Business Unit or Product Name

Protecting Enterprise Extender Traffic with a VPN

IBM z/Center of Excellence

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Agenda

- Reasons for Security
- Overview of Security
- Modeling EE Traffic
- Overview of VPN
- Demo of EE over VPN

Why Add Security

- ID theft is on the rise
- Meet new standards
  - PCI standard (Session S1713)
  - European Common Standard
  - US regulations starting to come around
    - California SB 1386
- Keep the business out of the paper

Why Add Security

- Failure to Secure your business
  - Fines and penalties
  - Incidents from loss of credit card holder data
    - Costs for forensics examinations
    - Liability for card issuers
    - Dispute resolution costs
  - Stock Shares plummet
  - Loss of Customers

Words to Live By

- **"The Security Perimeter is now at the End Point"
Anonymous**

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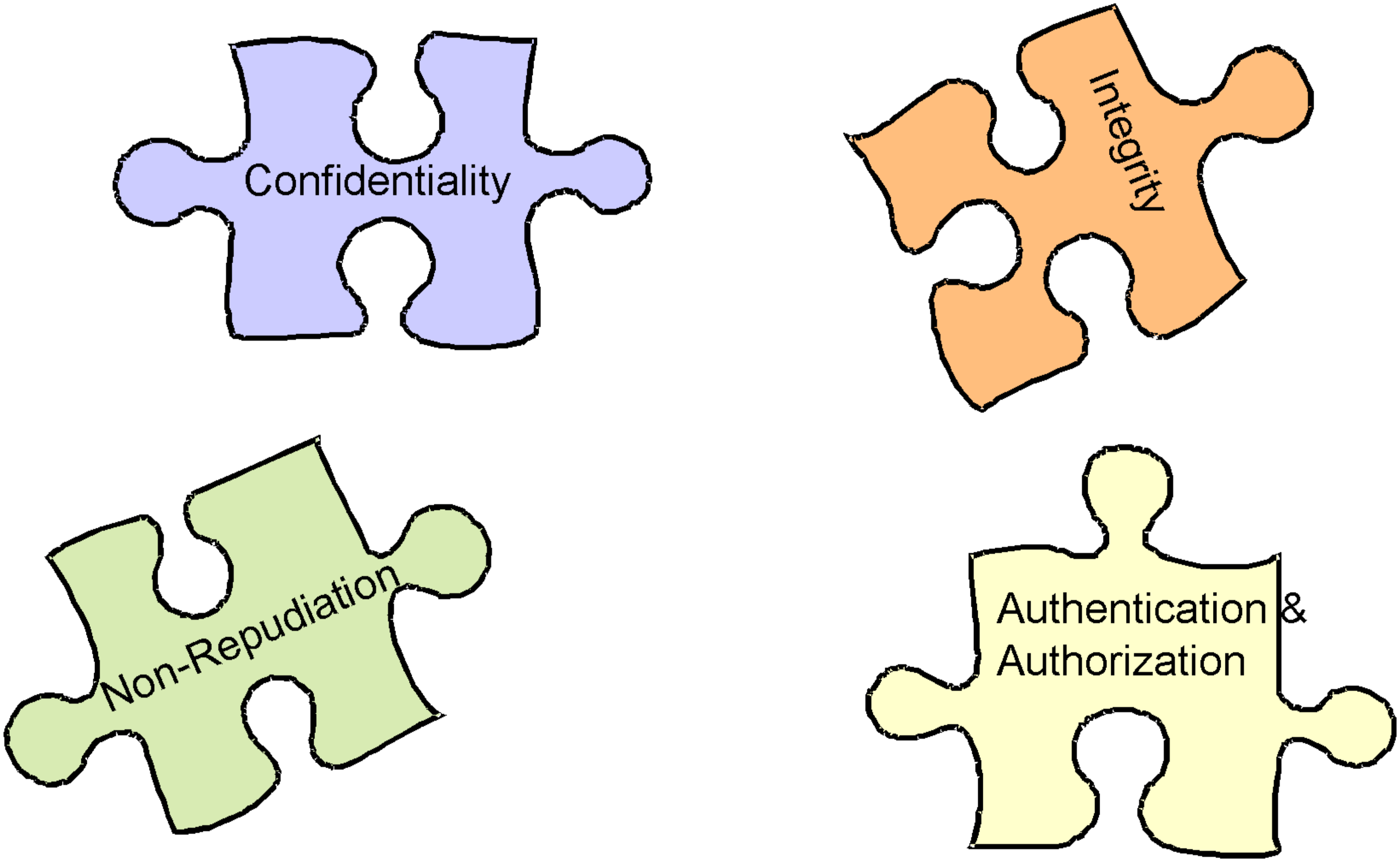
The Puzzle pieces of Security



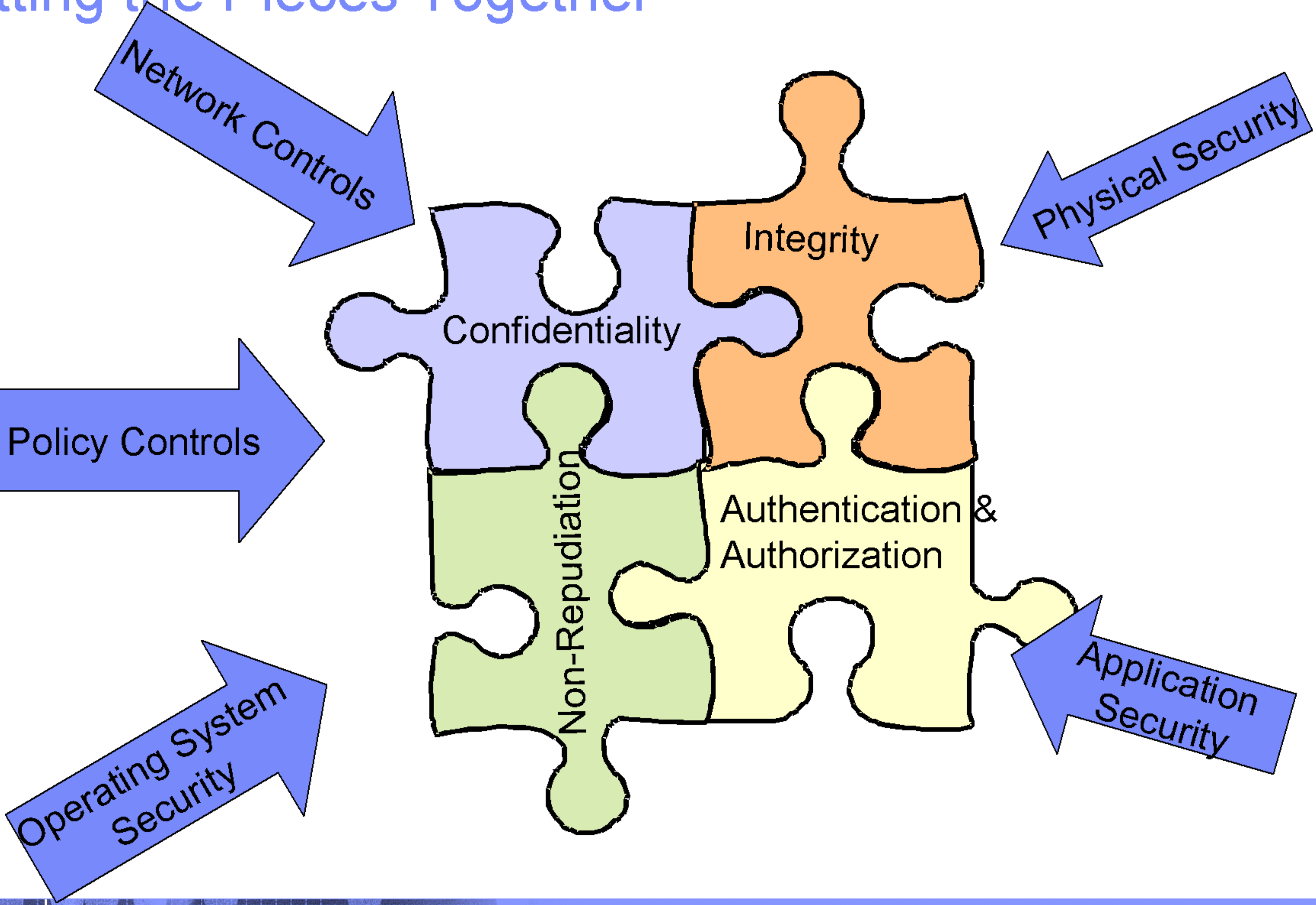
Confidentiality

Integrity

Non-Repudiation

Authentication & Authorization

Putting the Pieces Together



How Does EE Measure UP

- **Authorization**
  - OS control of datasets
- **Access Control**
  - APPN Topology Definitions
- **Data Confidentiality**
  - Session Level Encryption (static keys)
- **Data Integrity**
  - Checksums
- **Non-Repudiation**
  - None

More is needed!!!!

EE with VPN

- **Authorization**
  - EE Traffic can be authenticated with x.509 Certificates
- **Access Control**
  - Have to have the properly negotiated keys
- **Data Confidentiality**
  - Can Take advantage of AES or Triple DES encryption and Dynamic Key creation
- **Data Integrity**
  - IPSec has built in integrity checks
- **Non-Repudiation**
  - If you are using “End to End” VPNs the certificate you negotiate with had to come from a known party

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Modeling the EE traffic

- **What is EE from an <u>IP Perspective</u>**
  - Uses UDP
  - Ports 12000 – 12004
    - 12000 – Signaling
    - 12001 – EE Network Flow Control
    - 12002 – High Priority Traffic
    - 12003 – Medium Priority Traffic
    - 12004 – Low Priority Traffic
  - Using Static VIPA Addresses

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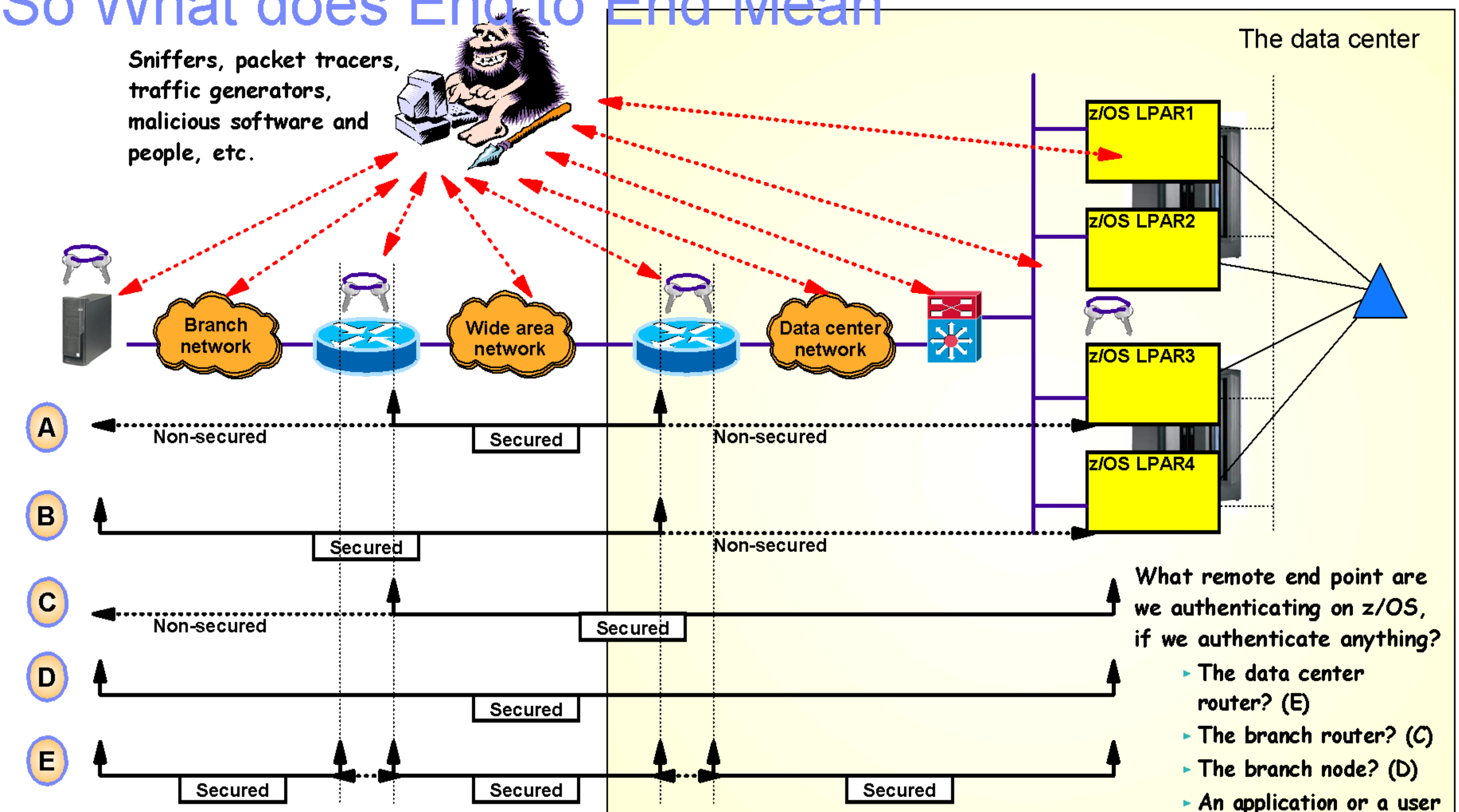
IPSec Overview

- **Increasing the Network Security Layer**
- **Created for IPv6**
- **Adopted for IPv4**
- **Dynamic Key Exchange**
  - Internet Key Exchange (IKE) – Uses UDP 500
  - Two phases to this
- **Available on most platforms**
- **Two Protocols**
  - AH
  - ESP
- **Two modes**

So What does End to End Mean



Sniffers, packet tracers, traffic generators, malicious software and people, etc.

What remote end point are we authenticating on z/OS, if we authenticate anything?

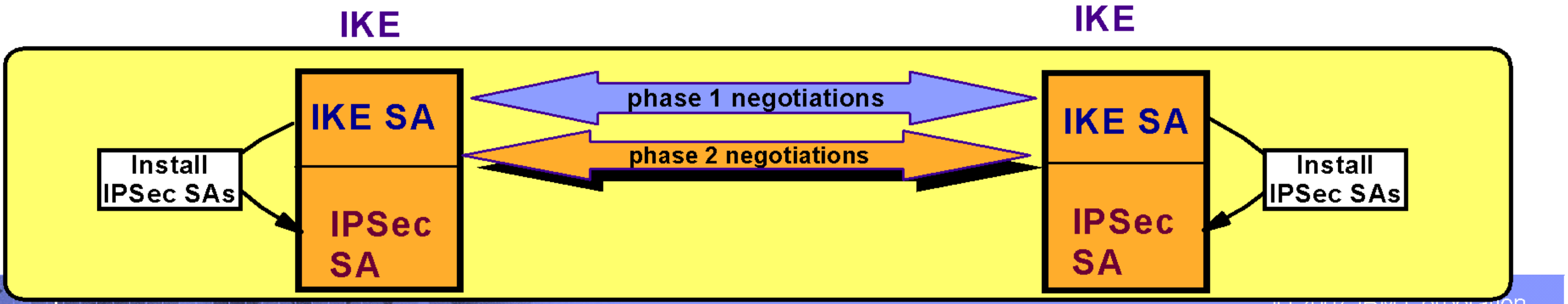
- The data center router? (E)
- The branch router? (C)
- The branch node? (D)
- An application or a user on the branch node? (D if connection-level security is used)

Only option D provides ultimate end point authentication, end-to-end confidentiality, and end-to-end message integrity.

Break down of VPN

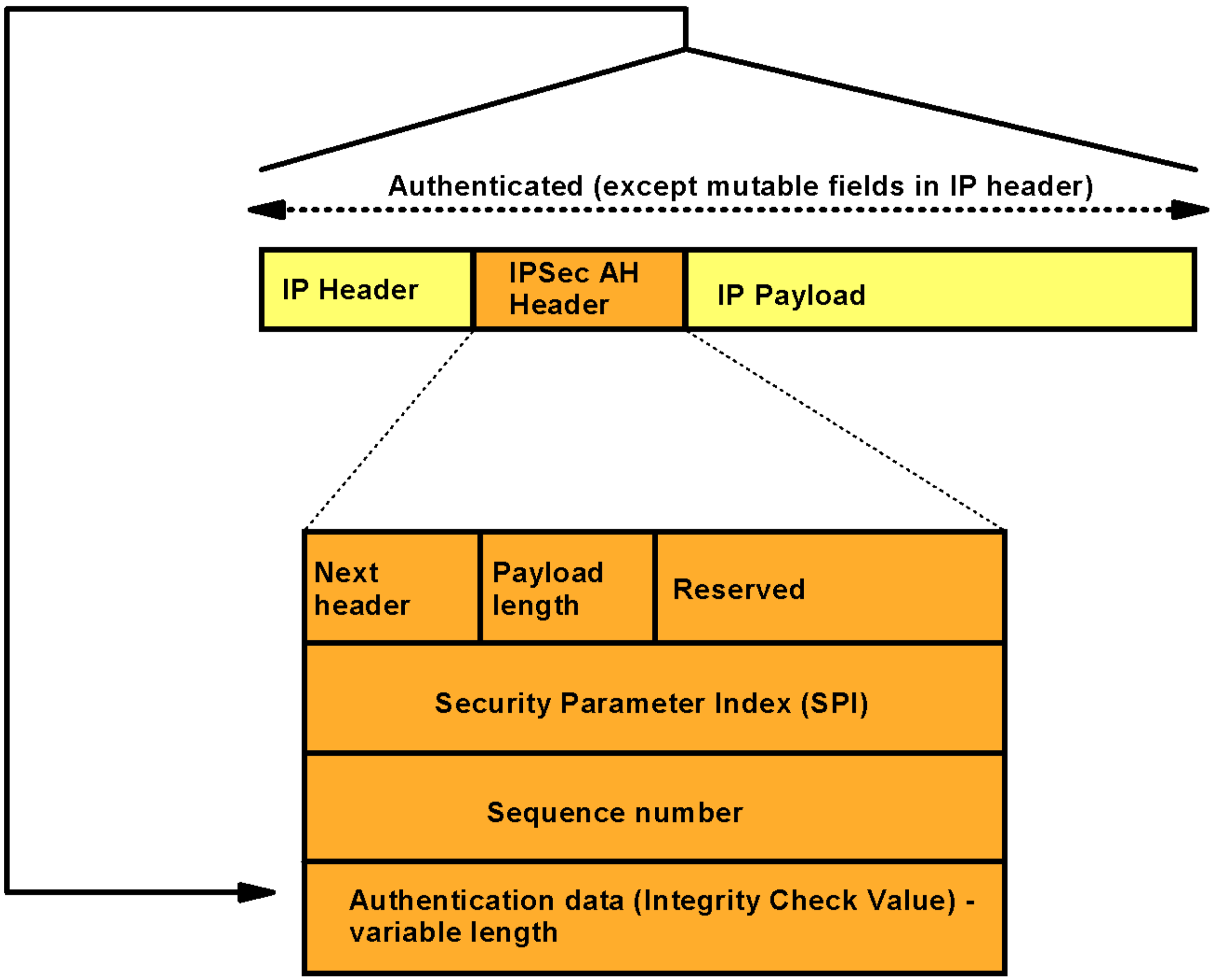
- **Phase 1 negotiation**
  - Creates a secure channel with a remote security endpoint
    - Negotiates an IKE SA
      - Generates cryptographic keys that will be used to protect Phase 2 negotiations and Informational exchanges
      - Authenticates the identity of the parties involved
      - Bidirectional, and not identified via SPIs
  - Requires processor-intensive cryptographic operations
  - Done infrequently

- **Phase 2 negotiation**
  - Negotiates a pair of IPSec SAs with a remote security endpoint
    - Generates cryptographic keys that are used to protect data
      - Authentication keys for use with AH
      - Authentication and/or encryption keys for use with ESP
  - Performed under the protection of an IKE SA
  - Done more frequently than phase 1



Make up of an Authentication Header packet (AH)

IP Protocol number 51



Authenticated (except mutable fields in IP header)

IP Header

IPSec AH Header

IP Payload

Next header

Payload length

Reserved

Security Parameter Index (SPI)

Sequence number

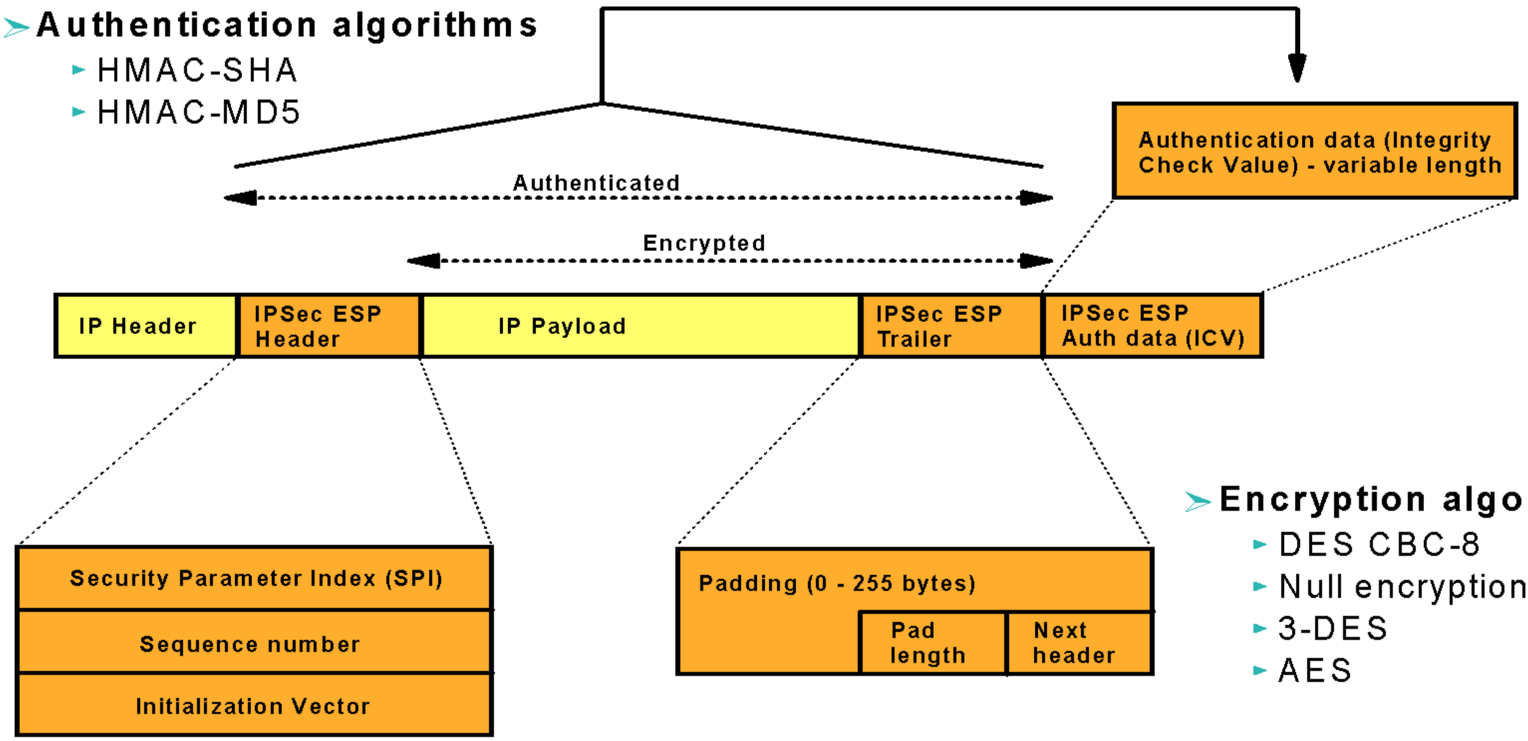
Authentication data (Integrity Check Value) - variable length

- **Authentication algorithms**
  - HMAC-SHA
  - HMAC-MD5

Make up of an Encapsulated Security Payload (ESP)

IP Protocol number 50

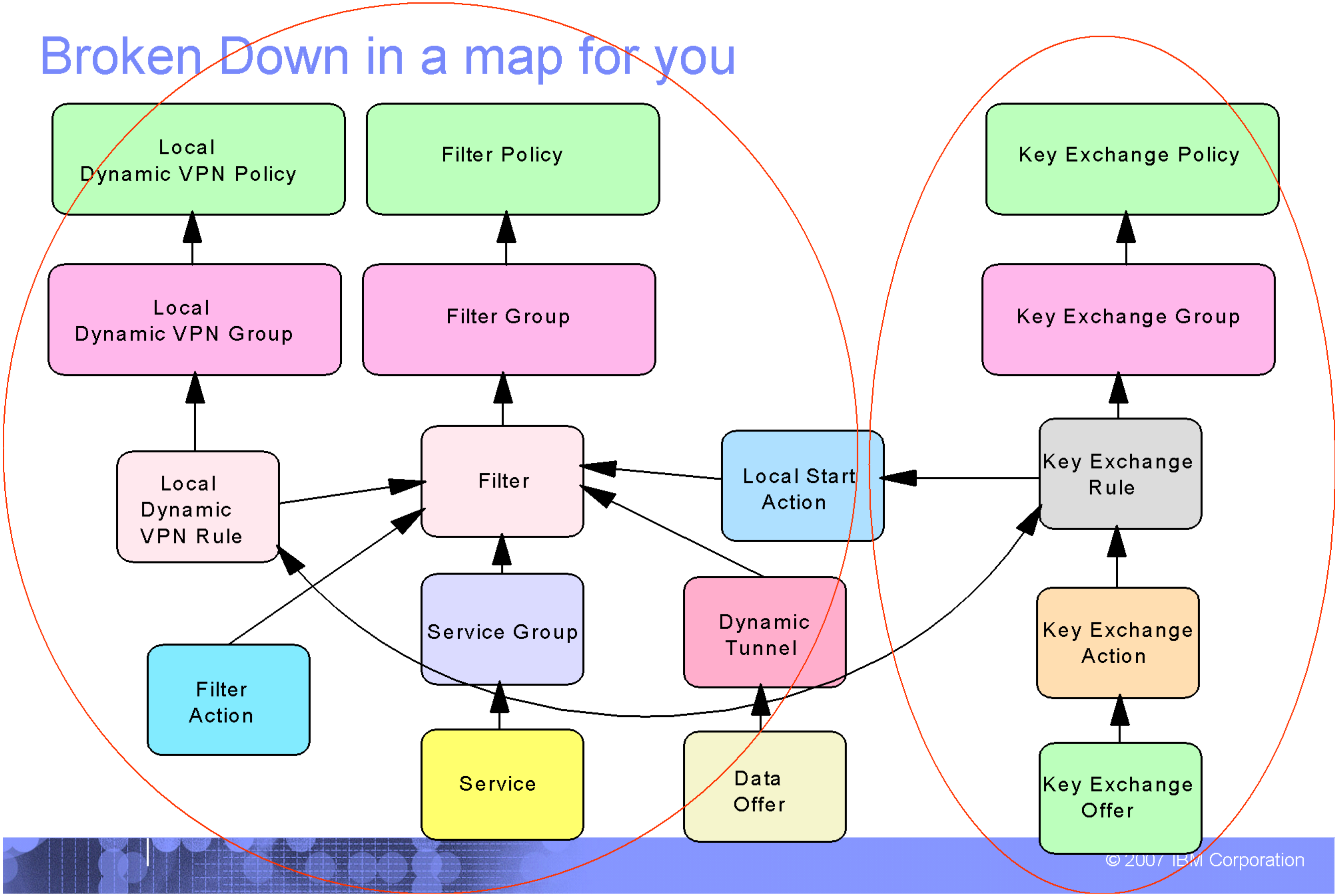
- Authentication algorithms
  - HMAC-SHA
  - HMAC-MD5



- Encryption algorithms
  - DES CBC-8
  - Null encryption
  - 3-DES
  - AES

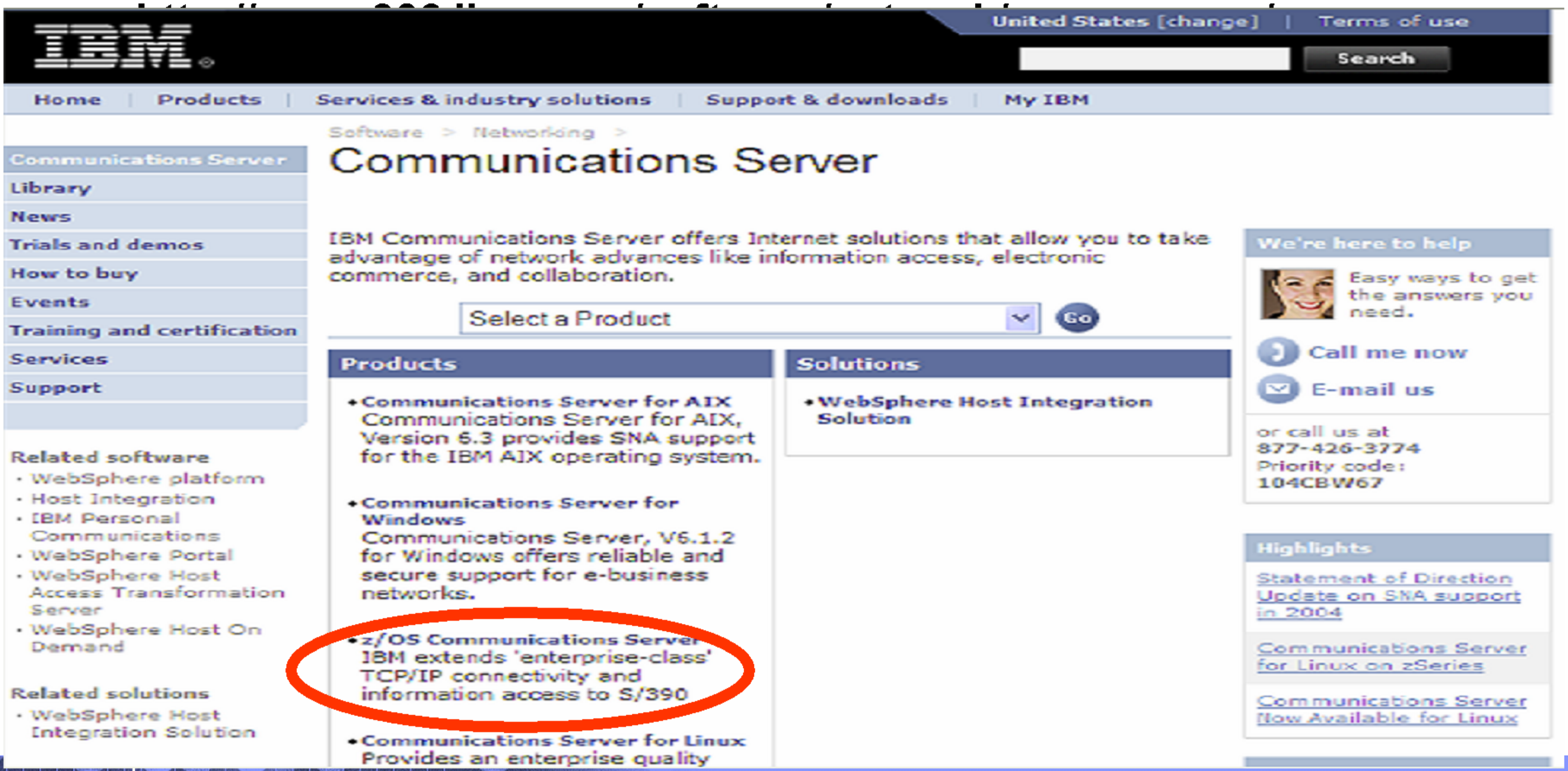
- If transport mode, then "Payload" contains the original transport header and original data (possibly encrypted)
- If tunnel mode, then "Payload" contains original IP header, original transport header, and original data
  - "Payload" can be encrypted

Broken Down in a map for you



Tip for IPSEC

- **Use the IBM Configuration Assistant for z/OS Communications Server**



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Communications Server

IBM Communications Server offers Internet solutions that allow you to take advantage of network advances like information access, electronic commerce, and collaboration.

Products

- **Communications Server for AIX** Communications Server for AIX, Version 6.3 provides SNA support for the IBM AIX operating system.
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- **z/OS Communications Server** IBM extends 'enterprise-class' TCP/IP connectivity and information access to S/390
- **Communications Server for Linux** Provides an enterprise quality

Solutions

- **WebSphere Host Integration Solution**

Related software

- WebSphere platform
- Host Integration
- IBM Personal Communications
- WebSphere Portal
- WebSphere Host Access Transformation Server
- WebSphere Host On Demand

Related solutions

- WebSphere Host Integration Solution

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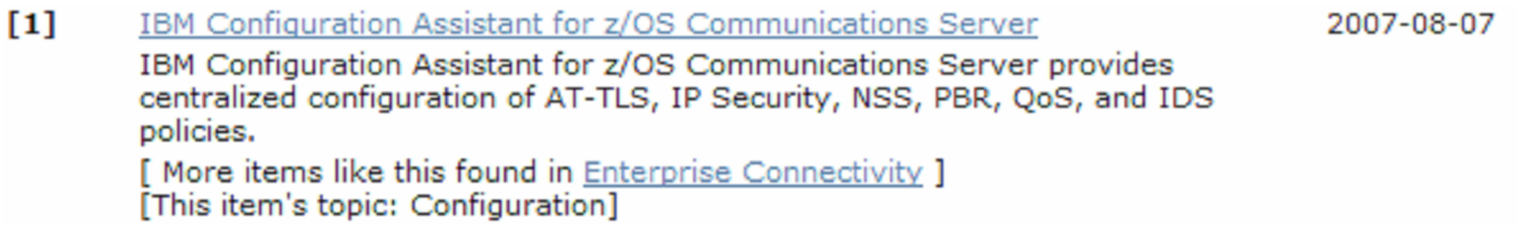
Highlights

Statement of Direction Update on SNA support in 2004

Communications Server for Linux on zSeries

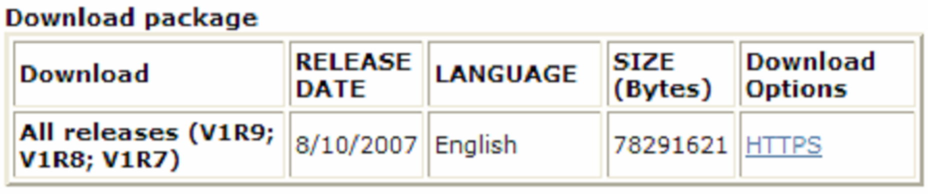
Communications Server Now Available for Linux



[1] IBM Configuration Assistant for z/OS Communications Server 2007-08-07

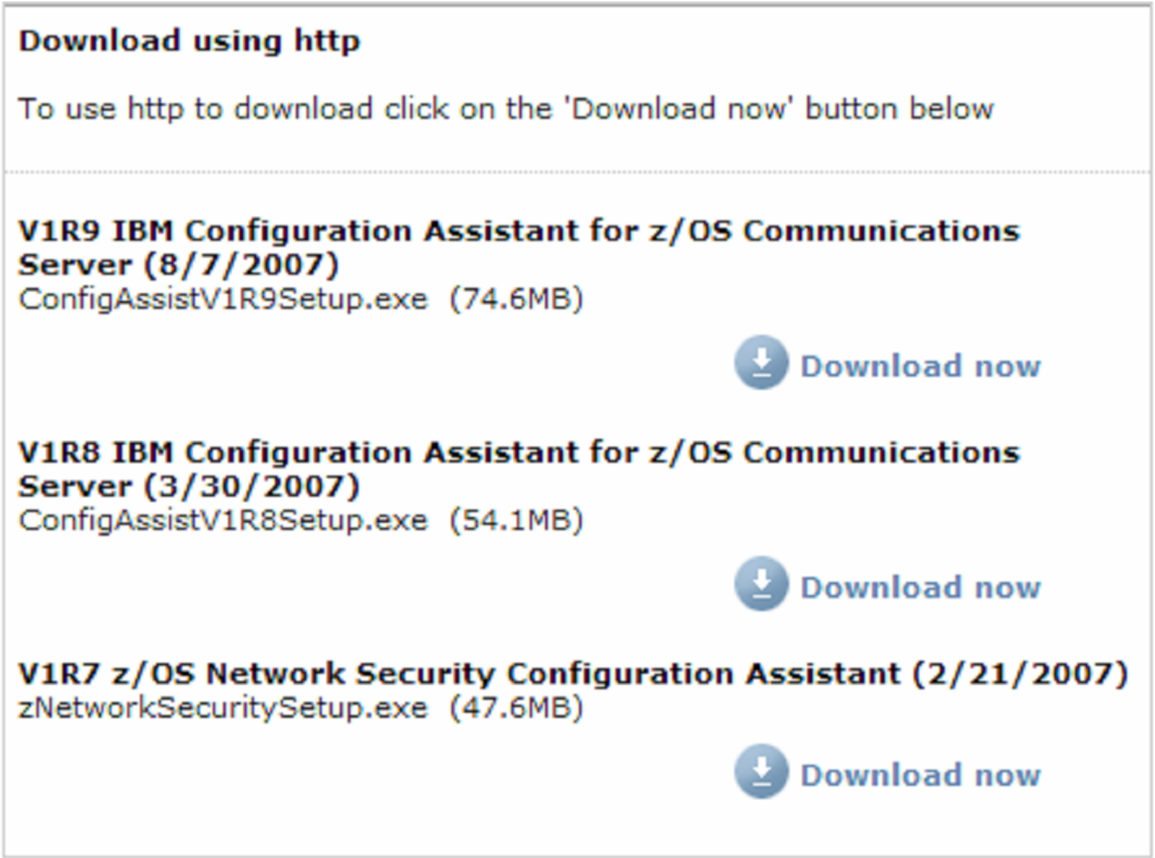
IBM Configuration Assistant for z/OS Communications Server provides centralized configuration of AT-TLS, IP Security, NSS, PBR, QoS, and IDS policies.

[More items like this found in Enterprise Connectivity]
[This item's topic: Configuration]



Download package

Download	RELEASE DATE	LANGUAGE	SIZE (Bytes)	Download Options
All releases (V1R9; V1R8; V1R7)	8/10/2007	English	78291621	HTTPS



Download using http

To use http to download click on the 'Download now' button below

V1R9 IBM Configuration Assistant for z/OS Communications Server (8/7/2007)
ConfigAssistV1R9Setup.exe (74.6MB)

V1R8 IBM Configuration Assistant for z/OS Communications Server (3/30/2007)
ConfigAssistV1R8Setup.exe (54.1MB)

V1R7 z/OS Network Security Configuration Assistant (2/21/2007)
zNetworkSecuritySetup.exe (47.6MB)

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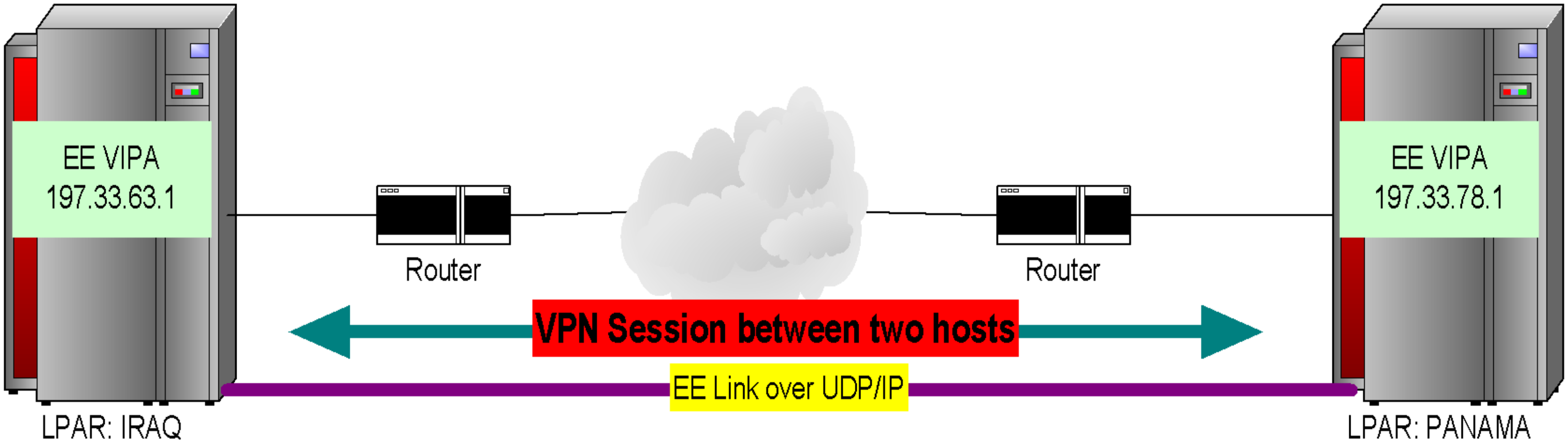
- **Demo of EE over VPN**

Some preparation needed

- **IPCONFIG IPSECURITY (Replace IPCONFIG FIREWALL)**
- **POLICY AGENT SETUP**
- **EE Deck Creation**
  - XCA
  - SMN

Overview of the Demo



The Demo!!!

Useful commands

- D NET,EE
- D NET,EE,IPADDR=static Vipa
- D NET,EEDIAG
- D TCPIP,<stack>,n,config
- ipsec –y display
- ipsec –k display

This Demo is on the Web

- On August 13th of 2008 this demo from beginning to end will be available for you to watch on the web

Communication Server Security Site

http://www-306.ibm.com/software/network/commserver/zos/security/

Direct Link

http://www.ibm.com/support/docview.wss?rs=852&uid=swg27013261

For More Information....

URL	Content
http://www.ibm.com/systems/z/	IBM System z
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http://www.ibm.com/software/network/commserver/library	IBM Communications Server Library - white papers, product documentation, etc.
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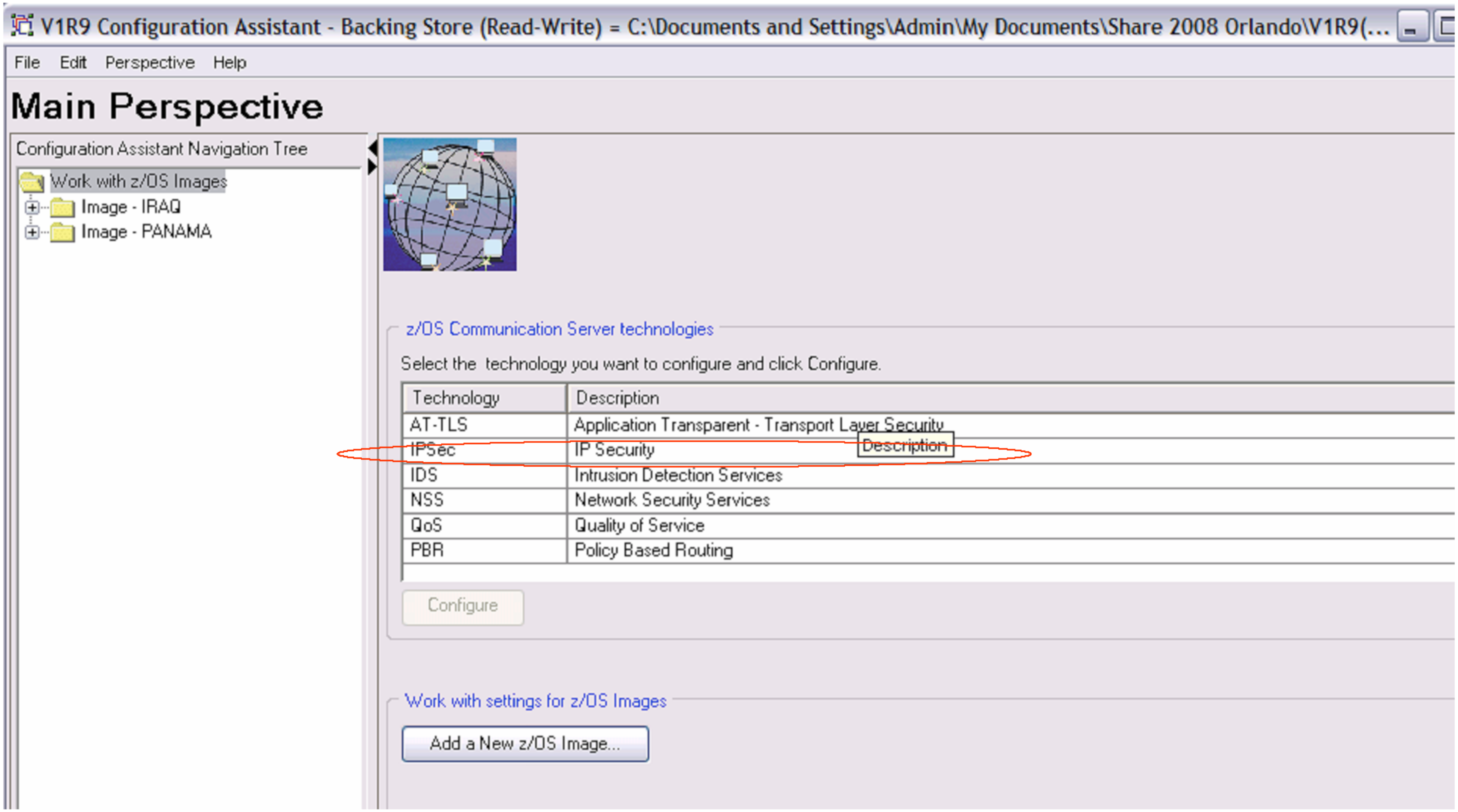
http://www.ibm.com/support/techdocs/	Technical Support Documentation (techdocs, flashes, presentations, white papers, etc.)
http://www.rfc-editor.org/rfcsearch.html	Request For Comments (RFCs)
http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp	IBM Education Assistant

APENDIX

- **See the following slides for the Gui**

How do you do it



V1R9 Configuration Assistant - Backing Store (Read-Write) = C:\Documents and Settings\Admin\My Documents\Share 2008 Orlando\V1R9(...
File
Edit
Perspective
Help
Configuration Assistant Navigation Tree
Work with z/OS Images
Image - IRAQ
Image - PANAMA
Description
Configure
Add a New z/OS Image...

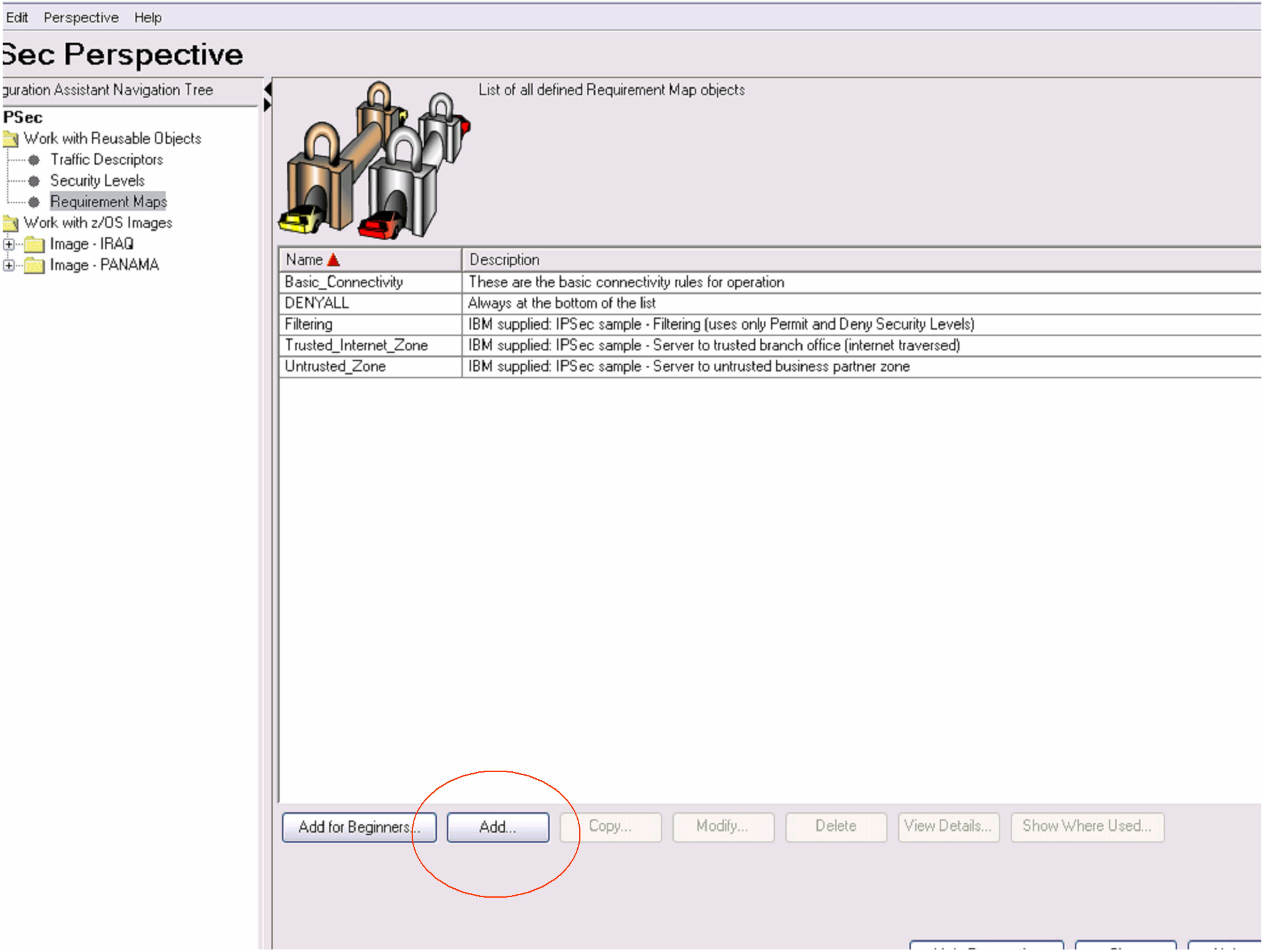
Main Perspective

z/OS Communication Server technologies

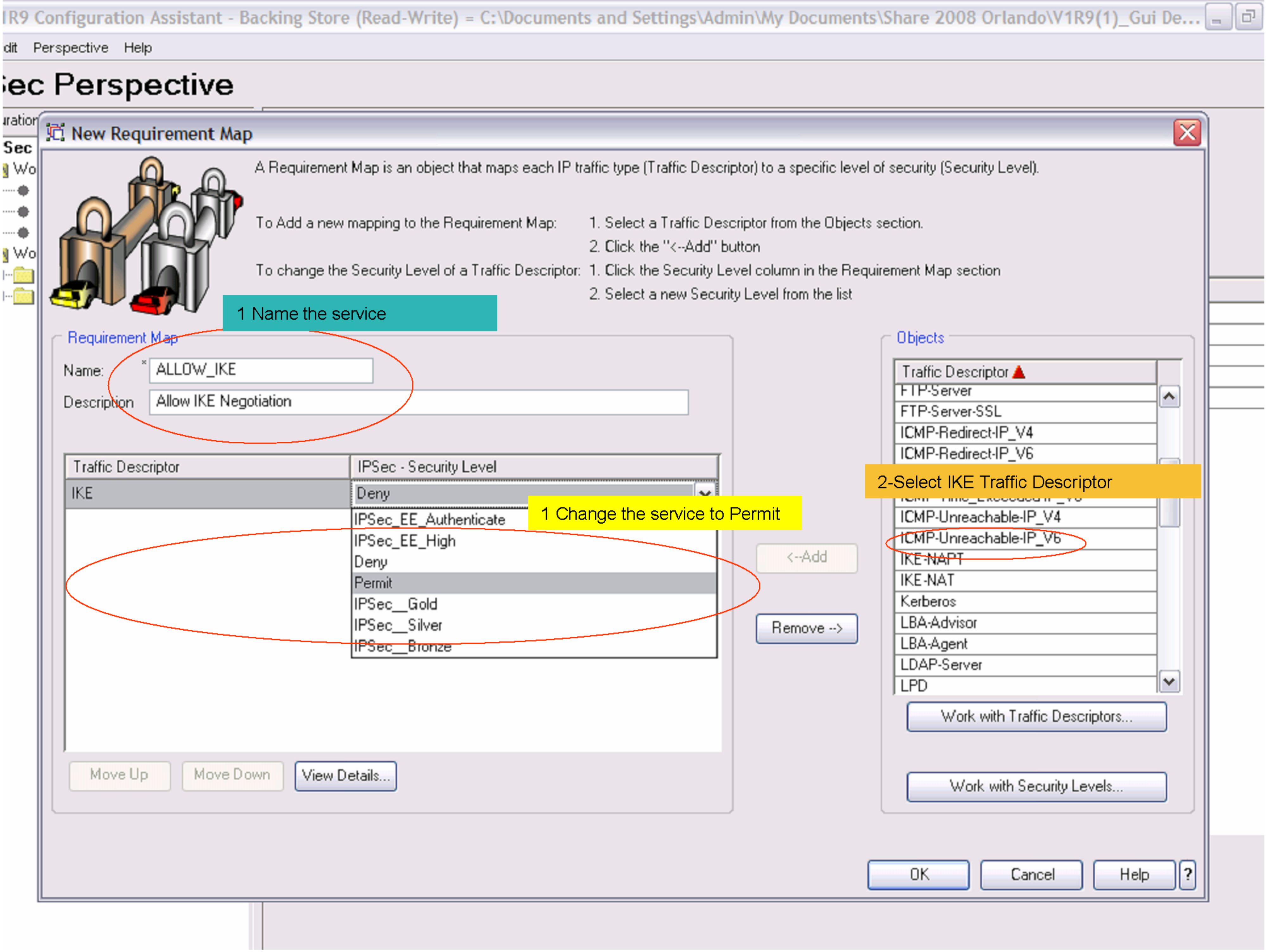
Select the technology you want to configure and click Configure.

Technology	Description
AT-TLS	Application Transparent - Transport Layer Security
IPSec	IP Security
IDS	Intrusion Detection Services
NSS	Network Security Services
QoS	Quality of Service
PBR	Policy Based Routing

Work with settings for z/OS Images



Name ▲	Description
Basic_Connectivity	These are the basic connectivity rules for operation
DENYALL	Always at the bottom of the list
Filtering	IBM supplied: IPSec sample - Filtering (uses only Permit and Deny Security Levels)
Trusted_Internet_Zone	IBM supplied: IPSec sample - Server to trusted branch office (internet traversed)
Untrusted_Zone	IBM supplied: IPSec sample - Server to untrusted business partner zone



IR9 Configuration Assistant - Backing Store (Read-Write) = C:\Documents and Settings\Admin\My Documents\Share 2008 Orlando\V1R9(1)_Gui De...

New Requirement Map

A Requirement Map is an object that maps each IP traffic type (Traffic Descriptor) to a specific level of security (Security Level).

To Add a new mapping to the Requirement Map: 1. Select a Traffic Descriptor from the Objects section.
2. Click the "<--Add" button

To change the Security Level of a Traffic Descriptor: 1. Click the Security Level column in the Requirement Map section
2. Select a new Security Level from the list

1 Name the service

Requirement Map

Name: * ALLOW_IKE

Description: Allow IKE Negotiation

Traffic Descriptor	IPSec - Security Level
IKE	Deny

IPSec_EE_Authenticate
IPSec_EE_High
Deny
Permit
IPSec__Gold
IPSec__Silver
IPSec__Bronze

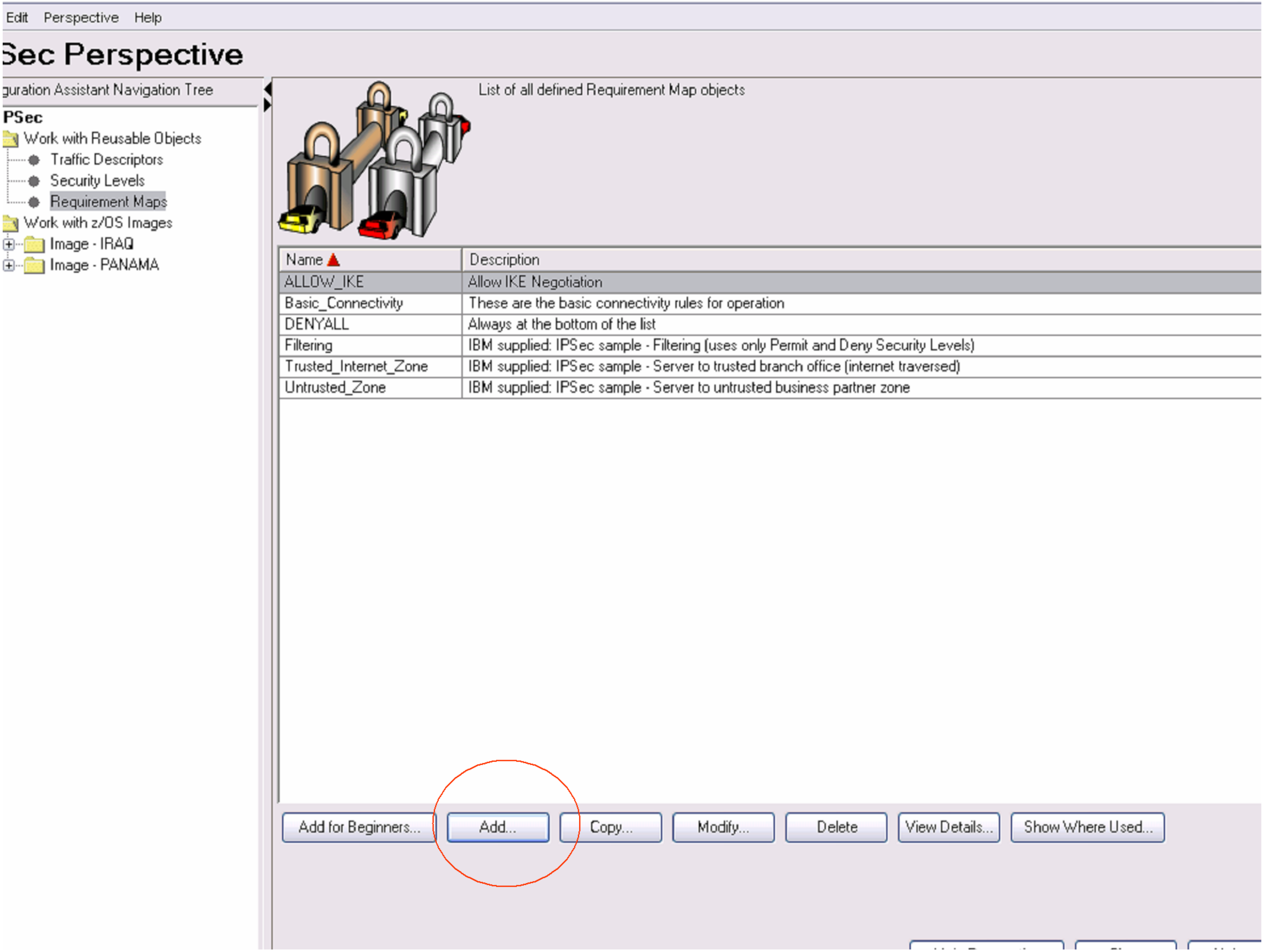
1 Change the service to Permit

Objects

Traffic Descriptor
FTP-Server
FTP-Server-SSL
ICMP-Redirect-IP_V4
ICMP-Redirect-IP_V6
ICMP-Time_Exceeded-IP_V6
ICMP-Unreachable-IP_V4
ICMP-Unreachable-IP_V6
IKE-NAPT
IKE-NAT
Kerberos
LBA-Advisor
LBA-Agent
LDAP-Server
LPD

2-Select IKE Traffic Descriptor

Work with Traffic Descriptors...
Work with Security Levels...
OK
Cancel
Help
?



List of all defined Requirement Map objects

Name ▲	Description
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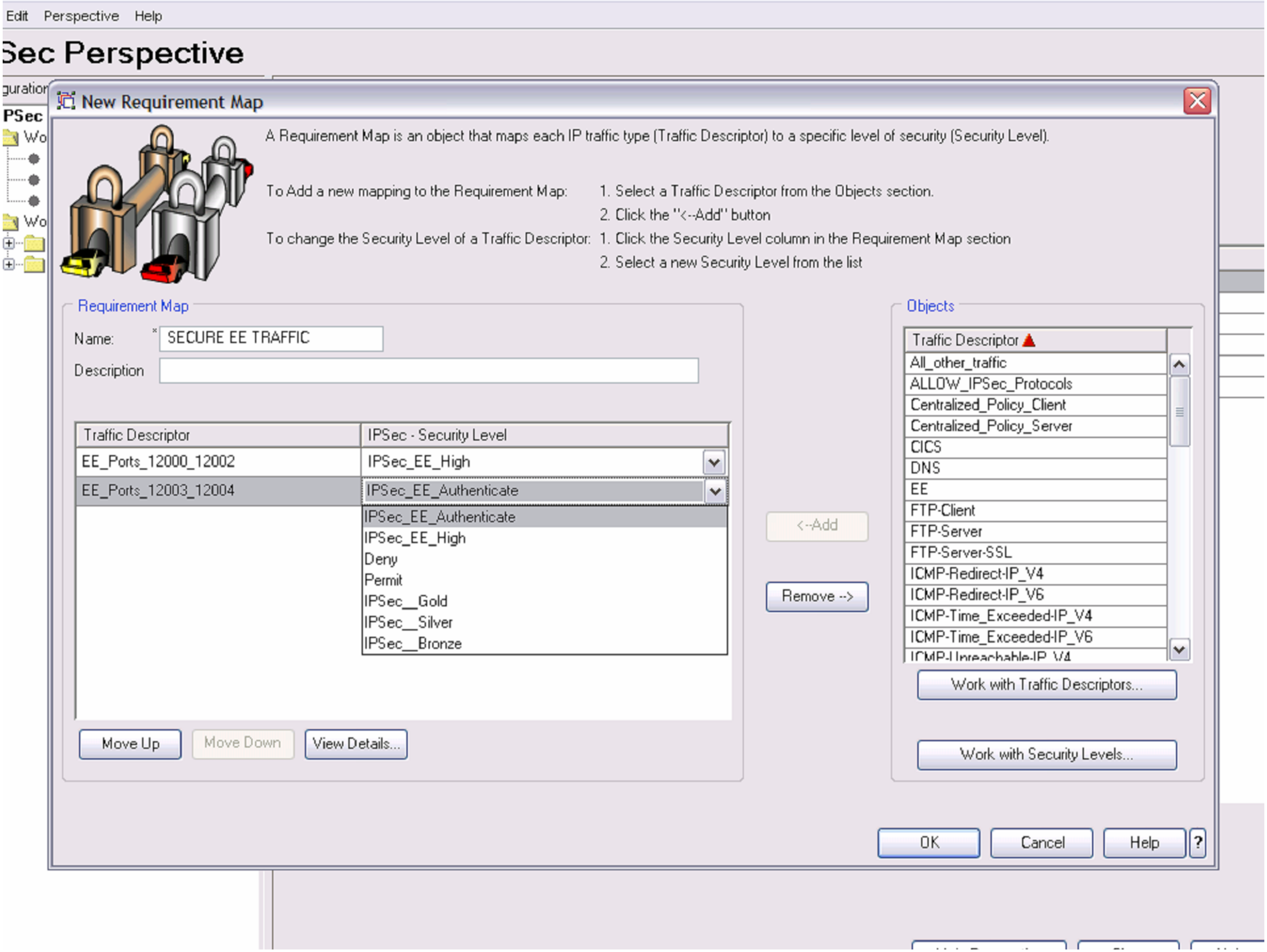

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Requirement Map

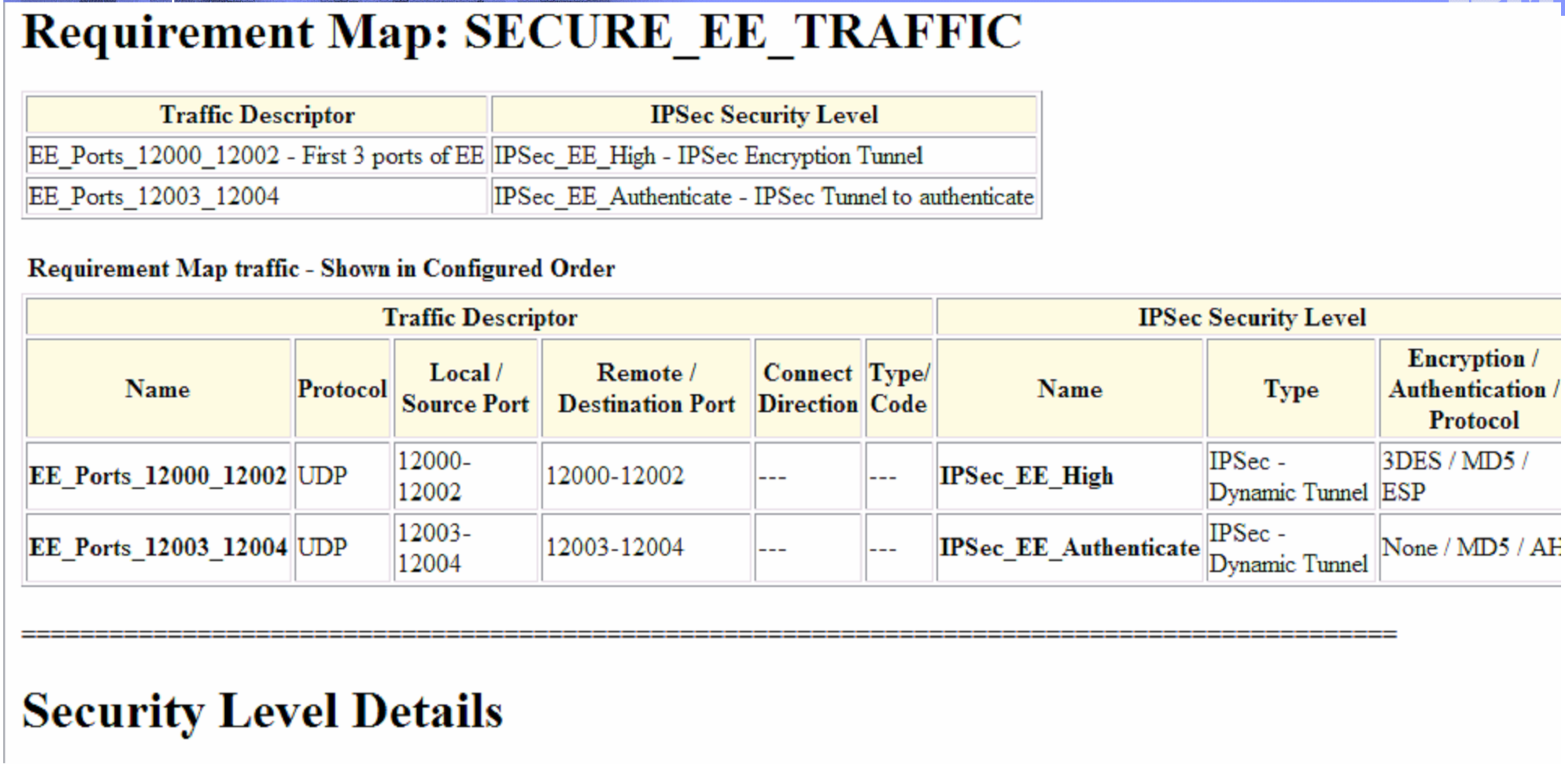
Name: * SECURE EE TRAFFIC

Description

Traffic Descriptor	IPSec - Security Level
EE_Ports_12000_12002	IPSec_EE_High
EE_Ports_12003_12004	IPSec_EE_Authenticate

Traffic Descriptor ▲
All_other_traffic
ALLOW_IPSec_Protocols
Centralized_Policy_Client
Centralized_Policy_Server
CICS
DNS
EE
FTP-Client
FTP-Server
FTP-Server-SSL
ICMP-Redirect-IP_V4
ICMP-Redirect-IP_V6
ICMP-Time_Exceeded-IP_V4
ICMP-Time_Exceeded-IP_V6
ICMP-Unreachable-IP_V4

Work with Traffic Descriptors...
Work with Security Levels...
OK
Cancel
Help
?



Requirement Map: SECURE_EE_TRAFFIC

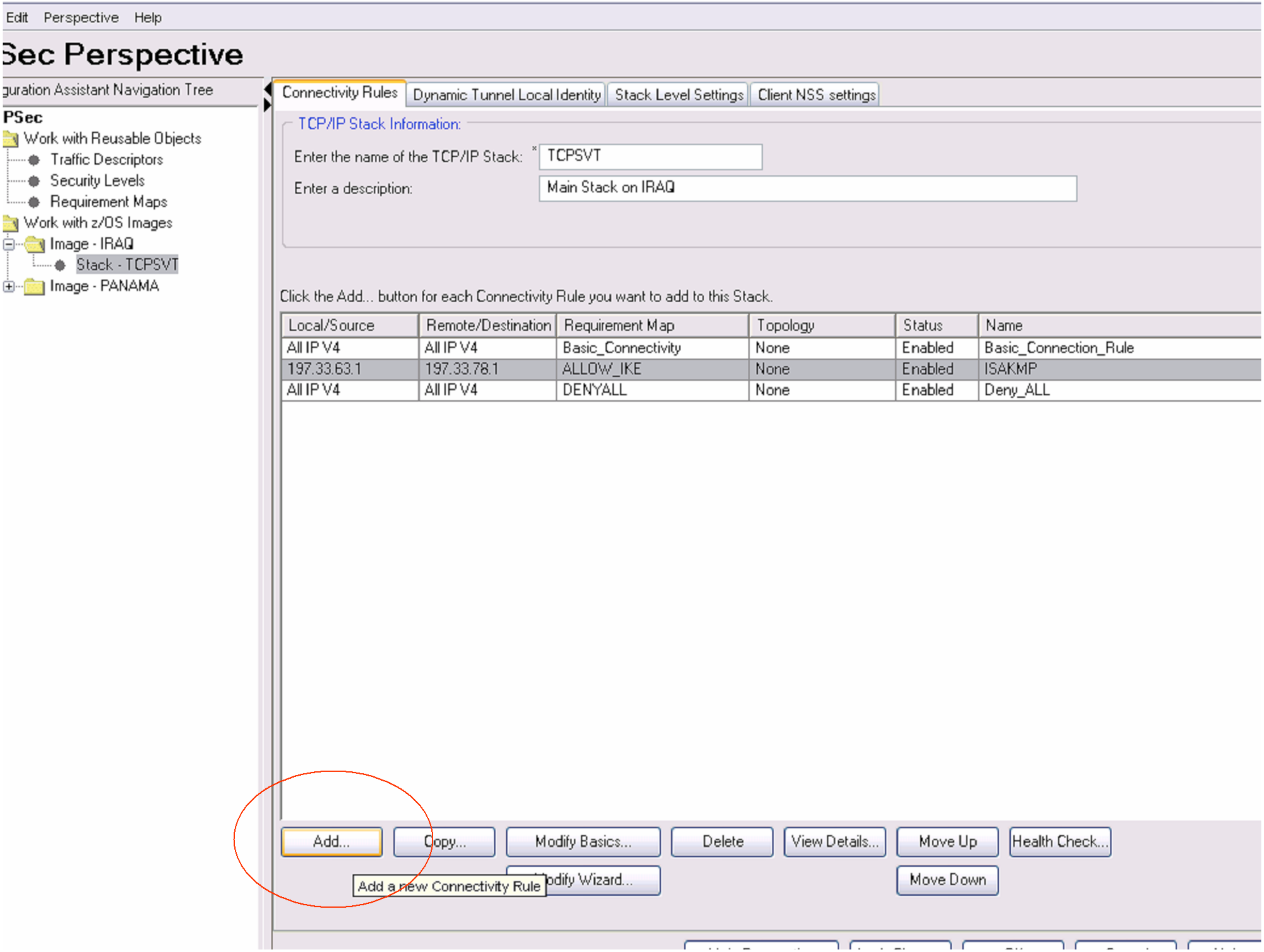
Traffic Descriptor	IPSec Security Level
EE_Ports_12000_12002 - First 3 ports of EE	IPSec_EE_High - IPSec Encryption Tunnel
EE_Ports_12003_12004	IPSec_EE_Authenticate - IPSec Tunnel to authenticate

Requirement Map traffic - Shown in Configured Order

Traffic Descriptor						IPSec Security Level		
Name	Protocol	Local / Source Port	Remote / Destination Port	Connect Direction	Type/ Code	Name	Type	Encryption / Authentication / Protocol
EE_Ports_12000_12002	UDP	12000-12002	12000-12002	---	---	**IPSec_EE_High**	IPSec - Dynamic Tunnel	3DES / MD5 / ESP
EE_Ports_12003_12004	UDP	12003-12004	12003-12004	---	---	**IPSec_EE_Authenticate**	IPSec - Dynamic Tunnel	None / MD5 / AH

Security Level Details

Note that these were created for the DEMO earlier. You can just us the defaults if you so desire

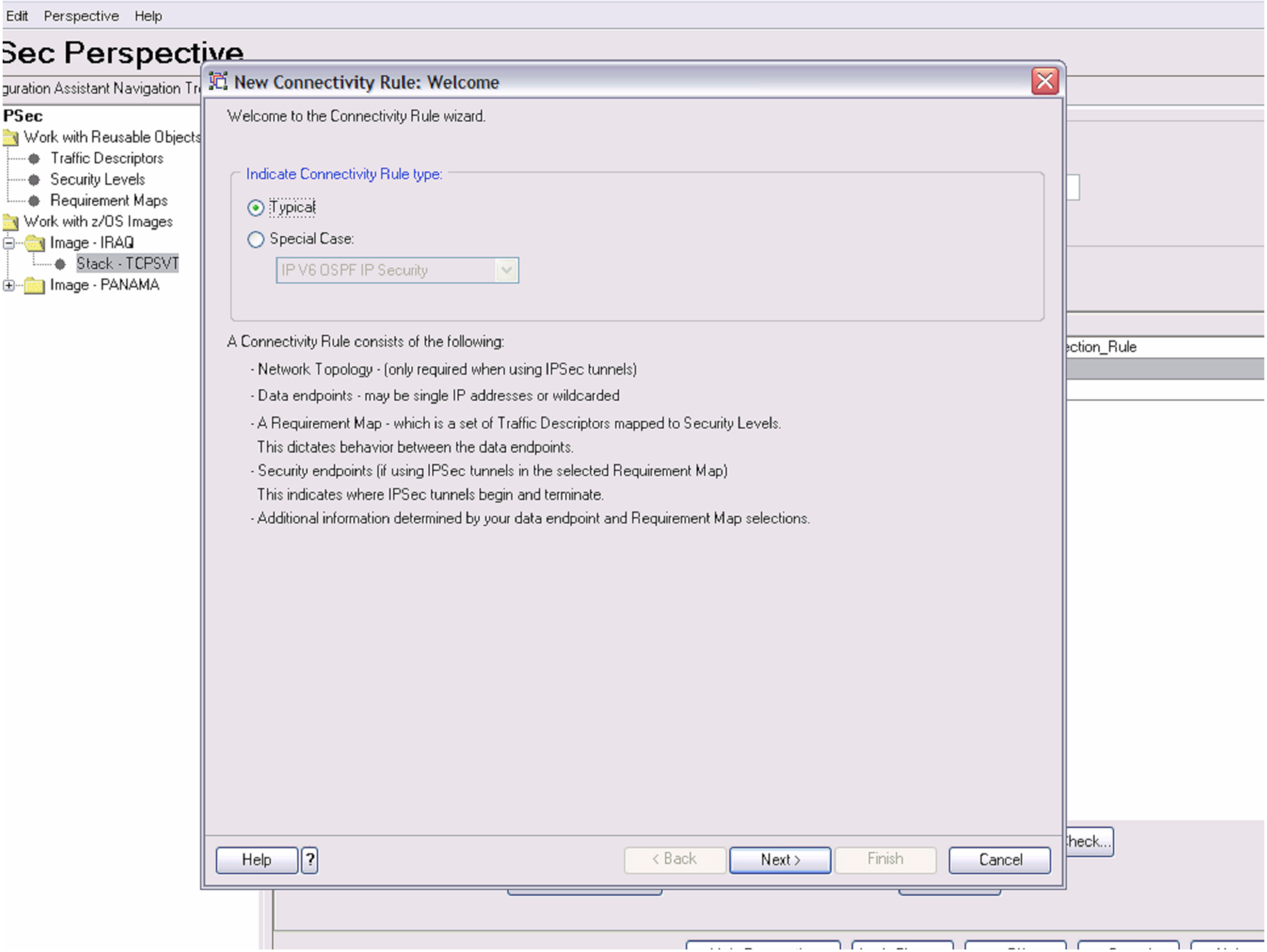


Enter the name of the TCP/IP Stack: * TCPSVT

Enter a description: Main Stack on IRAQ

Click the Add... button for each Connectivity Rule you want to add to this Stack.

Local/Source	Remote/Destination	Requirement Map	Topology	Status	Name
All IP V4	All IP V4	Basic_Connectivity	None	Enabled	Basic_Connection_Rule
197.33.63.1	197.33.78.1	ALLOW_IKE	None	Enabled	ISAKMP
All IP V4	All IP V4	DENYALL	None	Enabled	Deny_ALL



New Connectivity Rule: Welcome

Welcome to the Connectivity Rule wizard.

Indicate Connectivity Rule type:

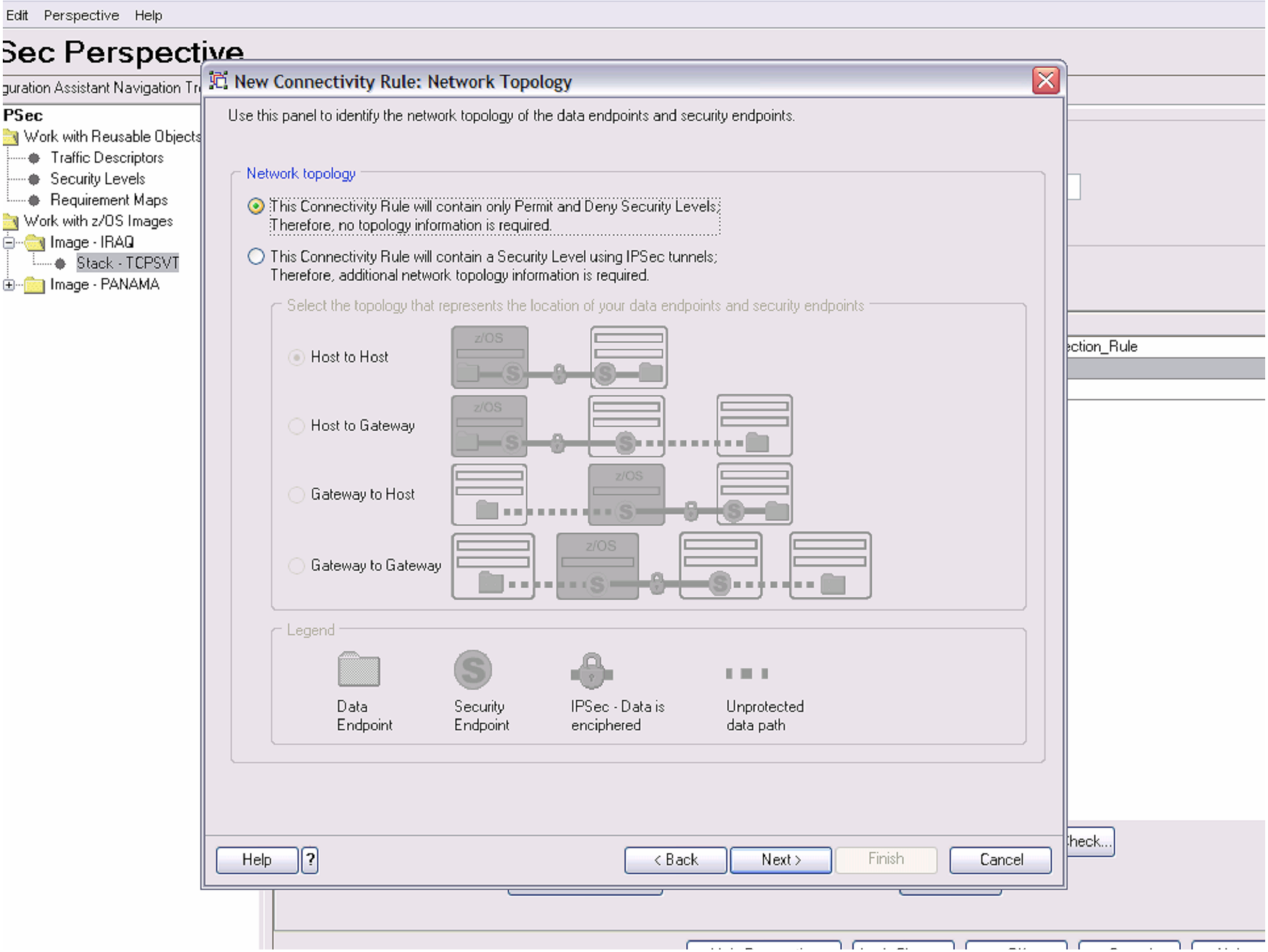
● Typical

○ Special Case:

IP V6 OSPF IP Security

A Connectivity Rule consists of the following:

- Network Topology - (only required when using IPSec tunnels)
- Data endpoints - may be single IP addresses or wildcarded
- A Requirement Map - which is a set of Traffic Descriptors mapped to Security Levels.
  This dictates behavior between the data endpoints.
- Security endpoints (if using IPSec tunnels in the selected Requirement Map)
  This indicates where IPSec tunnels begin and terminate.
- Additional information determined by your data endpoint and Requirement Map selections.



New Connectivity Rule: Network Topology

Use this panel to identify the network topology of the data endpoints and security endpoints.

Network topology

● This Connectivity Rule will contain only Permit and Deny Security Levels; Therefore, no topology information is required.

○ This Connectivity Rule will contain a Security Level using IPSec tunnels; Therefore, additional network topology information is required.

Select the topology that represents the location of your data endpoints and security endpoints

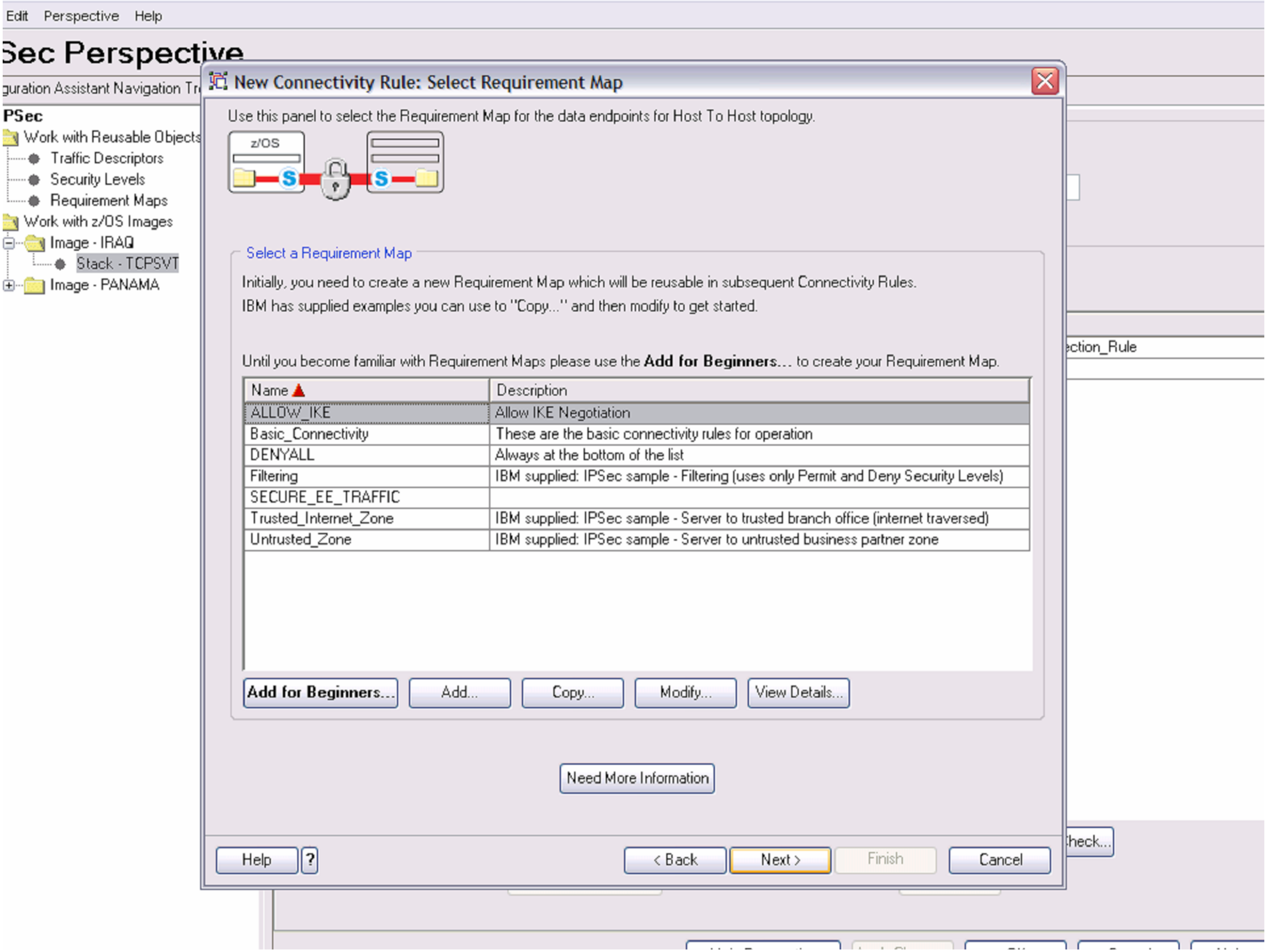
● Host to Host

○ Host to Gateway

○ Gateway to Host

○ Gateway to Gateway

Legend



New Connectivity Rule: Select Requirement Map

Use this panel to select the Requirement Map for the data endpoints for Host To Host topology.

Select a Requirement Map

Initially, you need to create a new Requirement Map which will be reusable in subsequent Connectivity Rules.

IBM has supplied examples you can use to "Copy..." and then modify to get started.

Until you become familiar with Requirement Maps please use the **Add for Beginners...** to create your Requirement Map.

Name ▲	Description
ALLOW_IKE	Allow IKE Negotiation
Basic_Connectivity	These are the basic connectivity rules for operation
DENYALL	Always at the bottom of the list
Filtering	IBM supplied: IPSec sample - Filtering (uses only Permit and Deny Security Levels)
SECURE_EE_TRAFFIC	
Trusted_Internet_Zone	IBM supplied: IPSec sample - Server to trusted branch office (internet traversed)
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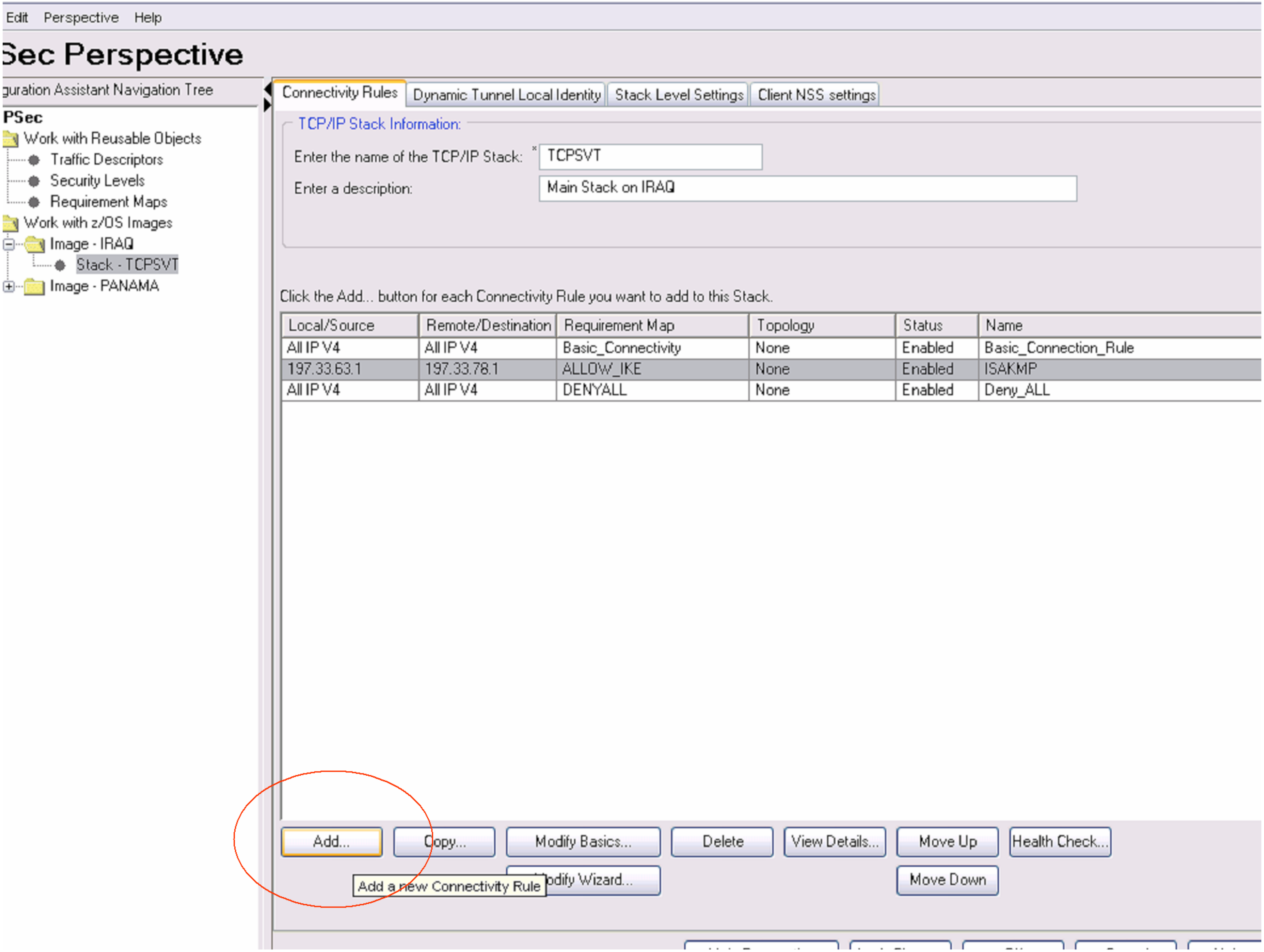

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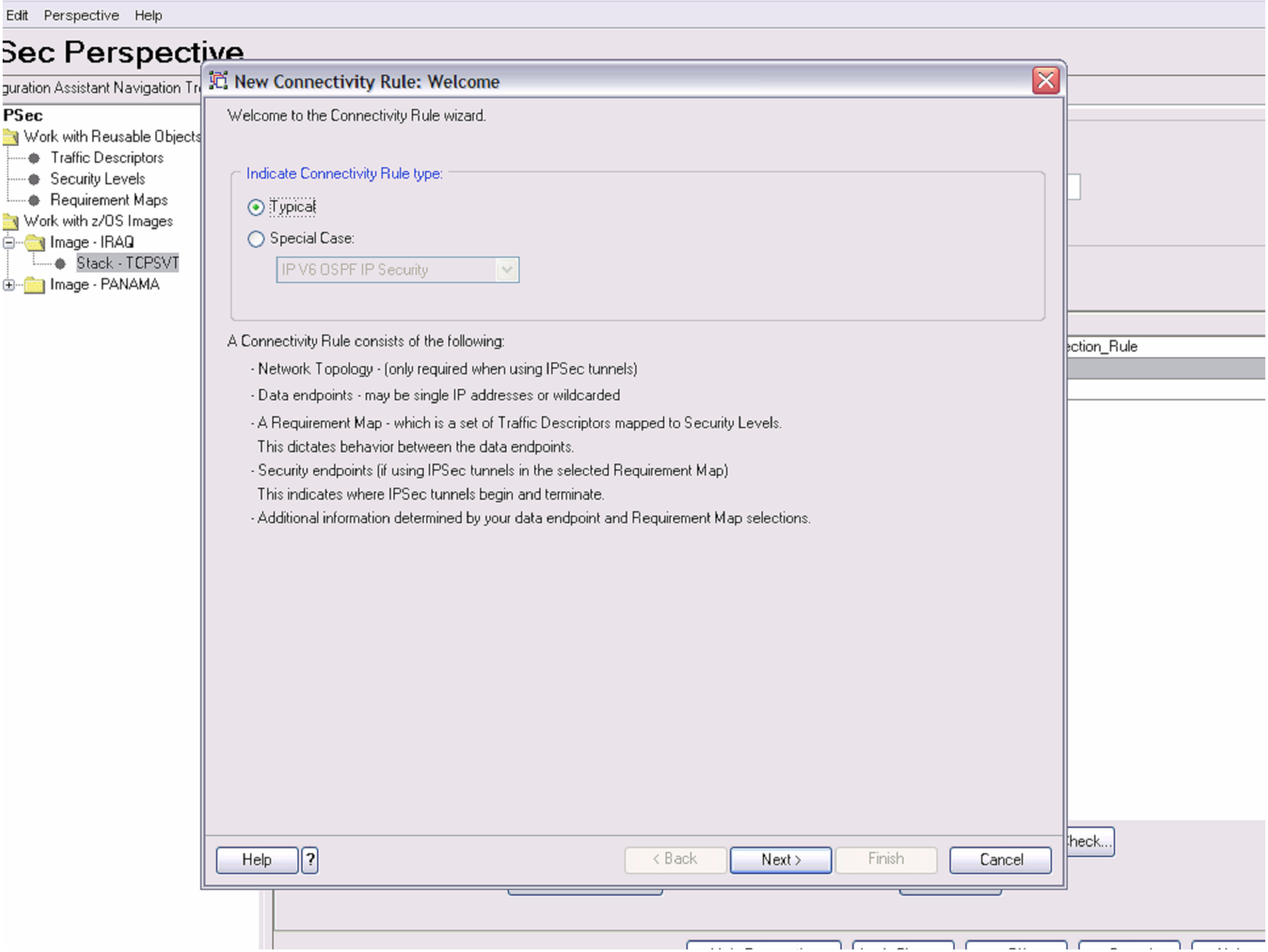
197.33.63.1	197.33.78.1	ALLOW_IKE	None	Enabled	ISAKMP
All IP V4	All IP V4	DENYALL	None	Enabled	Deny_ALL



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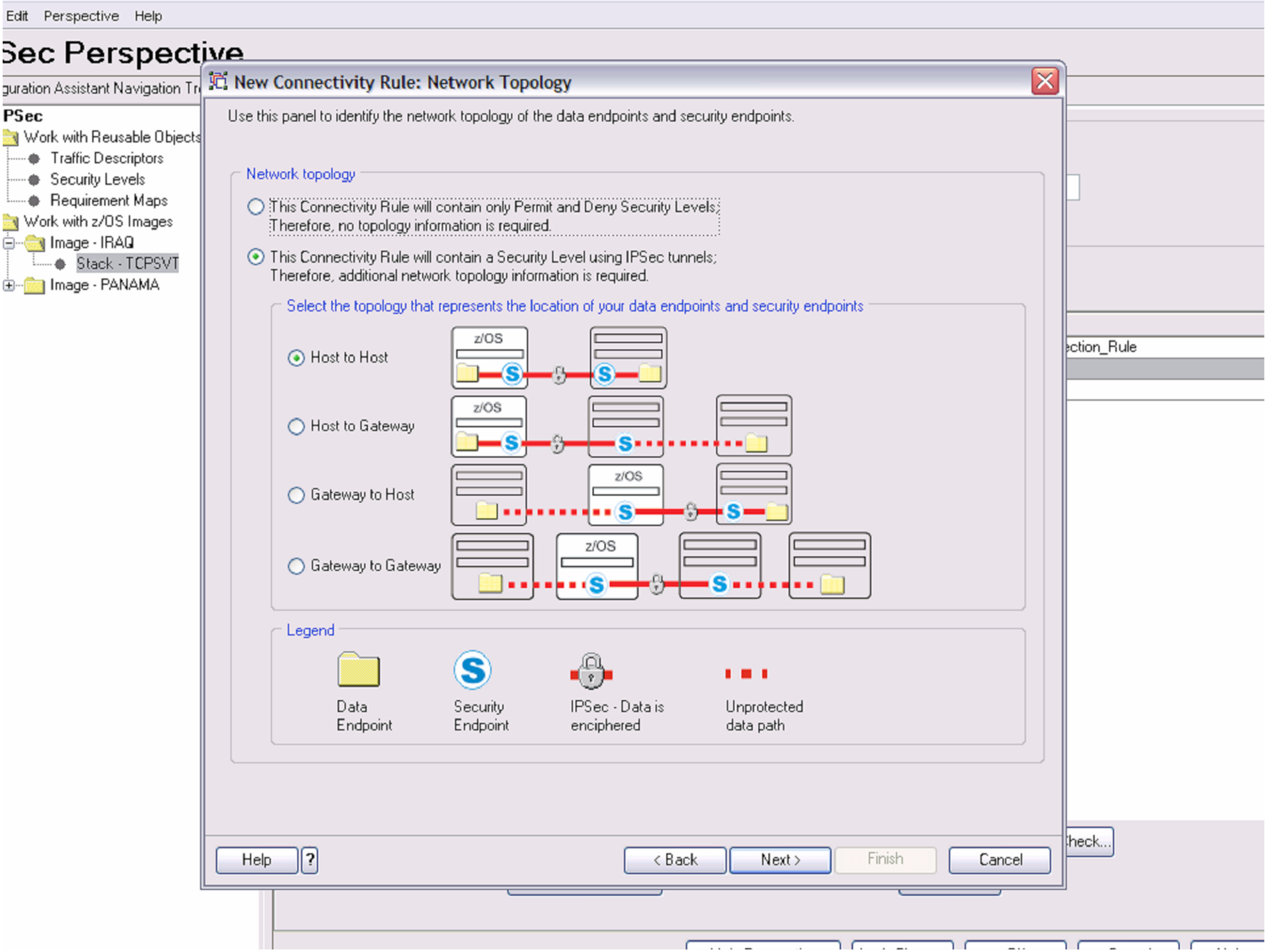

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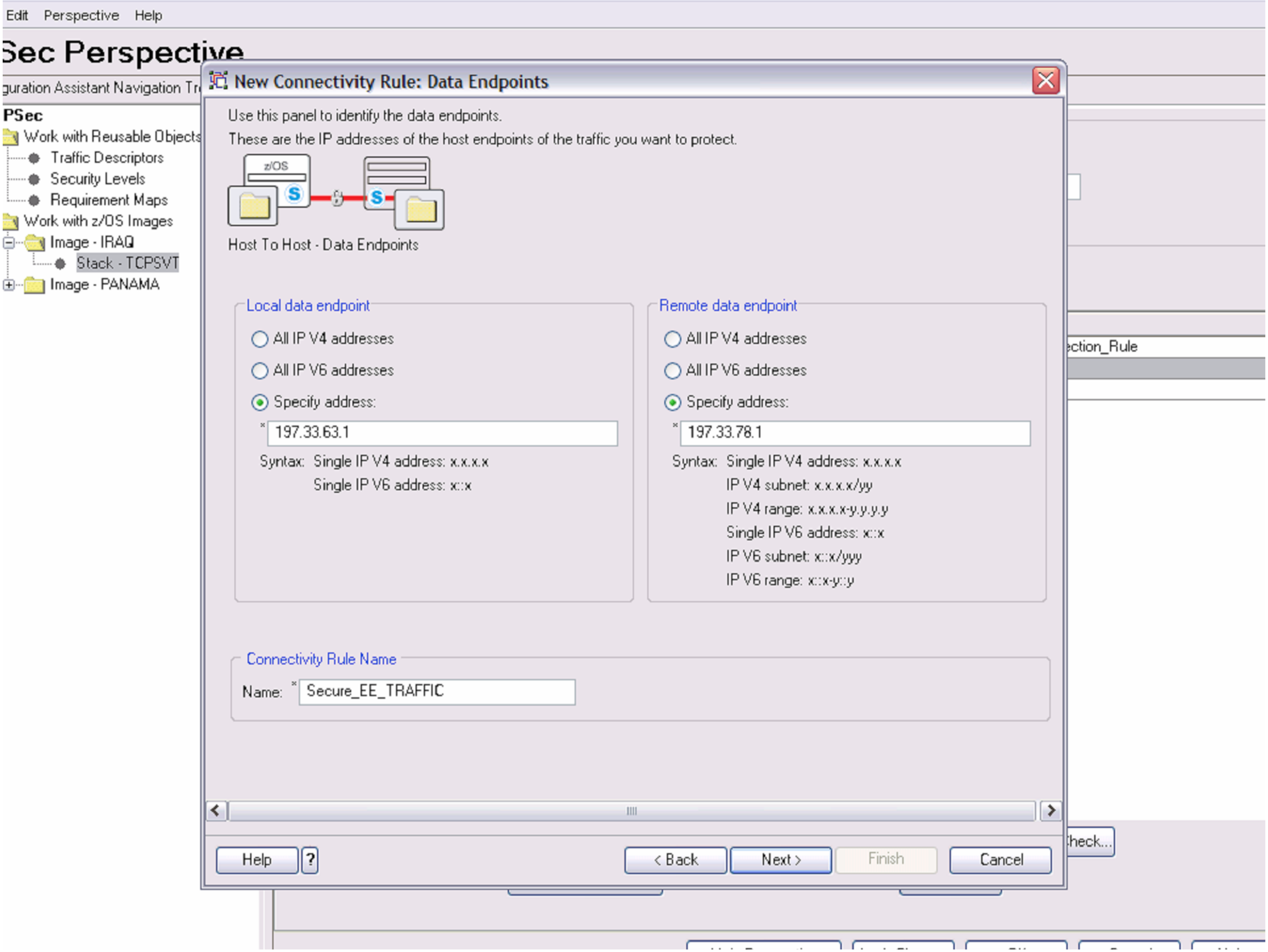
○ Host to Gateway

○ Gateway to Host

○ Gateway to Gateway

Legend



New Connectivity Rule: Data Endpoints

Use this panel to identify the data endpoints.

These are the IP addresses of the host endpoints of the traffic you want to protect.

Host To Host - Data Endpoints

Local data endpoint

○ All IP V4 addresses

○ All IP V6 addresses

● Specify address:

* 197.33.63.1

Syntax: Single IP V4 address: x.x.x.x
Single IP V6 address: x::x

Remote data endpoint

○ All IP V4 addresses

○ All IP V6 addresses

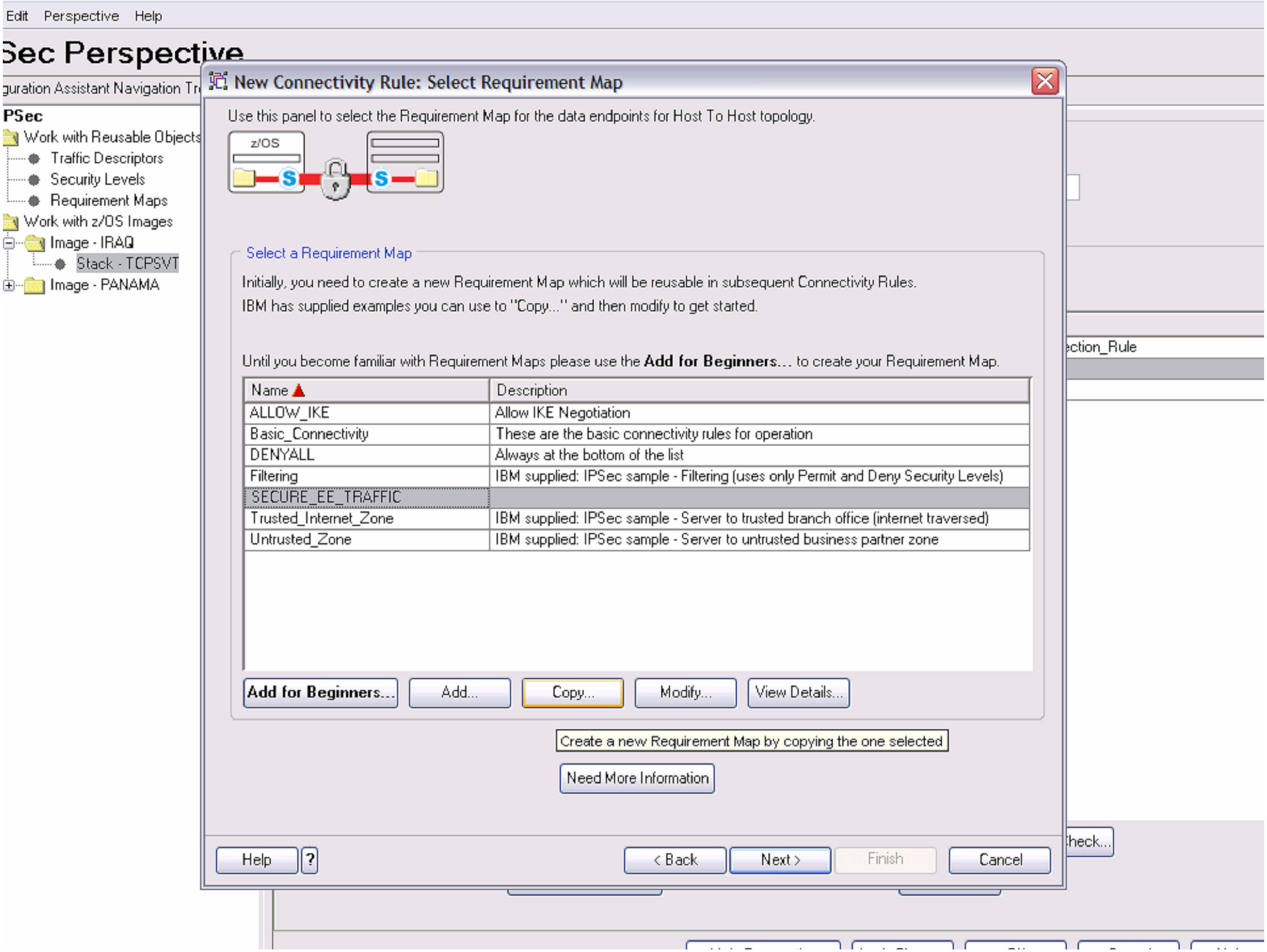
● Specify address:

* 197.33.78.1

Syntax: Single IP V4 address: x.x.x.x
IP V4 subnet: x.x.x.x/yy
IP V4 range: x.x.x.x-y.y.y.y
Single IP V6 address: x::x
IP V6 subnet: x::x/yyy
IP V6 range: x::x-y::y

Connectivity Rule Name

Name: * Secure_EE_TRAFFIC



New Connectivity Rule: Select Requirement Map

Use this panel to select the Requirement Map for the data endpoints for Host To Host topology.

Select a Requirement Map

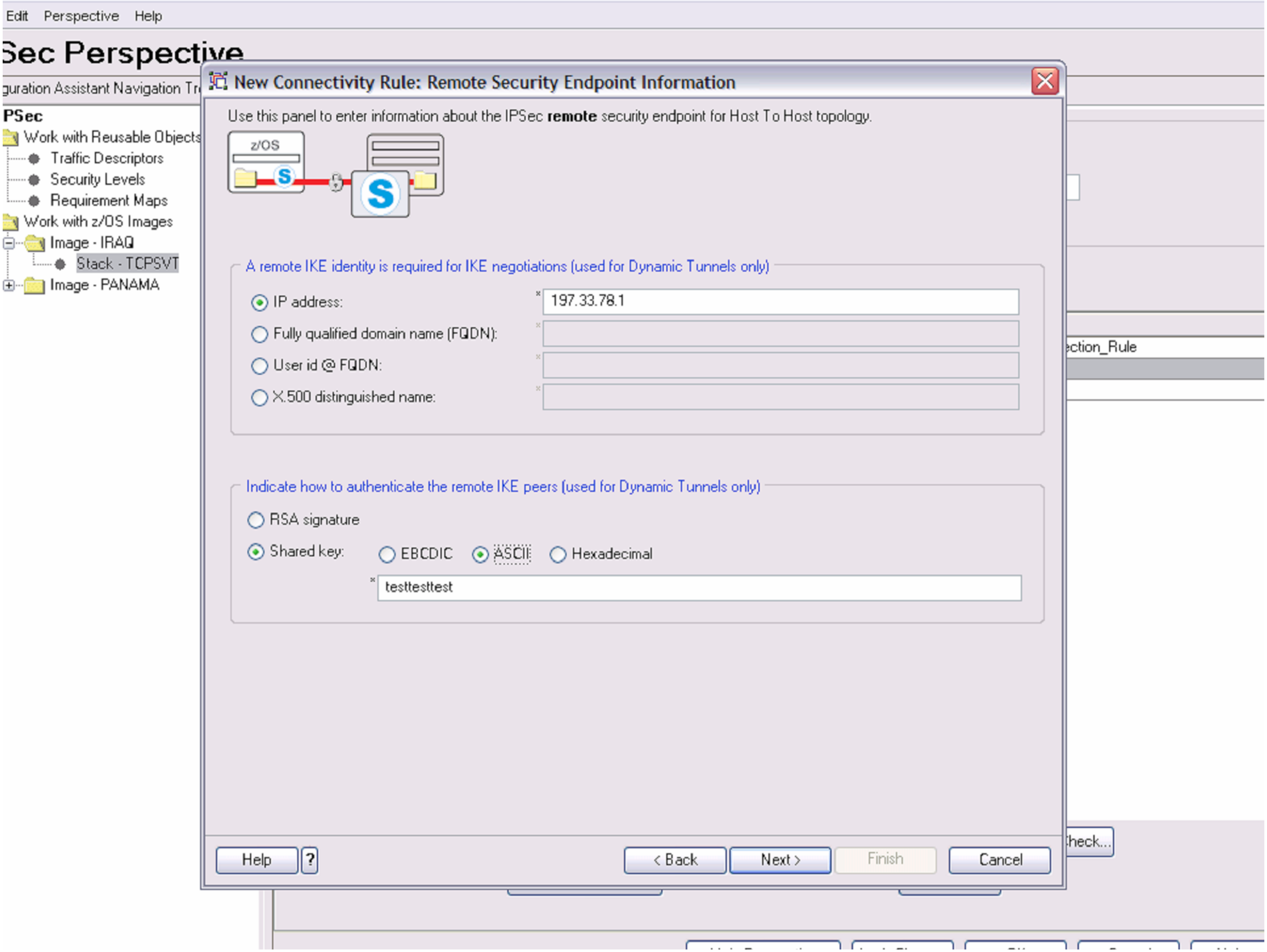
Initially, you need to create a new Requirement Map which will be reusable in subsequent Connectivity Rules.

IBM has supplied examples you can use to "Copy..." and then modify to get started.

Until you become familiar with Requirement Maps please use the **Add for Beginners...** to create your Requirement Map.

Name ▲	Description
ALLOW_IKE	Allow IKE Negotiation
Basic_Connectivity	These are the basic connectivity rules for operation
DENYALL	Always at the bottom of the list
Filtering	IBM supplied: IPSec sample - Filtering (uses only Permit and Deny Security Levels)
SECURE_EE_TRAFFIC	
Trusted_Internet_Zone	IBM supplied: IPSec sample - Server to trusted branch office (internet traversed)
Untrusted_Zone	IBM supplied: IPSec sample - Server to untrusted business partner zone

Create a new Requirement Map by copying the one selected



New Connectivity Rule: Remote Security Endpoint Information

Use this panel to enter information about the IPSec **remote** security endpoint for Host To Host topology.

A remote IKE identity is required for IKE negotiations (used for Dynamic Tunnels only)

● IP address: * 197.33.78.1

○ Fully qualified domain name (FQDN): *

○ User id @ FQDN: *

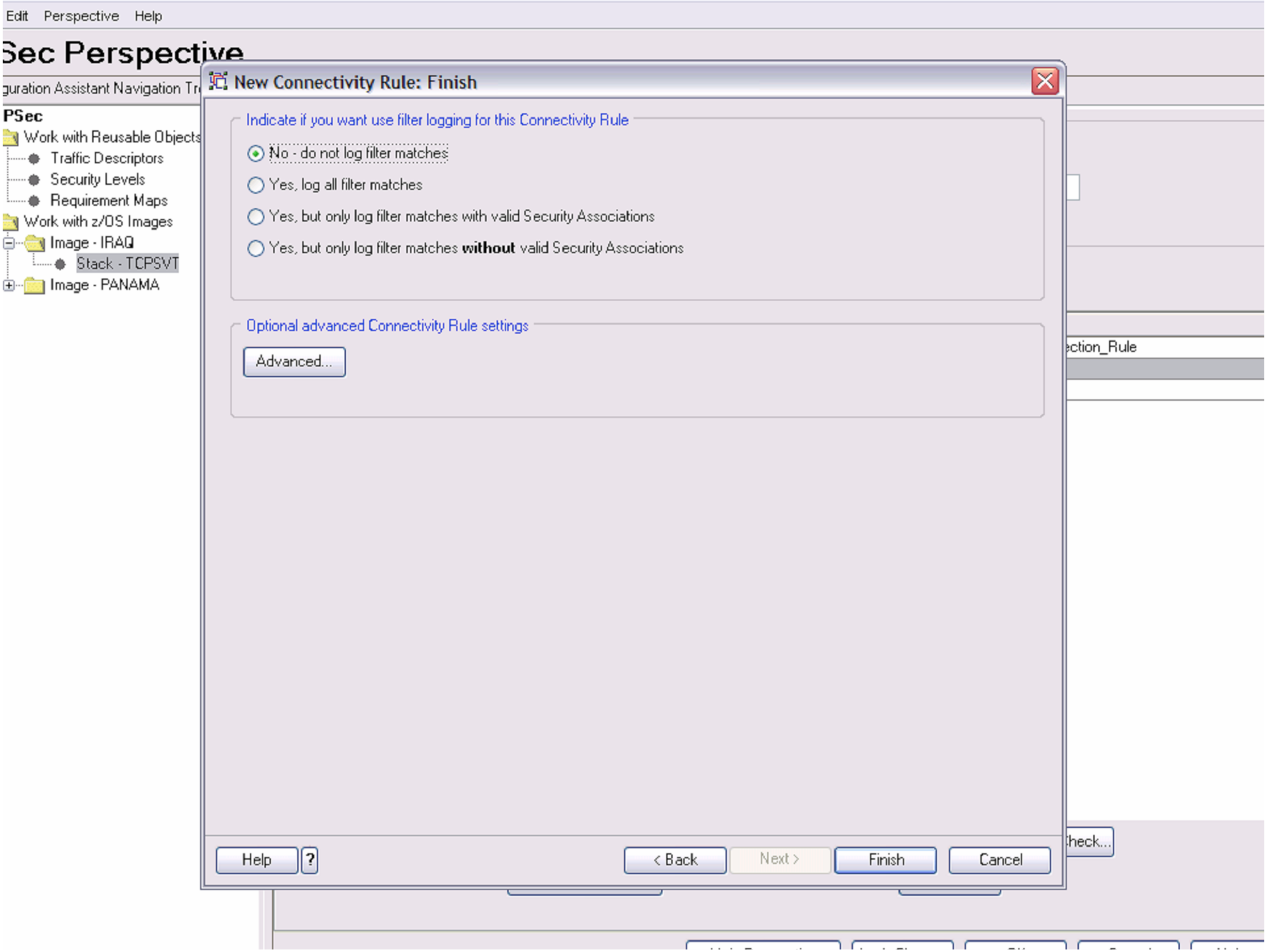
○ X.500 distinguished name: *

Indicate how to authenticate the remote IKE peers (used for Dynamic Tunnels only)

○ RSA signature

● Shared key: ○ EBCDIC ● ASCII ○ Hexadecimal

* testtesttest



New Connectivity Rule: Finish

Indicate if you want use filter logging for this Connectivity Rule

● No - do not log filter matches

○ Yes, log all filter matches

○ Yes, but only log filter matches with valid Security Associations

○ Yes, but only log filter matches **without** valid Security Associations

Optional advanced Connectivity Rule settings