IPv6 Ready Logo Phase-2

Interoperability Test Scenario
IKEv2

Technical Document

Revision 1.0.0

IPv6 Forum *http://www.ipv6forum.org/*
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MODIFICATION RECORD

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INTRODUCTION

Overview

The IPv6 forum plays a major role to bring together industrial actors, to develop and deploy the new generation of IP protocols. Contrary to IPv4, which started with a small closed group of implementers, the universality of IPv6 leads to a huge number of implementations. Interoperability has always been considered as a critical feature in the Internet community.

Due to the large number of IPv6 implementations, it is important to provide the market a strong signal proving the level of interoperability across various products.

To avoid confusion in the mind of customers, a globally unique logo programme should be defined. The IPv6 logo will give confidence to users that IPv6 is currently operational. It will also be a clear indication that the technology will still be used in the future. To summarize, this logo programme will contribute to the feeling that IPv6 is available and ready to be used.

The IPv6 Logo Program consists of three phases:

Phase I
In a first stage, the Logo will indicate that the product includes IPv6 mandatory core protocols and can interoperate with other IPv6 implementations.

Phase II
The "IPv6 ready" step implies a proper care, technical consensus and clear technical references. The IPv6 ready logo will indicate that a product has successfully satisfied strong requirements stated by the IPv6 Ready Logo Committee (v6RLC).

To avoid confusion, the logo "IPv6 Ready" will be generic. The v6LC will define the test profiles with associated requirements for specific functionalities.

Phase III
Same as Phase 2 with IPsec mandated.

Abbreviations and Acronyms

IKE:	Internet Key Exchange (IKEv2) Protocol
EN:	End-Node
SGW:	Security-Gateway
PSK:	Pre-Shared Key
ESN:	Extended Sequence Numbers
PFS:	Perfect Forward Secrecy
TAR-EN:	Target End-Node
TAR-SGW:	Target Security-Gateway
REF-Host:	Reference Host
REF-Router:	Reference Router

TEST ORGANIZATION

This document organizes tests by Section based on related test methodology or goals. Each group begins with a brief set of comments pertaining to all tests within that group. This is followed by a series of description blocks; each block describes a single test. The format of the description block is as follows:

Test Label:	The test label and title comprise the first line of the test block. The test label is composed by concatenating the short test suite name, the section number, the group number, and the test number within the group. These elements are separated by periods. The Test Number is the section, group and test number, also separated by periods.
Purpose:	The Purpose is a short statement describing what the test attempts to achieve. It is usually phrased as a simple assertion of the feature or capability to be tested.
References:	The References section lists cross-references to the scenarios and documentation that might be helpful in understanding and evaluating the test and results.
Resource Requirements:	The Resource Requirements section specifies the software, hardware, and test equipment that will be needed to perform the test.
Test Setup:	The Test Setup section describes the configuration of all devices prior to the start of the test. Different parts of the procedure may involve configuration steps that deviate from what is given in the test setup. If a value is not provided for a protocol parameter, then the protocol's default is used for that parameter.
Procedure:	This section of the test description contains the step-by-step instructions for carrying out the test. These steps include such things as enabling interfaces, unplugging devices from the network, or sending packets from a test station. The test procedure also cues the tester to make observations, which are interpreted in accordance with the observable results given for that test part.
Observable Results:	This section lists observable results that can be examined by the tester to verify that the target device is operating properly. When multiple observable results are possible, this section provides a short discussion on how to interpret them. The determination of a pass or fail for each test is usually based on how the behavior of target device compares to the results described in this section.
Possible Problems:	This section contains a description of known issues with the test procedure, which may affect test results in certain situations.

REFERENCES

The following documents are referenced in this text:

[IKEV2] Kaufman, C., "Internet Key Exchange (IKEv2) Protocol", RFC 4306, December 2005.

[RFC4307] Schiller, J., "Cryptographic Algorithms for Use in the Internet Key Exchange Version 2 (IKEv2)", RFC 4307, December 2005.

[Clarif] Eronen, P. and P. Hoffman, "IKEv2 Clarifications and Implementation Guidelines", RFC 4718, October 2006.

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Requirements

To obtain the IPv6 Ready Logo Phase-2 for IKEv2, the target device must satisfy all of the following requirements.

Equipment Type

There are two possibilities for equipment types:

End-Node:
A node who can use IKEv2 (IPsec transport mode and tunnel mode) only for itself. Host and Router can be an End-Node

SGW (Security Gateway):
A node who can provide IKEv2 (IPsec tunnel mode) for nodes behind it. Router can be a SGW

Function List

Basic/Advanced Functionality table

This interoperability test scenario consists following BASIC/ADVANCED functions.
The tests for ADVANCED functions may be omitted if the target device does not support the ADVANCED function.
All target devices are required to support BASIC. ADVANCED is required for all target devices which support ADVANCED function.

Parameter		BASIC	ADVANCED
Exchange Type		Initial Exchanges (IKE_INIT, IKE_AUTH)	-
		CREATE_CHILD_SA	-
		INFORMATIONAL	-
IKE_SA	**Encryption Algorithm**	ENCR_3DES	ENCR_AES_CBC ENCR_AES_CTR
	Pseudo-random Function	PRF_HMAC_SHA1	PRF_AES128_XCBC
	Integrity Algorithm	AUTH_HMAC_SHA1_96	AUTH_AES_XCBC_96
	Diffie-Hellman Group	2 (1024 MODP Group)	14 (2048 MODP Group)
CHILD_SA	**Encryption Algorithm**	ENCR_3DES	ENCR_AES_CBC ENCR_AES_CTR ENCR_NULL
	Integrity Algorithm	AUTH_HMAC_SHA1_96	AUTH_AES_XCBC_96 NONE
	ESN	Disable	Enable
Authentication Method		PSK	RSA Digital Signature
Security Protocol		ESP	-
Encapsulation mode	**End-Node**	Transport	Tunnel
	SGW	Tunnel	-
Multiple Proposals		Receiving	Sending and Receiving
Multiple Transforms		Receiving	Sending and Receiving
Liveness Check		Support	-
Cookies		-	Support
Rekeying		Support	-
Traffic Selector Negotiation		Support	-
Requesting an Internal Address on a Remote Network		-	Support

PFS	-	Support
Closing SAs	Support	

Tests performed on End-Node/SGW

The tests under the End-Node/SGW column marked by a "(BASIC)" must be performed as specified below. If the End-Node/SGW supports the particular ADVANCED function, the corresponding tests under the End-Node/SGW column marked by a "(ADVANCED)" must be performed. If there is no "(BASIC)" or "(ADVANCED)" listed under the End-Node/SGW column, this test may be omitted.

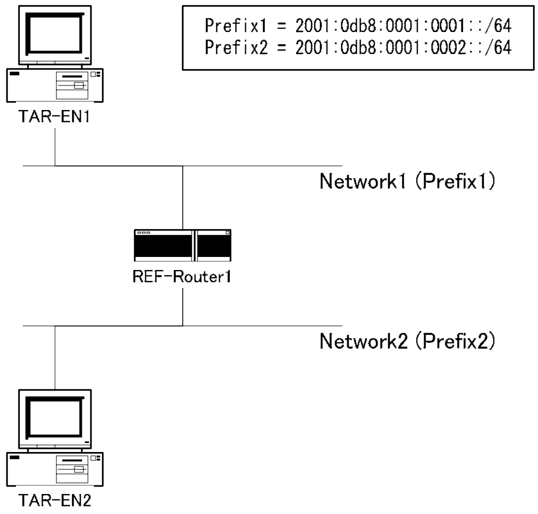
	Part	End-Nodes	SGWs	Required ADVANCED function
IKEv2Interop.1.1	A	(BASIC)	-	
	B	(BASIC)	-	
	C	-	(BASIC)	
	D	-	(BASIC)	
	E	(ADVANCED)	-	End-Node Tunnel Mode
	F	(ADVANCED)	-	End-Node Tunnel Mode
IKEv2Interop.1.2	A	(BASIC)	-	
	B	(BASIC)	-	
	C	-	(BASIC)	
	D	-	(BASIC)	
IKEv2Interop.1.3	A	(BASIC)	-	
	B	(BASIC)	-	
	C	-	(BASIC)	
	D	-	(BASIC)	
IKEv2Interop.1.4	A	(ADVANCED)	-	ENCR_AES_CBC for IKE_SA Encryption Algorithm
	B	(ADVANCED)	-	ENCR_AES_CTR for IKE_SA Encryption Algorithm
	C	(ADVANCED)	-	PRF_AES128_CBC for IKE_SA PRF
	D	(ADVANCED)	-	AUTH_AES_XCBC_96 for IKE_SA Integrity Algorithm
	E	(ADVANCED)	-	14 (2048 MODP Group) for IKE_SA DH Group
	F	(ADVANCED)	-	ENCR_AES_CBC for IKE_SA encryption algorithm
	G	(ADVANCED)	-	ENCR_AES_CTR for IKE_SA encryption algorithm
	H	(ADVANCED)	-	PRF_AES128_CBC for IKE_SA PRF
	I	(ADVANCED)	-	AUTH_AES_XCBC_96 for IKE_SA Integrity Algorithm
	J	(ADVANCED)	-	14 (2048 MODP Group) for IKE_SA DH Group
	K	-	(ADVANCED)	ENCR_AES_CBC for IKE_SA Encryption Algorithm
	L	-	(ADVANCED)	ENCR_AES_CTR for IKE_SA Encryption Algorithm
	M	-	(ADVANCED)	PRF_AES128_CBC for IKE_SA PRF
	N	-	(ADVANCED)	AUTH_AES_XCBC_96 for IKE_SA Integrity Algorithm
	O	-	(ADVANCED)	14 (2048 MODP Group) for IKE_SA DH Group
	P	-	(ADVANCED)	ENCR_AES_CBC for IKE_SA encryption algorithm
	Q	-	(ADVANCED)	ENCR_AES_CTR for IKE_SA encryption algorithm
	R	-	(ADVANCED)	PRF_AES128_CBC for IKE_SA PRF
	S	-	(ADVANCED)	AUTH_AES_XCBC_96 for IKE_SA Integrity Algorithm
	T	-	(ADVANCED)	14 (2048 MODP Group) for IKE_SA DH Group
IKEv2Interop.1.5	A	(ADVANCED)	-	ENCR_AES_CBC for CHILD_SA Encryption Algorithm
	B	(ADVANCED)	-	ENCR_AES_CTR for CHILD_SA Encryption Algorithm
	C	(ADVANCED)	-	ENCR_NULL for CHILD_SA Encryption Algorithm
	D	(ADVANCED)	-	AUTH_AES_XCBC_96 for IKE_SA encryption algorithm
	E	(ADVANCED)	-	NONE for IKE_SA encryption algorithm
	F	(ADVANCED)	-	Enabling ESN
	G	(ADVANCED)	-	ENCR_AES_CBC for CHILD_SA Encryption Algorithm
	H	(ADVANCED)	-	ENCR_AES_CTR for CHILD_SA Encryption Algorithm
	I	(ADVANCED)	-	ENCR_NULL for CHILD_SA Encryption Algorithm
	J	(ADVANCED)	-	AUTH_AES_XCBC_96 for IKE_SA encryption algorithm
	K	(ADVANCED)	-	NONE for IKE_SA encryption algorithm
	L	(ADVANCED)	-	Enabling ESN
	M	-	(ADVANCED)	ENCR_AES_CBC for CHILD_SA Encryption Algorithm
	N	-	(ADVANCED)	ENCR_AES_CTR for CHILD_SA Encryption Algorithm
	O	-	(ADVANCED)	ENCR_NULL for CHILD_SA Encryption Algorithm

	P	-	(ADVANCED)	AUTH_AES_XCBC_96 for IKE_SA encryption algorithm
	Q	-	(ADVANCED)	NONE for IKE_SA encryption algorithm
	R	-	(ADVANCED)	Enabling ESN
	S	-	(ADVANCED)	ENCR_AES_CBC for CHILD_SA Encryption Algorithm
	T	-	(ADVANCED)	ENCR_AES_CTR for CHILD_SA Encryption Algorithm
	U	-	(ADVANCED)	ENCR_NULL for CHILD_SA Encryption Algorithm
	V	-	(ADVANCED)	AUTH_AES_XCBC_96 for IKE_SA encryption algorithm
	W	-	(ADVANCED)	NONE for IKE_SA encryption algorithm
	X	-	(ADVANCED)	Enabling ESN
IKEv2Interop.1.6	A	(ADVANCED)	-	Enabling PFS
	B	(ADVANCED)	-	Enabling PFS
	C	-	(ADVANCED)	Enabling PFS
	D	-	(ADVANCED)	Enabling PFS
IKEv2Interop.1.7	A	(BASIC)	-	
	B	(BASIC)	-	
	C	(BASIC)	-	
	D	(BASIC)	-	
	E	(BASIC)	-	
	F	(BASIC)	-	
	G	(BASIC)	-	
	H	(BASIC)	-	
	I	-	(BASIC)	
	J	-	(BASIC)	
	K	-	(BASIC)	
	L	-	(BASIC)	
	M	-	(BASIC)	
	N	-	(BASIC)	
	O	-	(BASIC)	
	P	-	(BASIC)	
IKEv2Interop.1.8	A	(ADVANCED)	-	Sending Multiple Proposals for IKE_SA
	B	(BASIC)	-	
	C	-	(ADVANCED)	Sending Multiple Proposals for IKE_SA
	D	-	(BASIC)	
IKEv2Interop.1.9	A	(ADVANCED)	-	Sending Multiple Transforms for IKE_SA
	B	(ADVANCED)	-	Sending Multiple Transforms for IKE_SA
	C	(ADVANCED)	-	Sending Multiple Transforms for IKE_SA
	D	(ADVANCED)	-	Sending Multiple Transforms for IKE_SA
	E	(BASIC)	-	
	F	(BASIC)	-	
	G	(BASIC)	-	
	H	(BASIC)	-	
	I	-	(ADVANCED)	Sending Multiple Transforms for IKE_SA
	J	-	(ADVANCED)	Sending Multiple Transforms for IKE_SA
	K	-	(ADVANCED)	Sending Multiple Transforms for IKE_SA
	L	-	(ADVANCED)	Sending Multiple Transforms for IKE_SA
	M	-	(BASIC)	
	N	-	(BASIC)	
	O	-	(BASIC)	
	P	-	(BASIC)	
IKEv2Interop.1.10	A	(ADVANCED)	-	Sending Multiple Proposals for CHILD_SA
	B	(BASIC)	-	
	C	-	(ADVANCED)	Sending Multiple Proposals for CHILD_SA
	D	-	(BASIC)	
IKEv2Interop.1.11	A	(ADVANCED)	-	Sending Multiple Transforms for CHILD_SA
	B	(ADVANCED)	-	Sending Multiple Transforms for CHILD_SA
	C	(ADVANCED)	-	Sending Multiple Transforms for CHILD_SA
	D	(BASIC)	-	
	E	(BASIC)	-	
	F	(BASIC)	-	

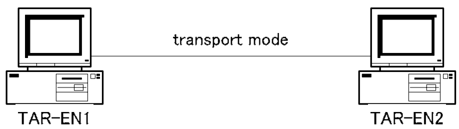
	G	-	(ADVANCED)	Sending Multiple Transforms for CHILD_SA
	H	-	(ADVANCED)	Sending Multiple Transforms for CHILD_SA
	I	-	(ADVANCED)	Sending Multiple Transforms for CHILD_SA
	J	-	(BASIC)	
	K	-	(BASIC)	
	L	-	(BASIC)	
IKEv2Interop.1.12		(ADVANCED)	(ADVANCED)	Requesting/Replying an Internal Address on a Remote Network
IKEv2Interop.1.13	A	(ADVANCED)	-	RSA Digital Signature
	B	(ADVANCED)	-	RSA Digital Signature
	C	-	(ADVANCED)	RSA Digital Signature
	D	-	(ADVANCED)	RSA Digital Signature

Common Topology

Common Topology 1: End-Node to End-Node Transport Mode



The transport mode is used in this topology.

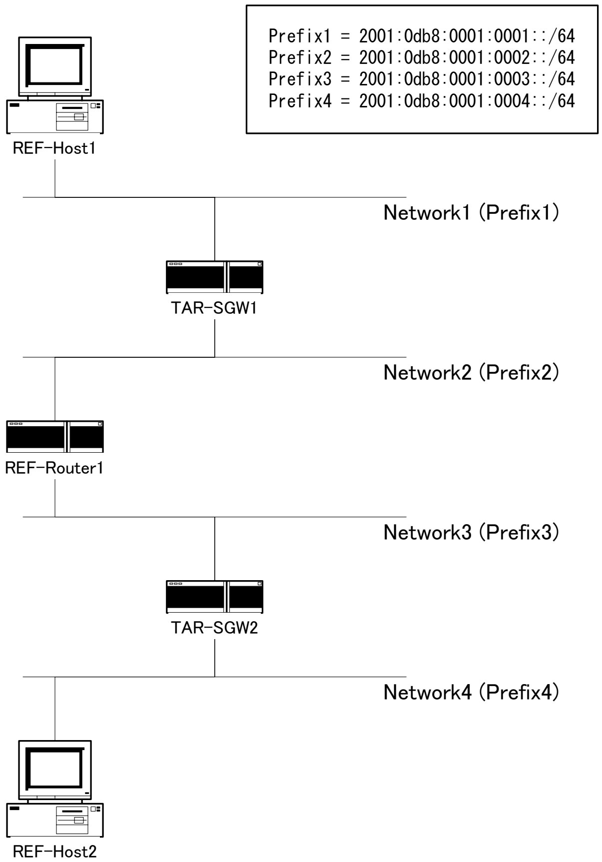


The common topology involves End-Node and Router devices on each link.

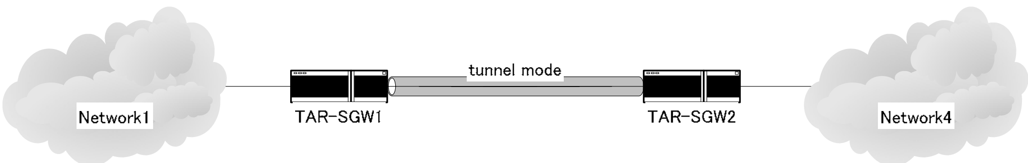
TAR-EN1	Applicant Implementation	*1
TAR-EN2	Vendor A/B End-Node	*1
REF-Router1	Any Router	

*1) Must have an ability to use a ping6 application and print out results indicating the receipt of an ICMPv6 Echo Reply

Common Topology 2: SGW to SGW Tunnel Mode



The tunnel mode is used in this topology.

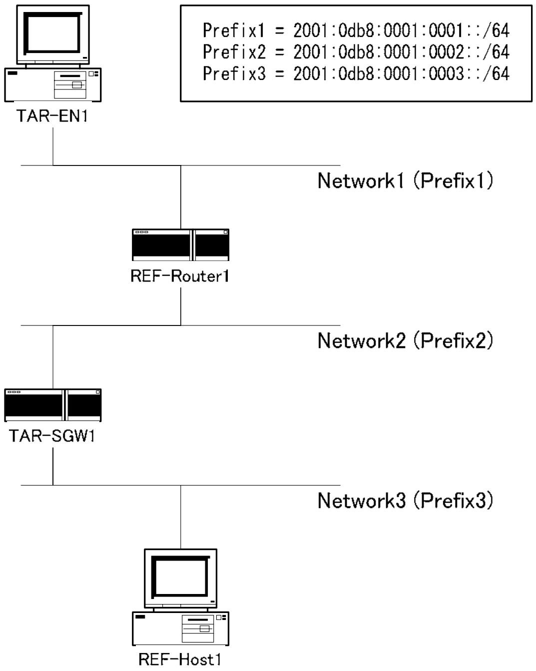


The common topology involves SGW, Router and Host devices on each link.

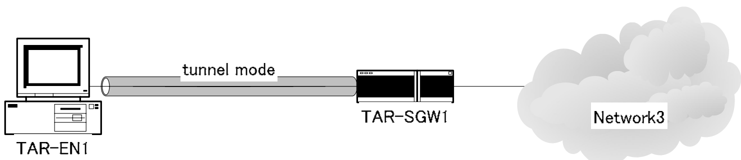
TAR-SGW1	Applicant Implementation	
TAR-SGW2	Vendor C/D SGW	
REF-Router1	Any Router	
REF-Host1	Any Host	*1
REF-Host2	Any Host	*1

*1) Must have an ability to use a ping6 application and print out results indicating the receipt of an ICMPv6 Echo Reply

Common Topology 3: End-Node to SGW/SGW to End-Node Tunnel Mode



The tunnel mode is used in this topology.



The common topology involves End-Node, SGW, Router and Host devices on each link.

TAR-EN1	Applicant Implementation (if End-Node) or Vendor A/B End-Node	*1
TAR-SGW1	Applicant Implementation (if SGW) or Vendor C/D SGW	
REF-Router1	Any Router	
REF-Host1	Any Host	*1

*1) Must have an ability to use a ping6 application and print out results indicating the receipt of an ICMPv6 Echo Reply

Common Configuration

Common Configuration 1: End-Node to End-Node Transport Mode

Common Configuration 1.1: TAR-EN1

IKE Peer

	Address	Port	Authentication		ID		PFS
			Method	Key Value	Type	Data	
Local	TAR-EN1	500	PSK	IKETEST123!	ID_IPV6_ADDR	TAR-EN1	Disable
Remote	TAR-EN2	500	PSK	IKETEST456!	ID_IPV6_ADDR	TAR-EN2	

IKE_SA

Algorithms				Lifetime
Encryption	PRF	Integrity	Diffie-Hellman	
ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)	600 seconds

When TAR -EN1 is the initiator, above proposal must be included.
Otherwise, TAR-EN1 must select above proposal.

CHILD_SA

	Security Protocol	Mode	Algorithms			Lifetime
			Encryption	Integrity	ESN	
Inbound	ESP	Transport	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable	450 seconds
Outbound						

When TAR-EN1 is the initiator, above proposal must be included.
Otherwise, TAR-EN1 must select above proposal.

	Traffic Selector					
	Source			Destination		
	Address Range	Next Layer Protocol	Port Range	Address Range	Next Layer Protocol	Port Range
Inbound	TAR-EN2	ANY	ANY	TAR-EN1	ANY	ANY
Outbound	TAR-EN1	ANY	ANY	TAR-EN2	ANY	ANY

When TAR-EN1 is the initiator, TAR-EN1 must propose Traffic Selector covering above address range. Otherwie, TAR-EN1 must narrow Traffic Selector to above address range.

Common Configuration 1.2: TAR-EN2

IKE Peer

	Address	Port	Authentication		ID		PFS
			Method	Key Value	Type	Data	
Local	TAR-EN2	500	PSK	IKETEST456!	ID_IPV6_ADDR	TAR-EN2	Disable
Remote	TAR-EN1	500	PSK	IKETEST123!	ID_IPV6_ADDR	TAR-EN1	

IKE_SA

Algorithms				Lifetime
Encryption	PRF	Integrity	Diffie-Hellman	
ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)	600 seconds

When TAR-EN2 is the initiator, above proposal must be included.
Otherwise, TAR-EN2 must select above proposal.

CHILD_SA

	Security Protocol	Mode	Algorithms			Lifetime
			Encryption	Integrity	ESN	
Inbound	ESP	Transport	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable	450 seconds
Outbound						

When TAR-EN2 is the initiator, above proposal must be included.
Otherwise, TAR-EN2 must select above proposal.

	Traffic Selector					
	Source			Destination		
	Address Range	Next Layer Protocol	Port Range	Address Range	Next Layer Protocol	Port Range
Inbound	TAR-EN1	ANY	ANY	TAR-EN2	ANY	ANY
Outbound	TAR-EN2	ANY	ANY	TAR-EN1	ANY	ANY

When TAR-EN2 is the initiator, TAR-EN2 must propose Traffic Selector covering above address range. Otherwie, TAR-EN2 must narrow Traffic Selector to above address range.

Common Configuration 2: SGW to SGW Tunnel Mode

Common Configuration 2.1: TAR-SGW1

IKE Peer

	Address	Port	Authentication		ID		PFS
			Method	Key Value	Type	Data	
Local	TAR-SGW1	500	PSK	IKETEST123!	ID_IPV6_ADDR	TAR-SGW1	Disable
Remote	TAR-SGW2	500	PSK	IKETEST456!	ID_IPV6_ADDR	TAR-SGW2	

IKE_SA

Algorithms				Lifetime
Encryption	PRF	Integrity	Diffie-Hellman	
ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)	600 seconds

When TAR-SGW1 is the initiator, above proposal must be included.
Otherwise, TAR-SGW1 must select above proposal.

CHILD_SA

	Security Protocol	Mode	Algorithms			Lifetime
			Encryption	Integrity	ESN	
Inbound	ESP	Tunnel	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable	450 seconds
Outbound						

When TAR-SGW1 is the initiator, above proposal must be included.
Otherwise, TAR-SGW1 must select above proposal.

	Traffic Selector					
	Source			Destination		
	Address Range	Next Layer Protocol	Port Range	Address Range	Next Layer Protocol	Port Range
Inbound	Network4	ANY	ANY	Network1	ANY	ANY
Outbound	Network1	ANY	ANY	Network4	ANY	ANY

When TAR-SGW1 is the initiator, TAR-SGW1 must propose Traffic Selector covering above address range. Otherwie, TAR-SGW1 must narrow Traffic Selector to above address range.

Common Configuration 2.2: TAR-SGW2

IKE Peer

	Address	Port	Authentication		ID		PFS
			Method	Key Value	Type	Data	
Local	TAR-SGW2	500	PSK	IKETEST456!	ID_IPV6_ADDR	TAR-SGW2	Disable
Remote	TAR-SGW1	500	PSK	IKETEST123!	ID_IPV6_ADDR	TAR-SGW1	

IKE_SA

Algorithms				Lifetime
Encryption	**PRF**	**Integrity**	**Diffie-Hellman**	
ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)	600 seconds

When TAR-SGW2 is the initiator, above proposal must be included. Otherwise, TAR-SGW2 must select above proposal.

CHILD_SA

	Security Protocol	Mode	Algorithms			Lifetime
			Encryption	**Integrity**	**ESN**	
Inbound / **Outbound**	ESP	Tunnel	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable	450 seconds

When TAR-SGW2 is the initiator, above proposal must be included. Otherwise, TAR-SGW2 must select above proposal.

	Traffic Selector					
	Source			**Destination**		
	Address Range	**Next Layer Protocol**	**Port Range**	**Address Range**	**Next Layer Protocol**	**Port Range**
Inbound	Network1	ANY	ANY	Network4	ANY	ANY
Outbound	Network4	ANY	ANY	Network1	ANY	ANY

When TAR-SGW2 is the initiator, TAR-SGW2 must propose Traffic Selector covering above address range. Otherwie, TAR-SGW2 must narrow Traffic Selector to above address range.

Common Configuration 3: End-Node to SGW/SGW to End-Node Tunnel Mode

Common Configuration 3.1: TAR-EN1

IKE Peer

	Address	Port	Authentication		ID		PFS
			Method	Key Value	Type	Data	
Local	TAR-EN1	500	PSK	IKETEST123!	ID_IPV6_ADDR	TAR-EN1	Disable
Remote	TAR-SGW1	500	PSK	IKETEST456!	ID_IPV6_ADDR	TAR-SGW1	

IKE_SA

Algorithms				Lifetime
Encryption	PRF	Integrity	Diffie-Hellman	
ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)	600 seconds

When TAR-EN1 is the initiator, above proposal must be included.
Otherwise, TAR-EN1 must select above proposal.

CHILD_SA

	Security Protocol	Mode	Algorithms			Lifetime
			Encryption	Integrity	ESN	
Inbound	ESP	Tunnel	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable	450 seconds
Outbound						

When TAR-EN1 is the initiator, above proposal must be included.
Otherwise, TAR-EN1 must select above proposal.

	Traffic Selector					
	Source			Destination		
	Address Range	Next Layer Protocol	Port Range	Address Range	Next Layer Protocol	Port Range
Inbound	Network3	ANY	ANY	TAR-EN1	ANY	ANY
Outbound	TAR-EN1	ANY	ANY	Network3	ANY	ANY

When TAR-EN1 is the initiator, TAR-EN1 must propose Traffic Selector covering above address range. Otherwie, TAR-EN1 must narrow Traffic Selector to above address range.

Common Configuration 3.2: TAR-SGW1

IKE Peer

	Address	Port	Authentication		ID		PFS
			Method	Key Value	Type	Data	
Local	TAR-SGW1	500	PSK	IKETEST456!	ID_IPV6_ADDR	TAR-SGW1	Disable
Remote	TAR-EN1	500	PSK	IKETEST123!	ID_IPV6_ADDR	TAR-EN1	

IKE_SA

Algorithms				Lifetime
Encryption	**PRF**	**Integrity**	**Diffie-Hellman**	
ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)	600 seconds

When TAR-SGW1 is the initiator, above proposal must be included.
Otherwise, TAR-SGW1 must select above proposal.

CHILD_SA

	Security Protocol	Mode	Algorithms			Lifetime
			Encryption	**Integrity**	**ESN**	
Inbound	ESP	Tunnel	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable	450 seconds
Outbound						

When TAR-SGW1 is the initiator, above proposal must be included.
Otherwise, TAR-SGW1 must select above proposal.

	Traffic Selector					
	Source			**Destination**		
	Address Range	**Next Layer Protocol**	**Port Range**	**Address Range**	**Next Layer Protocol**	**Port Range**
Inbound	TAR-EN1	ANY	ANY	Network3	ANY	ANY
Outbound	Network3	ANY	ANY	TAR-EN1	ANY	ANY

When TAR-SGW1 is the initiator, TAR-SGW1 must propose Traffic Selector covering above address range. Otherwie, TAR-SGW1 must narrow Traffic Selector to above address range.

IKEv2Interop.1.1: The Initial Exchanges

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions.

References:

- [IKEv2] – Section 1.2

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - B*
    Common Topology 1
  - *Part C - D*
    Common Topology 2
  - *Part E - F*
    Common Topology 3

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A - B*
    Common Configuration 1
  - *Part C - D*
    Common Configuration 2
  - *Part E - F*
    Common Configuration 3

Procedure:

Part A: End-Node to End-Node #1 (BASIC)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part B: End-Node to End-Node #2 (BASIC)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part C: SGW to SGW #1 (BASIC)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part D: SGW to SGW #2 (BASIC)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part E: End-Node to SGW (ADVANCED)

13. Initialize TAR-EN1 and TAR-SGW1 making sure they have cleared their Security Associations.
14. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of REF-Host1.
15. Observe the packets transmitted on Network1, Network2 and Network3.

Part F: SGW to End-Node (ADVANCED)

16. Initialize TAR-EN1 and TAR-SGW1 making sure they have cleared their Security Associations.
17. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of TAR-EN1.
18. Observe the packets transmitted on Network1, Network2 and Network3.

Observable Results:

Part A

Step 3:
TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part B

Step 6:
TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part C

Step 9:
TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part D

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Part E

Step 15:

TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network1 and Network2, and they are decrypted on Network3. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Part F

Step 18:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network1 and Network2, and they are decrypted on Network3. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Possible Problems:

- None.

IKEv2Interop.1.2: Rekeying CHILD_SA

Purpose:

To verify that a successful Rekeying can be achieved in two directions for CHILD_SAs.

References:

- [IKEv2] – Section 2.8

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - B*
    Common Topology 1
  - *Part C - D*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A*
    - TAR-EN1
      Common Configuration 1.1 with CHILD_SA lifetime of 30 seconds
    - TAR-EN2
      Common Configuration 1.2
  - *Part B*
    - TAR-EN1
      Common Configuration 1.1
    - TAR-EN2
      Common Configuration 1.2 with CHILD_SA lifetime of 30 seconds
  - *Part C*
    - TAR-SGW1
      Common Configuration 2.1 with CHILD_SA lifetime of 30 seconds
    - TAR-SGW2
      Common Configuration 2.2
  - *Part D*
    - TAR-SGW1
      Common Configuration 2.1
    - TAR-SGW2
      Common Configuration 2.2 with CHILD_SA lifetime of 30 seconds

Procedure:

Part A: End-Node to End-Node #1 (BASIC)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.

2. Initiate IKEv2 exchange and transmit continuous ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2 for 60 seconds.
3. Observe the packets transmitted on Network1 and Network2.

Part B: End-Node to End-Node #2 (BASIC)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit continuous ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1 for 60 seconds.
6. Observe the packets transmitted on Network1 and Network2.

Part C: SGW to SGW #1 (BASIC)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit continuous ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2 for 60 seconds.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part D: SGW to SGW #2 (BASIC)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit continuous ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1 for 60 seconds.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A

Step 3:

TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Before 30 seconds pass, TAR-EN1 initiates the rekeying for CHILD_SA and SAs are updated. Then each SPI in ESP is updated. The ping6 application result on TAR-EN1 keeps indicating the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part B

Step 6:

TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Before 30 seconds pass, TAR-EN2 initiates the rekeying for CHILD_SA and SAs are updated. Then each SPI in ESP is updated. The ping6 application result on TAR-EN2 keeps indicating the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part C

Step 9:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Before 30 seconds pass, TAR-SGW1 initiates the rekeying for CHILD_SA and SAs are updated. Then each SPI in ESP is updated. The ping6 application result on REF-Host1 keeps indicating the receipt of ICMPv6 Echo Reply from REF-Host2.

Part D

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Before 30 seconds pass, TAR-SGW2 initiates the rekeying for CHILD_SA and SAs are updated. Then each SPI in ESP is updated. The ping6 application result on REF-Host2 keeps indicating the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.3: Rekeying IKE_SA

Purpose:

To verify that a successful Rekeying can be achieved in two directions for IKE_SA.

References:

- [IKEv2] – Section 2.18

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - B*
    Common Topology 1
  - *Part C - D*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A*
    - TAR-EN1
      Common Configuration 1.1 with IKE_SA lifetime of 40 seconds and CHILD_SA lifetime of 30 seconds
    - TAR-EN2
      Common Configuration 1.2
  - *Part B*
    - TAR-EN1
      Common Configuration 1.1
    - TAR-EN2
      Common Configuration 1.2 with IKE_SA lifetime of 40 seconds and CHILD_SA lifetime of 30 seconds
  - *Part C*
    - TAR-SGW1
      Common Configuration 2.1 with IKE_SA lifetime of 40 seconds and CHILD_SA lifetime of 30 seconds
    - TAR-SGW2
      Common Configuration 2.2
  - *Part D*
    - TAR-SGW1
      Common Configuration 2.1
    - TAR-SGW2
      Common Configuration 2.2 with IKE_SA lifetime of 40 seconds and CHILD_SA lifetime of 30 seconds

Procedure:

Part A: End-Node to End-Node #1 (BASIC)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit continuous ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2 for 60 seconds.
3. Observe the packets transmitted on Network1 and Network2.

Part B: End-Node to End-Node #2 (BASIC)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit continuous ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1 for 60 seconds.
6. Observe the packets transmitted on Network1 and Network2.

Part C: SGW to SGW #1 (BASIC)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit continuous ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2 for 60 seconds.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part D: SGW to SGW #2 (BASIC)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit continuous ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1 for 60 seconds.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A

Step 3:

TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Before 40 seconds pass, TAR-EN1 initiates the rekeying for IKE_SA and SAs are updated independently of the rekeying for CHILD_SA. Then both SPIs in IKE header are updated. The ping6 application result on TAR-EN1 keeps indicating the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part B

Step 6:

TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Before 40 seconds pass, TAR-EN2 initiates the rekeying for CHILD_SA and SAs are updated independently of the rekeying for CHILD_SA. Then both SPIs in IKE header are updated. The ping6 application result on TAR-EN2 keeps indicating the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part C

Step 9:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Before 40 seconds pass, TAR-SGW1 initiates the rekeying for CHILD_SA and SAs are updated independently of the rekeying for CHILD_SA. Then both SPIs in IKE header are updated. The ping6 application result on REF-Host1 keeps indicating the receipt of ICMPv6 Echo Reply from REF-Host2.

Part D

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Before 40 seconds pass, TAR-SGW2 initiates the rekeying for CHILD_SA and SAs are updated independently of the rekeying for CHILD_SA. Then both SPIs in IKE header are updated. The ping6 application result on REF-Host2 keeps indicating the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.4: Cryptographic Algorithm Negotiation for IKE_SA

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions with various combination of cryptographic algorithms for IKE_SA.

References:

- [IKEv2] – Section 2.7

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - J*
    Common Topology 1
  - *Part K - T*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A - J*
    Common Configuration 1 with configuring IKE_SA crypto graphic algorithms as describing below

	Encryption	**PRF**	**Integrity**	**Diffie-Hellman**
Part A, F	ENCR_AES_CBC	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part B, G	ENCR_AES_CTR	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part C, H	ENCR_3DES	PRF_AES128_CBC	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part D, I	ENCR_3DES	PRF_HMAC_SHA1	AUTH_AES_XCBC_96	2 (1024 MODP Group)
Part E, J	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	14 (2048 MODP Group)

  - *Part K - T*
    Common Configuration 2 with configuring IKE_SA crypto graphic algorithms as describing below

	Encryption	**PRF**	**Integrity**	**Diffie-Hellman**
Part K, P	ENCR_AES_CBC	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part L, Q	ENCR_AES_CTR	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part M, R	ENCR_3DES	PRF_AES128_CBC	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part N, S	ENCR_3DES	PRF_HMAC_SHA1	AUTH_AES_XCBC_96	2 (1024 MODP Group)
Part O, T	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	14 (2048 MODP Group)

Procedure:

Part A - E: End-Node to End-Node #1 (ADVANCED)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.

2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part F - J: End-Node to End-Node #2 (ADVANCED)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part K - O: SGW to SGW #1 (ADVANCED)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part P - T: SGW to SGW #2 (ADVANCED)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A - E

Step 3:

TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part F - J

Step 6:

TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part K - O

Step 9:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part P - T

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.5: Cryptographic Algorithm Negotiation for CHILD_SA

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions with various combination of cryptographic algorithms for CHILD_SA.

References:

- [IKEv2] – Section 2.7

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - L*
    Common Topology 1
  - *Part M - X*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A - L*
    Common Configuration 1 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	**Integrity**	**ESN**
Part A, G	ENCR_AES_CBC	AUTH_HMAC_SHA1_96	Disable
Part B, H	ENCR_AES_CTR	AUTH_HMAC_SHA1_96	Disable
Part C, I	ENCR_NULL	AUTH_HMAC_SHA1_96	Disable
Part D, J	ENCR_3DES	AUTH_AES_XCBC_96	Disable
Part E, K	ENCR_3DES	NONE	Disable
Part F, L	ENCR_3DES	AUTH_HMAC_SHA1_96	Enable

  - *Part M - X*
    Common Configuration 2 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	**Integrity**	**ESN**
Part M, S	ENCR_AES_CBC	AUTH_HMAC_SHA1_96	Disable
Part N, T	ENCR_AES_CTR	AUTH_HMAC_SHA1_96	Disable
Part O, U	ENCR_NULL	AUTH_HMAC_SHA1_96	Disable
Part P, V	ENCR_3DES	AUTH_AES_XCBC_96	Disable
Part Q, W	ENCR_3DES	NONE	Disable
Part R, X	ENCR_3DES	AUTH_HMAC_SHA1_96	Enable

Procedure:

Part A - F: End-Node to End-Node #1 (ADVANCED)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part G - L: End-Node to End-Node #2 (ADVANCED)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part M - R: SGW to SGW #1 (ADVANCED)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part S - X: SGW to SGW #2 (ADVANCED)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A - F

Step 3:
TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part G - L

Step 6:
TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part M - R

Step 9:
TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part S - X

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.6: Reuse of Diffie-Hellman Exponentials

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions using PFS.

References:

- [IKEv2] – Section 2.12

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - B*
    Common Topology 1
  - *Part C - D*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A - B*
    Common Configuration 1 with enabling PFS
  - *Part C - D*
    Common Configuration 2 with enabling PFS

Procedure:

Part A: End-Node to End-Node #1 (ADVANCED)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part B: End-Node to End-Node #2 (ADVANCED)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part C: SGW to SGW #1 (ADVANCED)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.

9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part D: SGW to SGW #2 (ADVANCED)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A

Step 3:
TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part B

Step 6:
TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part C

Step 9:
TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part D

Step 12:
TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.7: Identification Type

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions with various combination of Identification Type

References:

- [IKEv2] – Section 3.5

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - H*
    Common Topology 1
  - *Part I - P*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A - F*
    - TAR-EN1
      Common Configuration 1 with configuring Identification describing below

	Local		**Remote**	
	Type	**Data**	**Type**	**Data**
Part A, D	ID_IPV4_ADDR (1)	192.0.2.1	ID_IPV4_ADDR (1)	192.0.2.2
Part B, E	ID_FQDN (2)	endnode1.example.com	ID_FQDN (2)	endnode2.example.com
Part C, F	ID_RFC822_ADDR (3)	endnode1@example.com	ID_RFC822_ADDR (3)	endnode2@example.com

- TAR-EN2
  Common Configuration 1 with configuring Identification describing below

	Local		**Remote**	
	Type	**Data**	**Type**	**Data**
Part A, D	ID_IPV4_ADDR (1)	192.0.2.2	ID_IPV4_ADDR (1)	192.0.2.1
Part B, E	ID_FQDN (2)	endnode2.example.com	ID_FQDN (2)	endnode1.example.com
Part C, F	ID_RFC822_ADDR (3)	endnode2@example.com	ID_RFC822_ADDR (3)	endnode1@example.com

- *Part G - L*
  - TAR-SGW1
    Common Configuration 1 with configuring Identification describing below

	Local		**Remote**	
	Type	**Data**	**Type**	**Data**
Part G, J	ID_IPV4_ADDR (1)	192.0.2.1	ID_IPV4_ADDR (1)	192.0.2.2
Part H, K	ID_FQDN (2)	sgw1.example.com	ID_FQDN (2)	sgw2.example.com

Part I, L	ID_RFC822_ADDR (3)	sgw1@example.com	ID_RFC822_ADDR (3)	sgw2@example.com

✧ TAR-SGW2
Common Configuration 1 with configuring Identification describing below

	Local		Remote	
	Type	**Data**	**Type**	**Data**
Part G, J	ID_IPV4_ADDR (1)	192.0.2.2	ID_IPV4_ADDR (1)	192.0.2.1
Part H, K	ID_FQDN (2)	sgw2.example.com	ID_FQDN (2)	sgw1.example.com
Part I, L	ID_RFC822_ADDR (3)	sgw2@example.com	ID_RFC822_ADDR (3)	sgw1@example.com

Procedure:

Part A - C: End-Node to End-Node #1 (BASIC)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part D - F: End-Node to End-Node #2 (BASIC)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part G - I: SGW to SGW #1 (BASIC)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part J - L: SGW to SGW #2 (BASIC)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A - C

Step 3:

TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part D - F

Step 6:

TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part G - I

Step 9:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part J - L

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.8: Multiple Proposals for IKE_SA

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions by initiating multiple proposals for IKE_SA.

References:

- [IKEv2] – Section 2.7

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - B*
    Common Topology 1
  - *Part C - D*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A*
    - TAR-EN1
      Common Configuration 1.1 with configuring IKE_SA crypto graphic algorithms as describing below

Proposal	Encryption	PRF	Integrity	Diffie-Hellman
Proposal #1	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Proposal #2	ENCR_AES_CBC	PRF_AES128_CBC	AUTH_AES_XCBC_96	14 (2048 MODP Group)

    - TAR-EN2
      Common Configuration 1.2

  - *Part B*
    - TAR-EN1
      Common Configuration 1.1
    - TAR-EN2
      Common Configuration 1.2 with configuring IKE_SA crypto graphic algorithms as describing below

Proposal	Encryption	PRF	Integrity	Diffie-Hellman
Proposal #1	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Proposal #2	ENCR_AES_CBC	PRF_AES128_CBC	AUTH_AES_XCBC_96	14 (2048 MODP Group)

  - *Part C*
    - TAR-SGW1
      Common Configuration 2.1 with configuring IKE_SA crypto graphic

algorithms as describing below

Proposal	Encryption	PRF	Integrity	Diffie-Hellman
Proposal #1	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Proposal #2	ENCR_AES_CBC	PRF_AES128_CBC	AUTH_AES_XCBC_96	14 (2048 MODP Group)

- TAR-SGW2
  Common Configuration 2.2

- *Part D*
  - TAR-SGW1
    Common Configuration 2.1
  - TAR-SGW2
    Common Configuration 2.2 with configuring IKE_SA crypto graphic algorithms as describing below

Proposal	Encryption	PRF	Integrity	Diffie-Hellman
Proposal #1	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Proposal #2	ENCR_AES_CBC	PRF_AES128_CBC	AUTH_AES_XCBC_96	14 (2048 MODP Group)

Procedure:

Part A: End-Node to End-Node #1 (ADVANCED)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part B: End-Node to End-Node #2 (BASIC)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part C: SGW to SGW #1 (ADVANCED)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part D: SGW to SGW #2 (BASIC)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A

Step 3:

TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part B

Step 6:

TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part C

Step 9:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part D

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.9: Multiple Transforms for IKE_SA

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions by initiating multiple transforms for IKE_SA.

References:

- [IKEv2] – Section 2.7

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - H*
    Common Topology 1
  - *Part I - P*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A - D*
    - TAR-EN1
      Common Configuration 1.1 with configuring IKE_SA crypto graphic algorithms as describing below

	Encryption	**PRF**	**Integrity**	**Diffie-Hellman**
Part A	ENCR_3DES ENCR_AES_CBC	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part B	ENCR_3DES	PRF_HMAC_SHA1 PRF_AES128_CBC	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part C	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96 AUTH_AES_XCBC_96	2 (1024 MODP Group)
Part D	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group) 14 (2048 MODP Group)

    - TAR-EN2
      Common Configuration 1.2

  - *Part E - H*
    - TAR-EN1
      Common Configuration 1.1
    - TAR-EN2
      Common Configuration 1.2 with configuring IKE_SA crypto graphic algorithms as describing below

	Encryption	**PRF**	**Integrity**	**Diffie-Hellman**

Part E	ENCR_3DES ENCR_AES_CBC	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part F	ENCR_3DES	PRF_HMAC_SHA1 PRF_AES128_CBC	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part G	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96 AUTH_AES_XCBC_96	2 (1024 MODP Group)
Part H	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group) 14 (2048 MODP Group)

- *Part I - L*
  - TAR-SGW1

    Common Configuration 2.1 with configuring IKE_SA crypto graphic algorithms as describing below

	Encryption	**PRF**	**Integrity**	**Diffie-Hellman**
Part I	ENCR_3DES ENCR_AES_CBC	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part J	ENCR_3DES	PRF_HMAC_SHA1 PRF_AES128_CBC	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part K	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96 AUTH_AES_XCBC_96	2 (1024 MODP Group)
Part L	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group) 14 (2048 MODP Group)

  - TAR-SGW2

    Common Configuration 2.2

- *Part M - P*
  - TAR-SGW1

    Common Configuration 2.1
  - TAR-SGW2

    Common Configuration 2.2 with configuring IKE_SA crypto graphic algorithms as describing below

	Encryption	**PRF**	**Integrity**	**Diffie-Hellman**
Part M	ENCR_3DES ENCR_AES_CBC	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part N	ENCR_3DES	PRF_HMAC_SHA1 PRF_AES128_CBC	AUTH_HMAC_SHA1_96	2 (1024 MODP Group)
Part O	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96 AUTH_AES_XCBC_96	2 (1024 MODP Group)
Part P	ENCR_3DES	PRF_HMAC_SHA1	AUTH_HMAC_SHA1_96	2 (1024 MODP Group) 14 (2048 MODP Group)

Procedure:

Part A - D: End-Node to End-Node #1 (ADVANCED)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part E - H: End-Node to End-Node #2 (BASIC)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.

5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part I - L: SGW to SGW #1 (ADVANCED)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part M - P: SGW to SGW #2 (BASIC)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A - D

Step 3:

TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part E - H

Step 6:

TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part I - L

Step 9:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part M - P

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.10: Multiple Proposals for CHILD_SA

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions by initiating multiple proposals for CHILD_SA.

References:

- [IKEv2] – Section 2.7

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - B*
    Common Topology 1
  - *Part C - D*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A*
    - TAR-EN1
      Common Configuration 1.1 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	Integrity	ESN
Proposal #1	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable
Proposal #2	ENCR_AES_CBC	AUTH_AES_XCBC_96	Enable

    - TAR-EN2
      Common Configuration 1.2

  - *Part B*
    - TAR-EN1
      Common Configuration 1.1

    - TAR-EN2
      Common Configuration 1.2 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	Integrity	ESN
Proposal #1	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable
Proposal #2	ENCR_AES_CBC	AUTH_AES_XCBC_96	Enable

  - *Part C*
    - TAR-SGW1

Common Configuration 2.1 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	Integrity	ESN
Proposal #1	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable
Proposal #2	ENCR_AES_CBC	AUTH_AES_XCBC_96	Enable

- ✧ TAR-SGW2
  Common Configuration 2.2

➢ *Part D*
- ✧ TAR-SGW1
  Common Configuration 2.1

- ✧ TAR-SGW2
  Common Configuration 2.2 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	Integrity	ESN
Proposal #1	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable
Proposal #2	ENCR_AES_CBC	AUTH_AES_XCBC_96	Enable

Procedure:

Part A: End-Node to End-Node #1 (ADVANCED)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part B: End-Node to End-Node #2 (BASIC)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part C: SGW to SGW #1 (ADVANCED)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part D: SGW to SGW #2 (BASIC)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A

Step 3:

TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part B

Step 6:

TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part C

Step 9:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part D

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.11: Multiple Transforms for CHILD_SA

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions by initiating multiple transforms for CHILD_SA.

References:

- [IKEv2] – Section 2.7

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - F*
    Common Topology 1
  - *Part J - L*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A - C*
    - TAR-EN1
      Common Configuration 1.1 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	**Integrity**	**ESN**
Part A	ENCR_3DES ENCR_AES_CBC	AUTH_HMAC_SHA1_96	Disable
Part B	ENCR_3DES	AUTH_HMAC_SHA1_96 AUTH_AES_XCBC_96	Disable
Part C	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable Enable

    - TAR-EN2
      Common Configuration 1.2

  - *Part D - F*
    - TAR-EN1
      Common Configuration 1.1

    - TAR-EN2
      Common Configuration 1.2 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	**Integrity**	**ESN**
Part D	ENCR_3DES ENCR_AES_CBC	AUTH_HMAC_SHA1_96	Disable

Part E	ENCR_3DES	AUTH_HMAC_SHA1_96 AUTH_AES_XCBC_96	Disable
Part F	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable Enable

- *Part G - I*
  - TAR-SGW1
    Common Configuration 2.1 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	**Integrity**	**ESN**
Part G	ENCR_3DES ENCR_AES_CBC	AUTH_HMAC_SHA1_96	Disable
Part H	ENCR_3DES	AUTH_HMAC_SHA1_96 AUTH_AES_XCBC_96	Disable
Part I	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable Enable

  - TAR-SGW2
    Common Configuration 2.2

- *Part J - L*
  - TAR-SGW1
    Common Configuration 2.1

  - TAR-SGW2
    Common Configuration 2.2 with configuring CHILD_SA crypto graphic algorithms as describing below

	Encryption	**Integrity**	**ESN**
Part J	ENCR_3DES ENCR_AES_CBC	AUTH_HMAC_SHA1_96	Disable
Part K	ENCR_3DES	AUTH_HMAC_SHA1_96 AUTH_AES_XCBC_96	Disable
Part L	ENCR_3DES	AUTH_HMAC_SHA1_96	Disable Enable

Procedure:

Part A - C: End-Node to End-Node #1 (ADVANCED)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part D - F: End-Node to End-Node #2 (BASIC)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part G - I: SGW to SGW #1 (ADVANCED)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security

Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part J - L: SGW to SGW #2 (BASIC)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A - C

Step 3:

TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part D - F

Step 6:

TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part G - I

Step 9:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part J - L

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.12: Requesting an Internal Address on a Remote Network

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions by using Configuration payloads.

References:

- [IKEv2] – Section 2.19

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures in Common Topology 3

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A*
    - TAR-EN1
      Common Configuration 3 with the configuration to request INTERNAL_IP6_ADDRESS by CFG_REQUEST.
      Traffic Selector must cover the following.

	Source			Destination		
	Address Range	**Next Layer Protocol**	**Port Range**	**Address Range**	**Next Layer Protocol**	**Port Range**
Inbound	Network3	ANY	ANY	TAR-EN1 (internal address given by TAR-SGW1)	ANY	ANY
Outbound	TAR-EN1 (internal address given by TAR-SGW1)	ANY	ANY	Network3	ANY	ANY

    - TAR-SGW1
      Common Configuration 3 with the configuration to accept CFG_REQUEST and to distribute the appropriate address (for example 2001:0db8:1:4::1/64) by CFG_REPLY.
      Traffic Selector must cover the following.

	Source			Destination		
	Address Range	**Next Layer Protocol**	**Port Range**	**Address Range**	**Next Layer Protocol**	**Port Range**
Inbound	TAR-EN1 (internal address given by TAR-SGW1)	ANY	ANY	Network3	ANY	ANY

Outbound	Network3	ANY	ANY	TAR-EN1 (internal address given by TAR-SGW1)	ANY	ANY

Procedure:

Part A: End-Node to SGW (ADVANCED)

1. Initialize TAR-EN1 and TAR-SGW1 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of REF-Host1.
3. Observe the packets transmitted on Network1, Network2 and Network3.

Observable Results:

Part A

Step 3:
TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network1 and Network2, and they are decrypted on Network3. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

IKEv2Interop.1.13: RSA Digital Signature

Purpose:

To verify that a successful Initial Exchange can be achieved in two directions using RSA Digital Signature as the authentication method.

References:

- [IKEv2] – Section 2.15

Resource Requirements:

- Monitor to capture packets
- Ping6 implementations

Test Setup:

- Network Topology
  For each Part, connect End-Nodes, SGWs, Routers and Hosts as per the figures below
  - *Part A - B*
    Common Topology 1
  - *Part C - D*
    Common Topology 2

- Configuration
  For each Part, configure End-Nodes and SGWs as per the configurations below
  - *Part A – B*
    - TAR-EN1
      Common Configuration 1.1 with configuring IKE peer as describing below

	Authentication	
	Method	**Key Value**
Local	RSA digital signature	-
Remote	RSA digital signature	-

    - TAR-EN2
      Common Configuration 1.2 with configuring IKE peer as describing below

	Authentication	
	Method	**Key Value**
Local	RSA digital signature	-
Remote	RSA digital signature	-

  - *Part C – D*
    - TAR-SGW1
      Common Configuration 2.1 with configuring IKE peer as describing below

	Authentication	
	Method	**Key Value**
Local	RSA digital signature	-
Remote	RSA digital signature	-

- TAR-SGW2
  Common Configuration 2.2 with configuring IKE peer as describing below

	Authentication	
	Method	Key Value
Local	RSA digital signature	-
Remote	RSA digital signature	-

For every case, RSA digital signature public keys can be exchanged between peers previously or can be installed into local or public CA.

Procedure:

Part A: End-Node to End-Node #1 (BASIC)

1. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
2. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN1 to the Global unicast address of TAR-EN2.
3. Observe the packets transmitted on Network1 and Network2.

Part B: End-Node to End-Node #2 (BASIC)

4. Initialize TAR-EN1 and TAR-EN2 making sure they have cleared their Security Associations.
5. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from TAR-EN2 to the Global unicast address of TAR-EN1.
6. Observe the packets transmitted on Network1 and Network2.

Part C: SGW to SGW #1 (BASIC)

7. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
8. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host1 to the Global unicast address of REF-Host2.
9. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Part D: SGW to SGW #2 (BASIC)

10. Initialize TAR-SGW1 and TAR-SGW2 making sure they have cleared their Security Associations.
11. Initiate IKEv2 exchange and transmit ICMPv6 Echo Requests from REF-Host2 to the Global unicast address of REF-Host1.
12. Observe the packets transmitted on Network1, Network2, Network3 and Network4.

Observable Results:

Part A

Step 3:
TAR-EN1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN1 indicates the receipt of ICMPv6 Echo Reply from TAR-EN2.

Part B

Step 6:

TAR-EN2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The ICMPv6 Echo Requests and ICMPv6 Echo Replies observed on Network1 and Network2 are encrypted by ESP. The ping6 application result on TAR-EN2 indicates the receipt of ICMPv6 Echo Reply from TAR-EN1.

Part C

Step 9:

TAR-SGW1 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host1 indicates the receipt of ICMPv6 Echo Reply from REF-Host2.

Part D

Step 12:

TAR-SGW2 initiates IKEv2 negotiation and SAs are established. ICMPv6 Echo Requests and ICMPv6 Echo Replies are passed on SAs. The observed ICMPv6 Echo Requests and ICMPv6 Echo Replies are encrypted by ESP on Network2 and Network3, and they are decrypted on Network1 and Network4. The ping6 application result on REF-Host2 indicates the receipt of ICMPv6 Echo Reply from REF-Host1.

Possible Problems:

- None.

Appendix A

1. Required Data

To obtain the IPv6 Ready Logo Phase-2 IKEv2, you need to send application with the test results attached.
The test results must include both Protocol Operations and Interoperability.
In this document, the **"Interoperability test"** result documentation is described.

There are currently two viable alternatives to obtain an interoperability results.

- Lab Test: Test results observed at a lab that is recognized by the IPv6 Ready Logo Committee.
- Self Test: Test results observed by the applicant company in their laboratory.

1.1. Test Data

As "IPv6 Ready Logo Phase-2 IKEv2" the following interoperability test result data are required.

Topology Map (Required)

Network topology figures or address list for each topology, with IPv6 addresses and MAC address of each attached interfaces, are required.
Fig. 1 and Fig. 2 are examples of topology figure.
Fig. 3 is an example of address list.
All IP addresses which are used during the test must be declared.

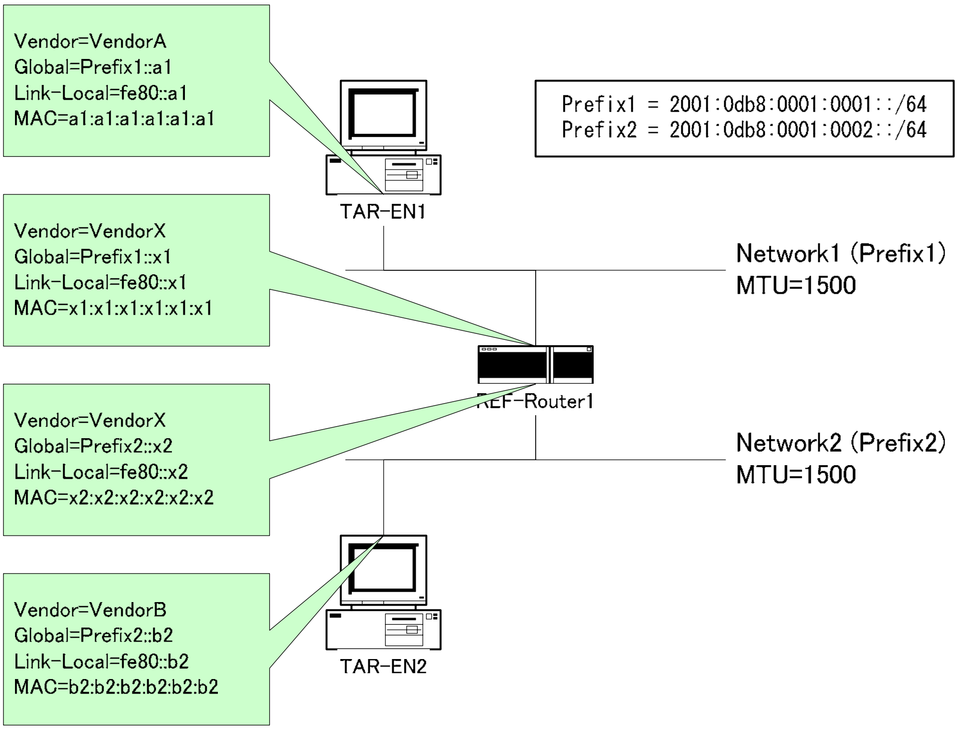


Fig 1 Topology figure example 1

```
      TAR-EN1
         |
     ----+-------+--- Network1
                 |
            REF-Router1
                 |
     ----+-------+--- Network2
         |
      TAR-EN2

Network1
========
    Prefix: 2001:db8:1:1::/64
    MTU: 1500

    TAR-EN1: VendorA
        Link-Local=fe80::a1
        Global=2001:db8:1:1::a1
        MAC=a1:a1:a1:a1:a1:a1

    REF-Router1: VendorX
        Link-Local=fe80::x1
        Global=2001:db8:1:1::x1
        MAC=x1:x1:x1:x1:x1:x1

Network2
========
    Prefix: 2001:db8:1:2::/64
    MTU: 1500

    REF-Router1: VendorX
        Link-Local=fe80::x2
        Global=2001:db8:1:2::x2
        MAC=x2:x2:x2:x2:x2:x2

    TAR-EN2: VendorB
        Link-Local=fe80::b2
        Global=2001:db8:1:2::b2
        MAC=b2:b2:b2:b2:b2:b2
```

Fig 2 Topology figure example 2

```
Network1
    Prefix: 2001:db8:1:1::/64
    MTU: 1500

Network2
    Prefix: 2001:db8:1:2::/64
    MTU: 1500

TAR-EN1: VendorA
    Network1)
        Link-Local=fe80::a1
        Global=2001:db8:1:1::a1
        MAC=a1:a1:a1:a1:a1:a1

REF-Router1: VendorX
    Network1)
        Link-Local=fe80::x1
        Global=2001:db8:1:1::x1
        MAC=x1:x1:x1:x1:x1:x1

    Network2)
        Link-Local=fe80::x2
        Global=2001:db8:1:2::x2
        MAC=x2:x2:x2:x2:x2:x2

TAR-EN2: VendorB
    Network2)
        Link-Local=fe80::b2
        Global=2001:db8:1:2::b2
        MAC=b2:b2:b2:b2:b2:b2
```

Fig 3 Address List example

Command Log (Required)

Save the command files for each test on each node.

Packet Capture File (Required)

Capture all packets on each link during the test with a device that is not part of the test.
For each part of test put the captured packet into individual files within
tcpdump (pcap) format, or readable HTML format.
If you run tcpdump, please specify packet size as 4096.
e.g.,) tcpdump -i if0 -s 4096 -w 1.1.A.VendorA.VendorB.Network1.dump

Test Result Table (Required)

Collect all test result tables in a file and fill the tables as required. This file must contain a table where all passes are clearly marked.

1.2. Data file name syntax

Please use following syntax in the file name.

A) Topology Map (Required)

Syntax: *Chapter.Section.Parts.ON.topology*

For "ON", use the vendor name of the Node which behaved as a Opposite side target Node (ON).
e.g.,)
If your device is an End-Node, the name should be like following.
ON: End-Node [vendor: VendorA, model: rEN1, version: 1.0]
ON: SGW [vendor: VendorC, model: rSGW1, version: 3.0]
1.1.AB.VendorA.topology
1.1.EF.VendorC.topology

If your device is a SGW, the name should be like following.
ON: SGW [vendor: VendorC, model: rSGW1, version: 3.0]
ON: End-Node [vendor: VendorA, model: rEN1, version: 1.0]
1.1.CD.VendorC.topology
1.1.EF.VendorA.topology

B) Command Log (Required)

Syntax: *Chapter.Section.Part.ON.result*

For "ON", use the vendor name of the Node which behaved as a Opposite side target Node (ON).
e.g.,)
If your device is an End-Node, the name should be like following.
ON: End-Node [vendor: VendorA, model: rEN1, version: 1.0]
ON: SGW [vendor: VendorC, model: rSGW1, version: 3.0]
1.1.A.VendorA.result
1.1.B.VendorA.result
1.1.E.VendorC.result
1.1.F.VendorC.result

If your device is a SGW, the name should be like following.
ON: SGW [vendor: VendorC, model: rSGW1, version: 3.0]
ON: End-Node [vendor: VendorA, model: rEN1, version: 1.0]
1.1.C.VendorC.result
1.1.D.VendorC.result
1.1.E.VendorA.result
1.1.F.VendorA.result

C) Packet Capture File (Required)

Syntax: *Chapter.Section.Part.ON.Network.dump*

For "*Network*", use the captured network name.
For "ON", use the vendor name of the Node which behaved as a Opposite side target Node (ON).
e.g.,)

If your device is an End-Node, the name should be like following.
ON: End-Node [vendor: VendorA, model: rEN1, version: 1.0]
ON: SGW [vendor: VendorC, model: rSGW1, version: 3.0]

1.1.A.VendorA.Network1.result
1.1.A.VendorA.Network2.result
1.1.B.VendorA.Network1.result
1.1.B.VendorA.Network2.result
1.1.E.VendorC.Network1.result
1.1.E.VendorC.Network2.result
1.1.E.VendorC.Network3.result
1.1.F.VendorC.Network1.result
1.1.F.VendorC.Network2.result
1.1.F.VendorC.Network3.result

If your device is a SGW, the name should be like following.
ON: SGW [vendor: VendorC, model: rSGW1, version: 3.0]
ON: End-Node [vendor: VendorA, model: rEN1, version: 1.0]

1.1.C.VendorC.Network1.result
1.1.C.VendorC.Network2.result
1.1.C.VendorC.Network3.result
1.1.D.VendorC.Network1.result
1.1.D.VendorC.Network2.result
1.1.D.VendorC.Network3.result
1.1.E.VendorA.Network1.result
1.1.E.VendorA.Network2.result
1.1.E.VendorA.Network3.result
1.1.E.VendorA.Network4.result
1.1.F.VendorA.Network1.result
1.1.F.VendorA.Network2.result
1.1.F.VendorA.Network3.result
1.1.F.VendorA.Network4.result

D) Test Result Table (Required)

Syntax: *Target_Node.table*

In this file you should make table for each part.
Your device can be described hereafter as a sample whether it is a End-Node or a SGW.
ON: End-Node [vendor: VendorA, model: rEN1, version: 1.0]
ON: End-Node [vendor: VendorB, model: rEN2, version: 2.0]
ON: SGW [vendor: VendorC, model: rSGW1, version: 3.0]
ON: SGW [vendor: VendorD, model: rSGW2, version: 4.0]

For End-Node to End-Node tests, following table is required.

	VendorA	VendorB
VendorX		

For End-Node to SGW tests, following table is required. (If your device is a End-Node)

	VendorC	VendorD
VendorX		

For SGW to End-Node tests, following table is required. (If your device is a SGW)

	VendorA	VendorB
VendorX		

For SGW to SGW tests, following table is required.

	VendorC	VendorD
VendorX		

e.g.,)
Test result of following End-Node.
TAR-EN1: End-Node [vendor: VendorX, model: rEN1, version: 5.0]
or
Test result of following SGW.
TAR-SGW1: SGW [vendor: VendorX, model: rSGW1, version: 5.0]
VendorX.table

1.3. Data Archive

Please organize your data as following directory structure.

```
${Your_Device_ver}/
        Conformance/
        Interoperability/
```

Put all interoperability data file in "Interoperability" directory.
Put all Conformance Self-Test results or Conformance Lab test results in "Conformance" directory.
Make a tar.gz format archive file, and put files under "${Your_Device_ver}" in it.

1.4. Network Traffic Application

In the test results, "ping" is the default application to send ICMP echo request.
If the target device does not have "ping" application,
it is possible to use any other application that behaves like the "ping" application
and passes traffic through the network.