QE1
with {
ensure that {
 when { QE1 sends a packet indicating that a response is requested
             to OE2 }
  then { QE1 indicates that communication with QE2
             is administratively prohibited }
--xxxxxxxxxxxxxxxxx--
TP id : TP_TRA_3121_01
summary : 'A SIIT_Translator must translate ICMPv6 Destination Unreachable
           (address unreachable) messages to ICMPv4 Destination Unreachable
           (host unreachable) messages'
RQ ref : RQ 003 3121, RQ 003 3117
       : SIIT_Translator
config : CF_TRA_02
TD ref : TD_TRA_3121_01
with {
        QE2 disconnected
ensure that {
  when { QEi sends a packet indicating that a response is requested
              to QE2 }
  then { QE1 indicates that QE2 is not reachable }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 3122 01
summary : 'A SIIT_Translator must translate ICMPv6 Destination Unreachable
           (port unreachable) messages to ICMPv4 Destination Unreachable
           (port unreachable) messages'
RQ ref : RQ_003_3122, RQ_003_3117
       : SIIT Translator
config : CF_TRA_02
       : TD_TRA_3122_01
TD ref
         QE2 configured not to listen on UDP_port_80
ensure that {
  when { QE1 sends a UDP_packet to QE2 on UDP_port_80 }
  then { QE1 indicates that the port is not reachable }
--xxxxxxxxxxxxxxxxxx--
```

```
TP id : TP TRA 3123 01
summary : 'A SIIT_Translator must translate ICMPv6 Packet Too Big messages
         to ICMPv4 Destination Unreachable (dont fragment (DF) bit sent
          and fragmentation required) messages'
RQ ref : RQ 003 3123
Role : SIIT_Translator config : CF TRA 02
TD ref : TD_TRA_3123_01
with {
ensure that {
  when { QE1 sends a packet length 1400
              indicating that a response is requested
              to QE2 }
  then { QE1 indicates that fragmentation is needed }
--xxxxxxxxxxxxxxxxxx--
TP id : TP_TRA_3125_01
summary : 'A SIIT_Translator must translate ICMPv6 Time Exceeded messages
          to ICMPv4 Time Exceeded messages'
RQ ref : RQ_003_3125
       : SIIT_Translator
Role
config : CF_TRA_02
TD ref : TD_TRA_3125_01
with {
ensure that {
  when { QE1 sends a packet indicating that a response is requested
             and indicating TTL of 4
             to QE2 }
  then { QE1 indicates receipt of the response from QE2 }
  when { QE1 sends a packet indicating that a response is requested
             and indicating TTL of 3
              to QE2 }
  then { QE1 indicates Time_Exceeded }
--xxxxxxxxxxxxxxxxxx--
TP id : TP_TRA_3130_01
summary : 'A SIIT_Translator must translate IPv6 packets with an IPv4-mapped
          destination to IPv4 packets'
RQ ref : RQ 003_3130
Role
       : SIIT_Translator
config : CF_TRA_02
TD ref : TD_TRA_3130_01
with {
ensure that {
 when { QE2 sends a packet indicating that a response is requested
             to QE1 }
  then { QE2 indicates receipt of the response from QE1 }
End Group 2.2
End Group 2
--* RFC2766 - Network Address Translation - Protocol Translation (NAT-PT)
Group 3 'RFC2766 - Network Address Translation - Protocol Translation (NAT-PT)'
Group 3.1 'DNS-ALG Operation'
       : TP TRA 6003 01
summary: 'With Bi-Directional-NAT-PT implemented, the DNS-ALG MUST be capable of translating V6
addresses
           in DNS Queries and responses into their V4-address bindings, and vice versa, as DNS
           traverse between V6 and V4 realms'
RQ ref : RQ_003_6003
```

```
Role
       : NAT-PT_router
config : CF_TRA_03
TD ref : TD_TRA_6003_01
          EUT configured 'as Bi-Directional-NAT-PT with DNS-ALG'
       and QE4 configured with 1 A record for QE2
ensure that {
  when \{ QE1 sends a packet indicating that a response is requested
                to the fully_qualified_domain_name of QE2 }
            EUT translates the needed DNS packets -- i.e. Change the query type from AAAA to A
            before QE1 receives the response from QE2}
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 6003 02
summary: 'With Bi-Directional-NAT-PT implemented, the DNS-ALG MUST be capable of translating V6
addresses
           in DNS Queries and responses into their V4-address bindings, and vice versa, as DNS
packets
          traverse between V6 and V4 realms'
RQ ref : RQ_003_6003, RQ_003_6017, RQ_003_6020, RQ_003_6022, RQ_003_6023
       : NAT-PT_router
config : CF TRA 03
TD ref : TD_TRA_6003 02
          EUT configured 'as Bi-Directional-NAT-PT with DNS-ALG'
with {
        and QE3 configured with 1 AAAA_record for QE1
ensure that {
  when { QE2 sends a packet indicating that a response is requested
                to the fully qualified domain name of QE1 }
            EUT translates the needed DNS packets
            -- i.e. Change the query type from A to AAAA, the response type from AAAA to A,
            -- and V4 to or from V6 addresses
            before QE2 receives the response from QE1}
  }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 6018 01
summary : 'The DNS-ALG on the NAT-PT device SHALL modify DNS Queries for for A records going into
           the V6 domain by replacing the string "IN-ADDR.ARPA" with the string "IP6.ARPA" in
           "Node address to Node name query requests"'
RQ ref : RQ_003_6003, RQ_003_6018, RQ_003_6019
Role
       : NAT-PT_router
config : CF_TRA_03
TD ref : TD_TRA_6018_01
with {
            EUT configured 'as Bi-Directional-NAT-PT with DNS-ALG'
        and QE3 configured with at least 1 AAAA_record for QE1
ensure that {
   when { QE2 sends a PTR_DNS_Query for QE1 to QE3 }
    then { QE2 indicates receipt of all the A records for QE1 from QE3 }
End Group 3.1
Group 3.2 'Traditional NAT-PT Operation'
--xxxxxxxxxxxxxxxxxxxxxx
TP id : TP_TRA_6006_01
summary: 'In basic NAT-PT implementation, if the outgoing packet is not a session initialisation
packet
           and the NAT-PT does not already have stored some state about the related session,
           the packet SHOULD be silently discarded'
RQ ref : RQ_003_6006
Role
       : NAT-PT router
config : CF_TRA_04
TD ref : TD_TRA_6006_01
with {
ensure that {
  when { QE1 sends a packet not indicating a session_initialisation
                and indicating that a response is requested
                to QE2 }
  then {
          EUT silently discards the packet}
```

--xxxxxxxxxxxxxxxxx--

```
TP id : TP_TRA_6007_01
summary: 'In basic NAT-PT implementation, if the outgoing packet is a session initialisation
          the NAT-PT SHALL locally allocate an address from its pool of addresse'
RQ ref : RQ 003 6007, RQ_003_6008
Role : NAT-PT_router
config : CF_TRA_04
TD ref : TD_TRA_6007_01
with {
ensure that {
  when { QE1 sends a IPv6_packet indicating a session_initialisation
               and indicating that a response is requested
                to QE2 }
  then {
           EUT translates the IPv6_packet to an IPv4_packet
            before QE1 receives the response from QE2}
  }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 6011 01
summary : 'In basic NAT-PT implementation, the NAT-PT SHALL determins and then translates the
returning
          packets belonging to the same session'
RQ ref : RQ_003_6011, RQ_003_6012
Role : NAT-PT router
config : CF_TRA_04
TD ref : TD_TRA_6011_01
with {
ensure that {
  when { QE1 sends a packet indicating that a response is requested
                to QE2 }
           EUT translates IPv6 packets to and from IPv4 packets
           before QE1 receives the response from QE2}
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 6014 01
summary: 'With a NAPT-PT between IPv6 and IPv4 realms, on receipt of a return IPv4 packet,
          the NAPT-PT SHALL, on recognition of the TCP port, translated the packet back to V6'
RQ ref : RQ_003 6014
       : NAT-PT_router
Role
config : CF_TRA_04
TD ref : TD TRA 6014 01
with {
ensure that {
  when { QE1 sends a TCP_packet indicating that a response is requested
                to OE2 }
            EUT translates IPv6_packets to and from IPv4_packets
            before QE1 receives the response from QE2}
  }
End Group 3.2
Group 3.3 'Protocol Translation Details'
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 6032 01
summary: 'NAT-PT SHOULD translate all IP/ICMP headers from v4 to v6 in order to make end-to-end
           IPv4 to IPv6 communication possible. With the exception of the Source Address
           and Destination Address, the translation SHALL be as specified in SIIT [RFC 2765 [5].
          This test is for ping packets'
RQ ref : RQ_003_6032, RQ_003_6035, RQ_003_6036, RQ_003_6037
       : NAT-PT router
config : CF_TRA_04
TD ref : TD_TRA_6032_01
with {
ensure that {
           QE2 sends a packet indicating that a response is requested to QE1 }
  when {
  then {
            EUT translates the needed packets
```

```
before QE2 receives the response from QE1}
--xxxxxxxxxxxxxxxxxx--
TP id : TP TRA 6032 02
summary: 'NAT-PT SHOULD translate all IP/ICMP headers from v4 to v6 in order to make end-to-end
           IPv4 to IPv6 communication possible. With the exception of the Source Address
           and Destination Address, the translation SHALL be as specified in SIIT [RFC 2765 [5].
           This test is for ICMP Network Unreachable packets'
RQ ref : RQ_003_6032, RQ_003_6035, RQ_003_6036, RQ_003_6037
       : NAT-PT_router
Role
config : CF_TRA_11
TD ref : TD TRA 6032 02
with { QE4 configured with no route to Network_B
ensure that {
  when {
            QE1 sends a packet indicating that a response is requested to QE2 }
  then {
            EUT translates the needed ICMP packets
            before QE4 indicates that QE2 is not reachable to QE1}
--xxxxxxxxxxxxxxxx--
TP id : TP_TRA_6033 01
summary: 'NAT-PT SHOULD translate all IP/ICMP headers from v6 to v4 in order to make end-to-end
           IPv6 to IPv4 communication possible. With the exception of the Source Address
           and Destination Address, the translation SHALL be as specified in SIIT [RFC 2765 [5].
           This test is for ping packets'
RQ ref : RQ 003 6033, RQ 003 6038, RQ 003 6039, RQ 003 6040
Role : NAT-PT_router config : CF_TRA 04
TD ref : TD_TRA_6033_01
with {
ensure that {
  \quad \hbox{ when } \quad \{
            QE1 sends a packet indicating that a response is requested to QE2 }
           EUT translates the needed packets
            before QE1 receives the response from QE2}
  }
--xxxxxxxxxxxxxxxxxx--
TP id : TP TRA 6041 01
\operatorname{summary}: 'The UDP checksums, when is set to a non-zero value, SHOULD be recalculated
          to reflect the address change from v4 to v6'
RQ ref : RQ_003_6041
Role
        : NAT-PT_router
config : CF_TRA_04
TD ref : TD_TRA_6041_01
with {
ensure that {
            QE2 sends a UDP packet indicating that a response is requested to QE1 }
  when {
  then
           EUT translates the needed packets -- among them, the UDP checksum
            before QE2 receives the response from QE1}
  }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 6042 01
 \textbf{summary} : \ \ ^-\text{TCP checksum SHOULD be recalculated to reflect the address change from v4 to v6'} \\
RQ ref : RQ_003_6042
       : NAT-PT_router
Role
config : CF_TRA_04
TD ref : TD TRA 6042 01
with {
ensure that {
  when {
            QE2 sends a TCP_packet indicating that a response is requested to QE1 }
            EUT translates the needed packets -- among them, the TCP checksum
  then
            before QE2 receives the response from QE1}
  }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 6046 01
summary : 'The UDP checksums, when is set to a non-zero value, SHOULD be recalculated
```

```
to reflect the address change from v6 to v4'
RQ ref : RQ 003 6046
Role
       : NAT-PT_router
config : CF_TRA_04
TD ref : TD_TRA_6046_01
with {
ensure that {
            QE1 sends a UDP_packet indicating that a response is requested to QE2 }
  when {
  then
            {\tt EUT} translates the needed packets -- among them, the UDP checksum
            before QE2 receives the response from QE1}
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 6047 01
 \textbf{summary} : \ \ ^-\text{TCP} \ \ \text{checksum SHOULD be recalculated to reflect the address change from v6 to v4'} 
RQ ref : RQ 003 6047
       : NAT-PT router
config : CF_TRA_04
TD ref : TD_TRA_6047_01
with {
ensure that {
  when {
            QE1 sends a TCP packet indicating that a response is requested to QE2 }
            EUT translates the needed packets -- among them, the TCP checksum
  then
           before QE1 receives the response from QE2}
  }
End Group 3.3
End Group 3
--* RFC3056 - Connection of IPv6 Domains via IPv4 Clouds
Group 4 'RFC3056 - Connection of IPv6 Domains via IPv4 Clouds'
Group 4.1 'Address Selection'
       : TP TRA 0005 01
TP id
\operatorname{summary}: 'A 6to4 host having only one 6to4 address communicating with
           other 6to4 host having one 6to4 and one native addresses
           should use the 6to4 addresses'
RQ ref : RQ_003_0005
Role
       : 6to4_host
config : CF_TRA_05
TD ref : TD_TRA_0005_01
          EUT configured with 1 6to4 address
with {
       and EUT configured with no IPv6_native_address
       and QE1 configured with 1 6to4_address
       and QE1 configured with 1 IPv6 native address
       and QE3 configured with 1 AAAA record for the IPv6 native address of QE1
       and QE3 configured with 1 AAAA_record for the 6to4_address of QE1
ensure that {
  when { EUT sends a packet indicating that a response is requested
               to the fully_qualified_domain_name of QE1
        and EUT receives all the AAAA_records for QE1 }
        { EUT sends the packet to the 6to4_address of QE1
  then
            before EUT receives the response from QE1 }
  }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 0005 02
summary : 'A 6to4 host having one 6to4 and one native addresses communicating with
           other 6to4 host having only one 6to4 address
           should use the 6to4 addresses'
RQ ref : RQ 003 0005
       : 6to4 host
Role
config : CF_TRA_06
TD ref : TD_TRA_0005_02
          EUT configured with 1 6to4 address
       and EUT configured with 1 IPv6 native address
       and QE2 configured with 1 6to4 address
```

```
and QE2 configured with no IPv6_native_address
ensure that {
  when {
           EUT sends a packet indicating that a response is requested
               to the 6to4 address of QE2
           EUT sends the packet from its 6to4 address
  then {
           before EUT receives the response from QE2 }
--xxxxxxxxxxxxxxxxxx--
TP id : TP_TRA_0007_01
summary: 'A 6to4 host having one 6to4 and one native addresses communicating with
          other 6to4 host having one 6to4 and one native addresses
          should use both native or both 6to4 addresses'
RQ ref : RQ_003_0007
Role
        : 6to4 host
config : CF TRA 06
TD ref
       : TD TRA 0007 01
          EUT configured with 1 6to4 address
with {
      and EUT configured with 1 IPv6_native_address
       and QE2 configured with 1 6to4_address
      and QE2 configured with 1 IPv6 native address
ensure that {
  when { EUT sends a packet indicating that a response is requested
               to the 6to4_address of QE2
           EUT sends the packet from its 6to4 address
  then {
           before EUT receives the response from QE2 }
--xxxxxxxxxxxxxxxxx--
      : TP TRA 0007 02
summary: 'A 6to4 host having one 6to4 and one native addresses communication with
          other 6to4 host having one 6to4 and one native addresses
          should use both native or both 6to4 addresses'
RQ ref : RQ 003 0007
       : 6to4 host
config
       : CF TRA 12
TD ref : TD_TRA 0007 02
         EUT configured with 1 6to4_address
with {
      and EUT configured with 1 IPv6_native_address
      and QE2 configured with 1 6to4_address
      and QE2 configured with 1 IPv6_native_address
ensure that {
  when { EUT sends a packet indicating that a response is requested
               to the IPv6_native_address of QE2
  then {
           EUT sends the packet from its IPv6_native_address
           before EUT receives the response from QE2 }
  }
End Group 4.1
--xxxxxxxxxxxxxxxxx--
Group 4.2 'Encapsulation in IPv4'
      : TP TRA 0011 01
{\tt summary} : 'The IPv4 packet body encapsulates the IPv6 header and payload'
RO ref : RO 003 0011
Role
       : 6to4 router
config
       : CF TRA 06
TD ref : TD_TRA_0011_01
          QE1 configured with 1 6to4_address
with {
      and QE2 configured with 1 6to4_address
ensure that {
  when \{ QE1 sends a packet indicating that a response is requested
               to the 6to4_address of QE2
           EUT encapsulates the QE1 packet into an IPv4 packet
  then {
           before QE1 receives the response from QE2}
  }
```

End Group 4.2

```
--xxxxxxxxxxxxxxxxxx--
Group 4.3 'Maximum Transmission Unit'
TP id : TP TRA 0012 01
\operatorname{summary}: 'The \operatorname{IPv4} "do not fragment" bit SHOULD NOT be set in the encapsulating
           IPv4 header'
RQ ref : RQ 003 0012
       : 6to4_router
Role
config : CF_TRA_06
TD ref : TD_TRA_0012_01
with {
          EUT configured not to perform IPv4_PMTU_Discovery
       and QE1 configured with 1 6to4_address
       and QE2 configured with 1 6to4_address
       and the PMTU of Network D is lower than the IPv6 packets MTU
ensure that {
  when { QE1 sends an IPv6_packet indicating that a response is requested
                to the 6to4_address of QE2
  then {
           EUT encapsulates the QE1 IPv6_packet into an IPv4_packet
               containing do_not_fragment_bit indicating false
            before QE1 receives the response from QE2}
  }
End Group 4.3
--xxxxxxxxxxxxxxxxxx--
Group 4.4 'Security Considerations'
--Note on TP_TRA_0049_01 related to RQ_003_0049: How can be generated a
--packet with a source address equal to a non global unicast address?
End Group 4.4
End Group 4
--* RFC3596 - DNS Extensions to Support IP Version 6
__****************
Group 5 'RFC3596 - DNS Extensions to Support IP Version 6'
TP id : TP_TRA_5005_01
summary : 'A DNSv6 server must return all AAAA records concerning
          a domain name when it receives a AAAA query'
RQ ref : RQ 003 5005
Role : DNSv6 server
config : CF TRA 07
TD ref : TD TRA 5005 01
with { EUT configured with at least 2 AAAA records for QE2
ensure that {
 when { QE1 sends a AAAA_DNS_Query for QE2 to EUT } then { QE1 indicates receipt of all the AAAA_records for QE2 from EUT }
End Group 5
__***************
--* RFC4213 - Basic Transition Mechanisms for IPv6 Hosts and Routers
Group 6 'RFC4213 - Basic Transition Mechanisms for IPv6 Hosts and Routers'
TP id : TP TRA 4004 01
{\tt summary} : 'An \overline{{\tt IPv6}/{\tt IPv4}} node must be able to deal with both A records
           and AAAA records'
RQ ref : RQ 003 4004
Role : IPv6/IPv4 Node
config : CF_TRA_08
TD ref : TD_TRA_4004_01
```

```
QE1 configured with at least 1 AAAA_record for QE2
       and QE1 configured with at least 1 A record for QE2
      and EUT configured to use QE1 as DNS_Server
ensure that {
             EUT is requested to send an IPv6 packet
  when {
                 indicating that a response is requested
                 to OE2
         and EUT is requested to send an IPv4_packet
                 indicating that a response is requested
                 to QE2 }
             EUT indicates receipt of IPv6_response from QE2
  then {
          and EUT indicates receipt of IPv4_response from QE2 }
}
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 4047 01
summary : 'An IPv6/IPv4_Node must be able to decapsulate IPv6 in IPv4 packets'
RQ ref : RQ_003_4047
       : IPv6/IPv4 Node
Role
config : CF_TRA_09
TD ref : TD_TRA_4047_01
\mathtt{with}\ \{
        EUT configured to establish a static tunnel to network A via QE1
      and QE1 configured to establish a static tunnel to network B via EUT
ensure that {
 when { QE2 sends a packet indicating that a response is requested
             to QE3 }
  then { QE2 indicates receipt of the response from QE3 }
--xxxxxxxxxxxxxxxxx--
TP id : TP_TRA_4048_01
summary : 'An IPv6/IPv4_Node acting as a decapsulator must check that the
          source of a received encapsulated packet is the address of
          the encapsulator'
RQ ref : RQ_003_4048
Role
       : IPv6/IPv4 Node
and QE1 configured to establish a static_tunnel to network_B via EUT
ensure that {
 when \{ QE2 sends a packet indicating that a response is requested
             to OE3 }
  then { QE2 receives no response from QE3 }
--xxxxxxxxxxxxxxxxx--
TP id : TP_TRA_4055_01
\operatorname{summary} : 'An IPv6/IPv4_Node acting as a decapsulator must be able to
          reassemble an IPv4 packet of size 1500'
RQ ref : RQ_003_4055, RQ_003_4057
Role : IPv6/IPv4_Node
config : CF_TRA_09
TD ref : TD_TRA_4055_01
         EUT configured to establish a static_tunnel to network_A via QE1
with { }
      and QE1 configured to establish a static_tunnel to network_B via EUT
ensure that {
 when \{ QE2 sends a packet of length 1500
             indicating that a response is requested
  then { QE2 indicates receipt of the response from QE3 }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 4064 01
\operatorname{summary} : 'An IPv6/IPv4_Node acting as a decapsulator must be decrement
          the hop limit of forwarded packets by one'
RQ ref : RQ 003 4064
Role : IPv6/IPv4 Node
config : CF TRA 09
```

```
TD ref : TD_TRA_4064_01
        EUT configured to establish a static tunnel to network A via QE1
with {
       and QE1 configured to establish a static_tunnel to network_B via EUT
ensure that {
  when { QE2 sends a packet indicating that a response is requested
              and indicating TTL of 3
              to OE3 }
  then { QE2 indicates receipt of the response from QE3 }
  when { QE2 sends a packet indicating that a response is requested
             and indicating TTL of 2
              to OE3 }
  then { QE2 receives no response from QE3 }
--xxxxxxxxxxxxxxxxx--
TP id : TP TRA 4071 01
summary: 'An IPv6/IPv4 Node builds a link-local address for its tunnel
          interface using the interface IPv4 address'
 {\bf RQ \ ref} \quad : \ {\bf RQ\_003\_4071}, \ {\bf RQ\_003\_4073}, \ {\bf RQ\_003\_4074} 
       : IPv6/IPv4_Node
Role
config : CF_TRA_09
TD ref : TD TRA 4071 01
with {
ensure that {
 when { QE1 sends a packet indicating that a response is requested
              to the link local address of EUT }
  then { QE1 indicates receipt of the response from EUT}
End Group 6
--* RFC4214 - Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)
Group 7 'RFC4214 - Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)'
TP id : TP TRA 2009 01
summary : 'An ISATAP Node builds a link-local address for its ISATAP
           interface using IPv4 address from its locator set'
RQ ref : RQ_003_2009
Role : ISATAP Node
config : CF_TRA_10
TD ref : TD_TRA_2009_01
with {
ensure that {
 when { QE1 sends a packet indicating that a response is requested
              to the ISATAP_link_local_address of EUT }
  then { QE1 indicates receipt of the response from EUT }
}
--xxxxxxxxxxxxxxxx--
TP id : TP TRA 2018 01
summary : 'An advertising ISATAP_router only send unicast router
          advertisements'
RQ ref : RQ_003_2018
Role : ISATAP Node
config : CF_TRA_10
TD ref : TD_TRA_2018_01
with {
ensure that {
  when { QE1 sends a Router_Solicitation to EUT }
  then
           QE1 indicates receipt of a Router_Advertisement from EUT
          and QE2 indicates no receipt of a Router_Advertisement from EUT }
}
End Group 7
```

History

Document history			
V1.1.1	February 2008	Publication	