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Samsung SDS **EMM**

Configuration Guide for Ipvsec settings
in Microsoft Windows Server 2016/2019
for Common Criteria Evaluation



Solution version 2.2.5

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PREFACE

This guide describes how to set up IPsec configuration on Microsoft Windows Server 2016 for the mutual authentication among the servers installed in Samsung SDS EMM as the environment for Common Criteria evaluation to MDMPP v4.0. The guide outlines the followings:

1. host to host communication (transport mode)
2. Standalone Machine (not Domain-joined Machine)
3. Settings of Main mode vs Quick mode
4. Select Authentication Methods
 - PSK
 - Not Kerberos
 - Not Certificate (from CA, local)
5. Select Security Method
 - integrity : SHA-256
 - Encryption : AES-CBC 256
 - key exchange : DH Group 14
6. Enable FIPS feature in Microsoft Windows

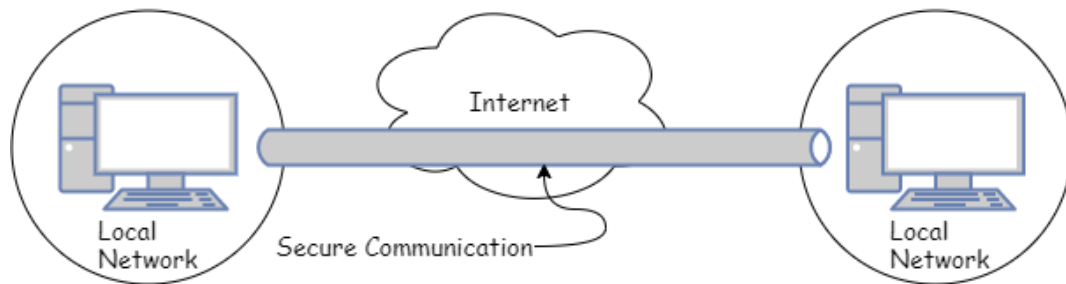
Note: This guides how to set up the IPsec in MS Windows Server 2016/2019 for establishing the secure communication channel between the EMM server and the external server (e.g., DBMS).

Revision History

Solution version	Manual version	Manual revised date	Revised details
2.2.5	2.2.5a	October 2019	Initially published.
2.2.5	2.2.5b	January 2023	Add the settings for Windows Server 2019

□ Abstract

- This guide shows how to set up the secure communication between the servers in terms of the components of Samsung SDS EMM.

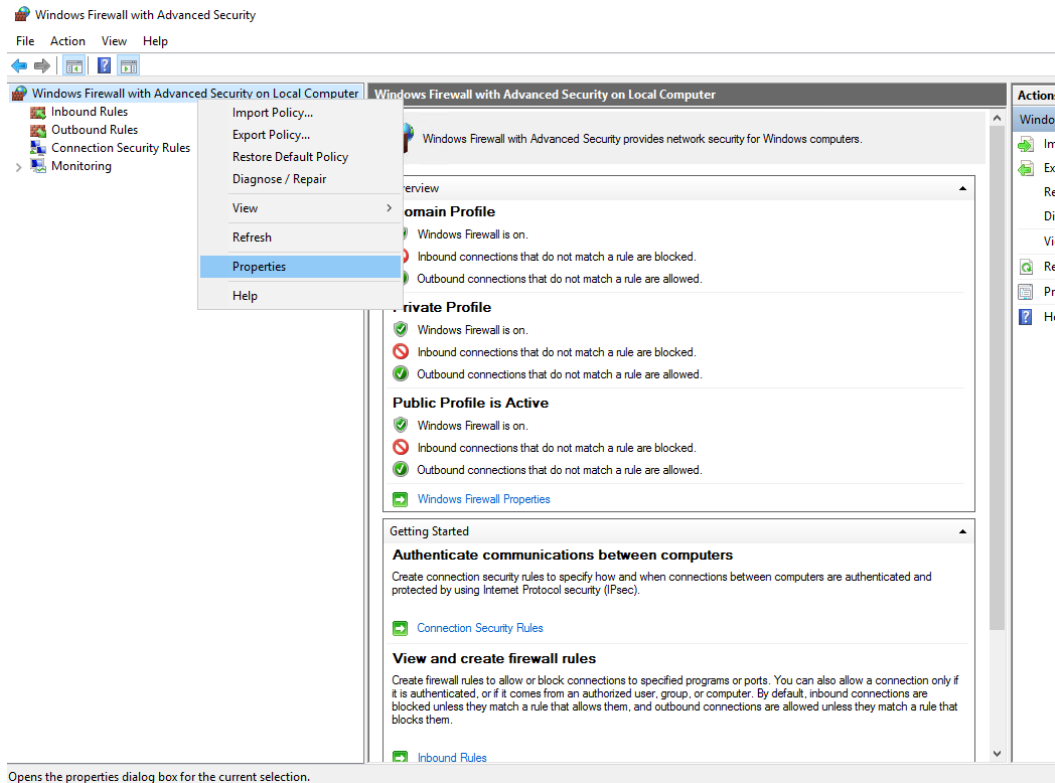


□ Test environment

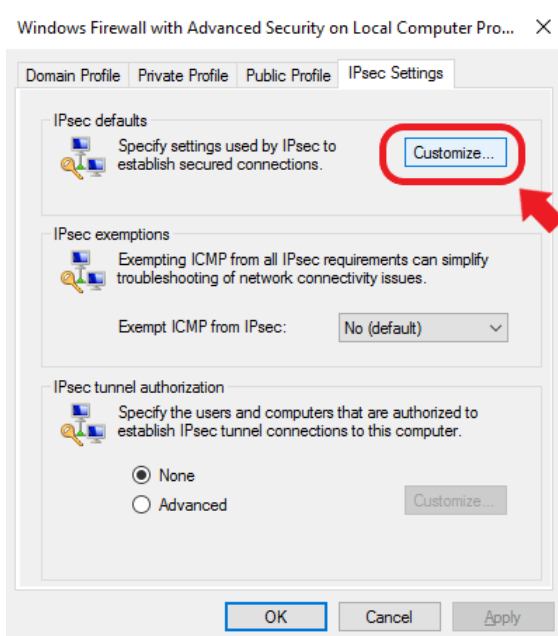
- Create 2 of Virtual Machines (hereinafter VM)
 - . VM A IP : 10.0.222.54
 - . VM B IP : 10.0.222.159

□ Practice

1. Go to [Control Panel] → [Administrative Tools] → [Windows Firewall with Advanced Security]
 - In the case of Windows Server 2019, go to [Server Manager] → [Tools] → [Windows Defender Firewall with Advanced Security]
2. Click [Properties] while the task bar selected and right-click on [Windows Firewall with Advanced Security on Local Computer]
 - In the case of Windows Server 2019, click [Properties] while the task bar selected and right-click on [Windows Defender Firewall with Advanced Security on Local Computer]



3. Go to [IPsec Settings] → [IPsec defaults], and click [Customize]



Check the default settings and click OK

Customize IPsec Defaults



IPsec will use these settings to establish secured connections when there are active connection security rules.

When you use the default options, any settings in a GPO with a higher precedence are used.

Key exchange (Main Mode)

- Default (recommended)
- Advanced

Customize...

Data protection (Quick Mode)

- Default (recommended)
- Advanced

Customize...

Authentication method

- Default
- Computer and user (Kerberos V5)
- Computer (Kerberos V5)
- User (Kerberos V5)
- Advanced

Customize...

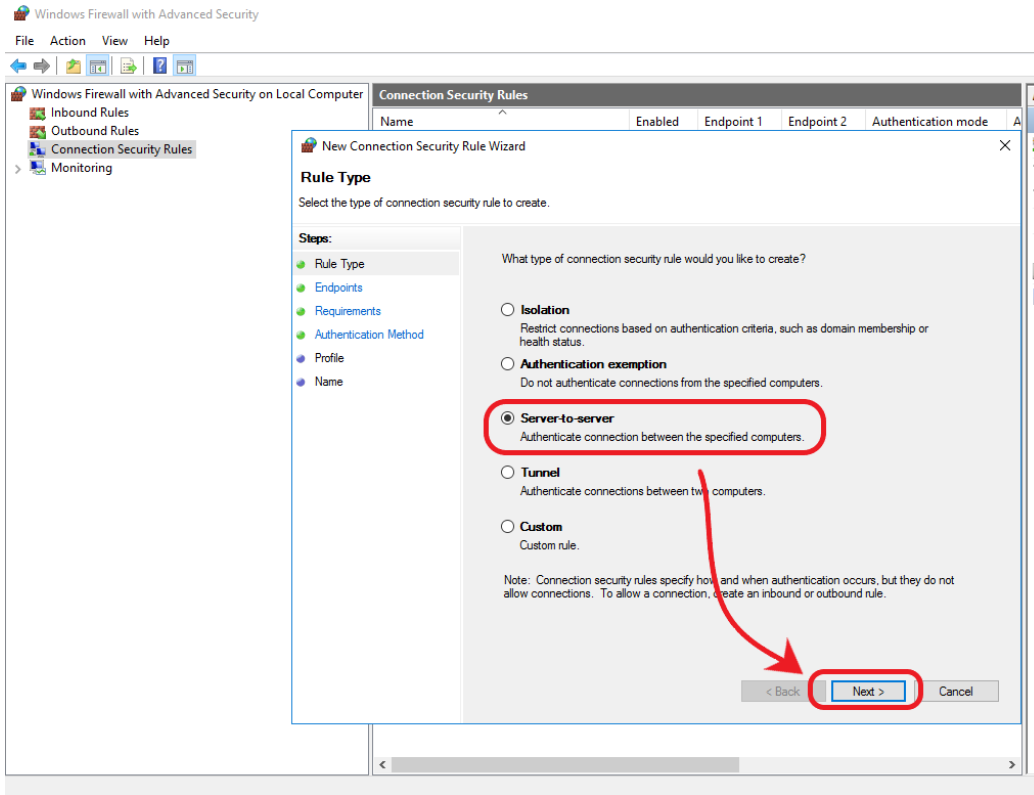
OK

Cancel

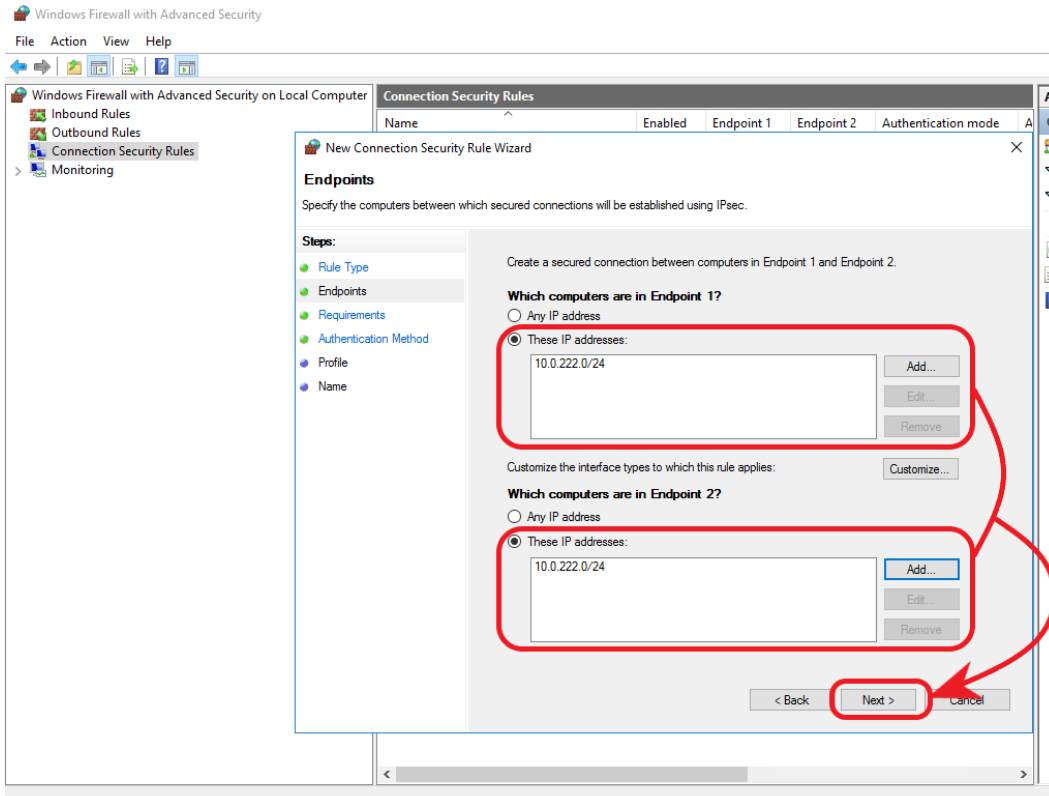
4. Set up the algorithm by referring the 3 modes below for CC evaluation

<p>Key exchange (Main Mode)</p>	<ul style="list-style-type: none"> . Select [Advanced], and click [Customize...] . Delete the [Security methods], click [Add...] . Click [OK] after setting as <ul style="list-style-type: none"> * Integrity algorithm : SHA-256 * Encryption algorithm : AES-CBC 256 * Key exchange algorithm : Diffie-Hellman Group 14 . Click [OK]
<p>Data protection (Quick Mode)</p>	<ul style="list-style-type: none"> . Select [Advanced], and click [Customize...] . Check '√' at [Require encryption for all connection security rules that use these settings] . Delete the [Data integrity and encryption], click [Add...] . Select [ESP(recommended)] . Click [OK] after setting as <ul style="list-style-type: none"> * Integrity algorithm : AES-GMAC 256 * Encryption algorithm : AES-GCM 256 . Click [OK]
<p>Authentication method</p>	<ul style="list-style-type: none"> . Select [Advanced], and click [Customize...] . Delete the [First authentication methods], click [Add...] . Click [OK] after setting as <ul style="list-style-type: none"> * Select [Preshared key] and enter the desired value . Click [OK]

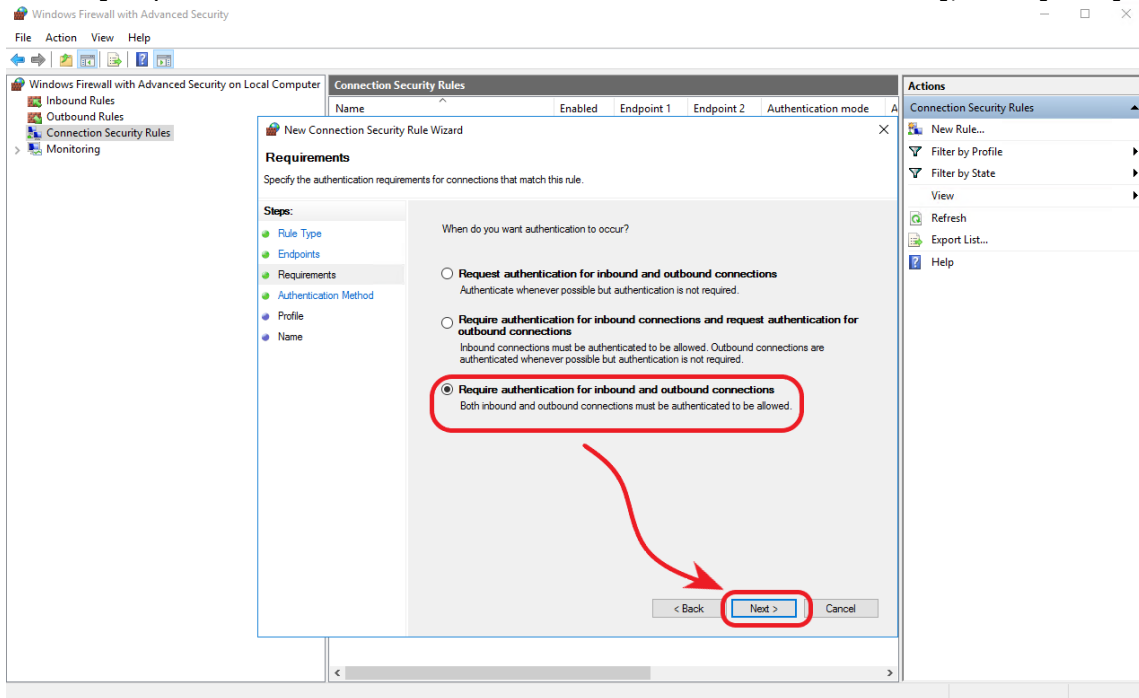
5. Double click [Connection Security Rules],
select [Rule Type] in [New Connection Security Rules Wizard] window,
Select [Rule Type] in Steps, [New Rule...], [Server-to-server] for IPsec setting
. Click [Next]



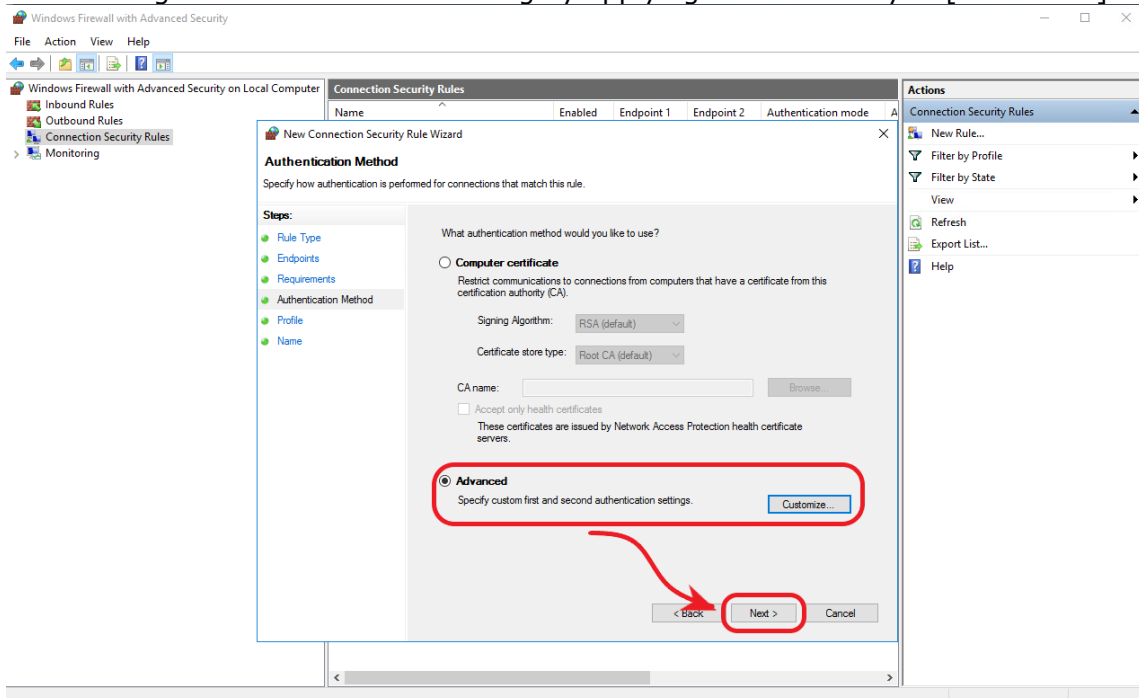
In [Endpoints] steps, a second connection is needed.
Note: This guide shows the setting per subnet. Please set up for respective use.



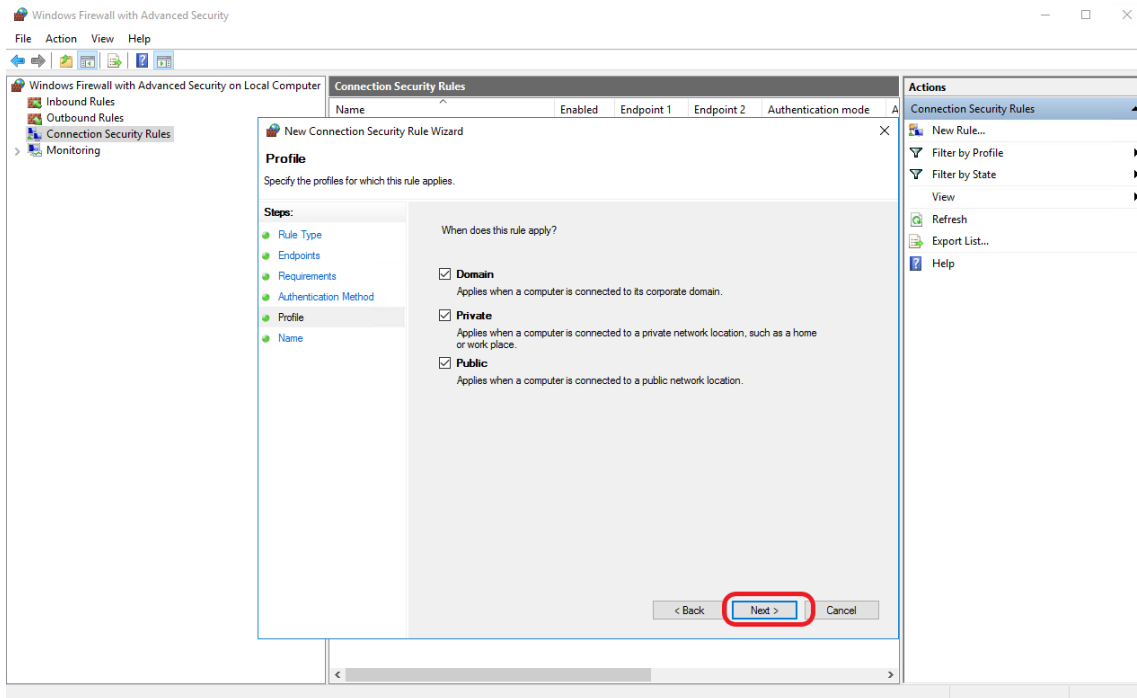
In [Requirements], please refer to the settings as below
Select [Require authentication for inbound and outbound connections], click [Next]



In [Authentication Method], select [Advanced], click [Next]
Note: This guide shows the PSK setting by applying Preshared Key in [Customize].

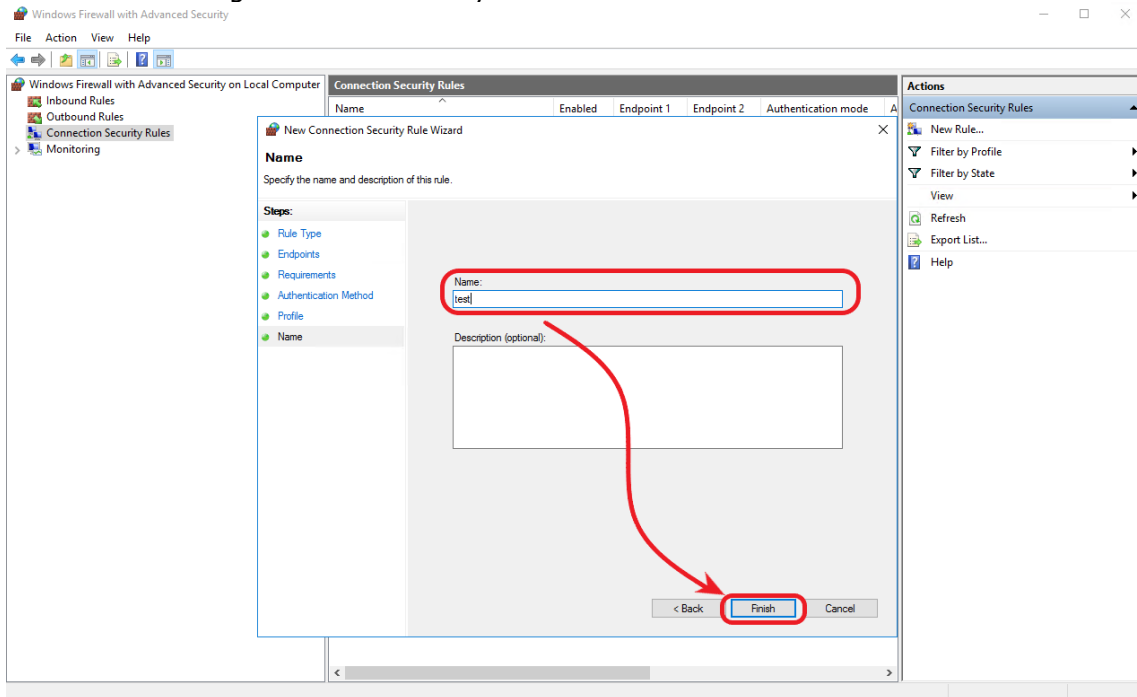


In [Profile], check '√' at Domain, Private and Public and click [Next]



In [Name], please enter the appropriate name (and Description as an option).
Click [Finish].

Note: This setting should be exactly same to each Host.

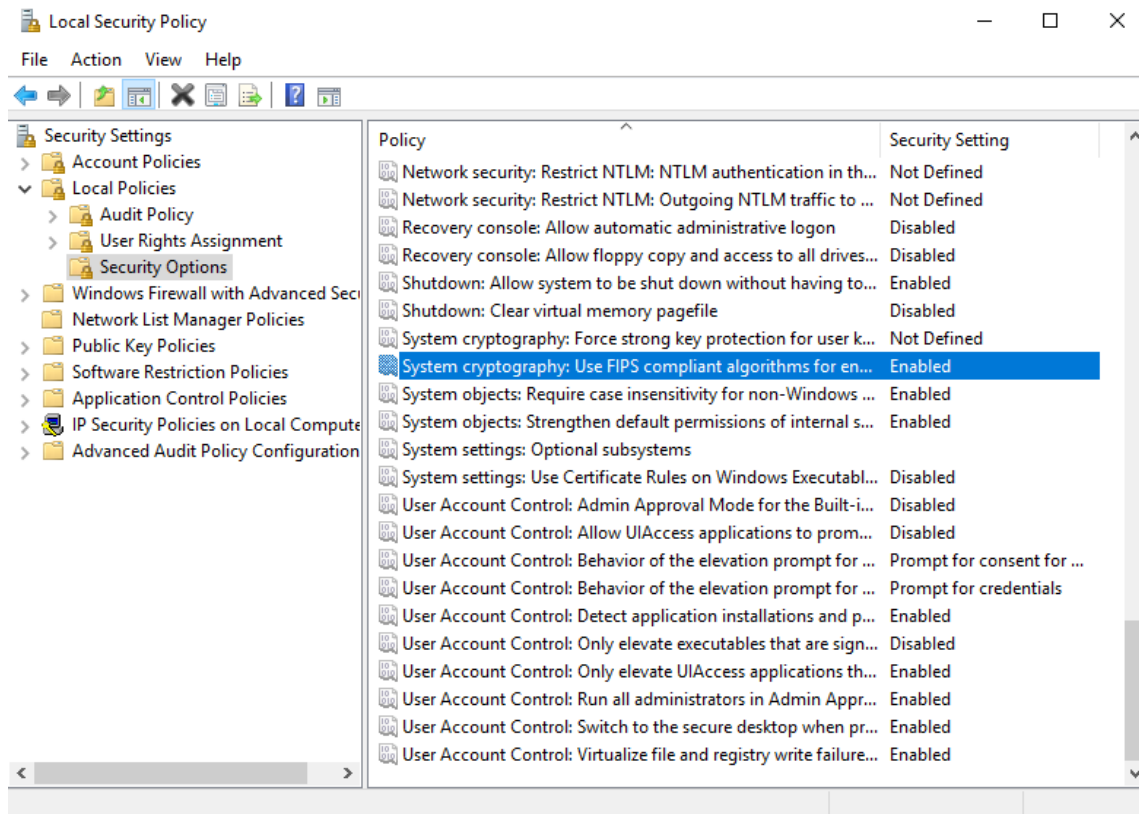


□ Option) FIPS setting for CC evaluation

1. Go to [Control Panel] → [Administrative Tools] → run [Local Security Policy]

- In the case of Windows Server 2019, go to [Server Manager] → [Tools] →→ run [Local Security Policy]

2. Go to [Security Settings] → [Local Policies] → [Security Options] →
Select [System cryptography: Use FIPS compliant algorithms for encryption,
hashing, and signing] Enabled (please see below)



□ Test

1. Run Command prompt by entering [cmd] in search field (magnifier icon at the bottom left of the screen) > test the ping and check the status

Host A

CA. Command Prompt

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\devadmin>ping 10.0.222.159

Pinging 10.0.222.159 with 32 bytes of data:
Reply from 10.0.222.159: bytes=32 time<1ms TTL=128
Reply from 10.0.222.159: bytes=32 time<1ms TTL=128
Reply from 10.0.222.159: bytes=32 time<1ms TTL=128
Reply from 10.0.222.159: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.222.159:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Host B

CA. Command Prompt

```
Microsoft Windows [Version 10.0.14393]
(c) 2016 Microsoft Corporation. All rights reserved.

C:\Users\devadmin>ping 10.0.222.159

Pinging 10.0.222.159 with 32 bytes of data:
Reply from 10.0.222.159: bytes=32 time<1ms TTL=128
Reply from 10.0.222.159: bytes=32 time<1ms TTL=128
Reply from 10.0.222.159: bytes=32 time<1ms TTL=128
Reply from 10.0.222.159: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.222.159:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

2. Run Packet monitoring by WireShark

[Before applying IPsec]
Host A

The screenshot shows the Wireshark interface on Host A. The filter bar is set to `ip.src==10.0.222.159 or ip.dst==10.0.222.159`. The packet list shows several ICMP Echo (ping) requests and replies between 10.0.222.159 and 10.0.222.54. Packet 37865 is selected, and its details pane shows the Ethernet II, IPv4, and ICMP protocol layers. The packet bytes pane displays the raw data in hexadecimal and ASCII, with the ASCII portion circled in red, showing the text `..x|!... ..oh..E- <,..... =..... -6..US.. ..abcdef ghijklmn opqrstuv wabcdefg hi`.

No.	Time	Source	Destination	Protocol	Length	Info
37854	12170.508570	10.0.222.54	10.0.222.159	ICMP	74	Echo (ping) request id=0
37855	12170.508735	10.0.222.159	10.0.222.54	ICMP	74	Echo (ping) reply id=0
37859	12171.524194	10.0.222.54	10.0.222.159	ICMP	74	Echo (ping) request id=0
37860	12171.524335	10.0.222.159	10.0.222.54	ICMP	74	Echo (ping) reply id=0
37864	12172.539816	10.0.222.54	10.0.222.159	ICMP	74	Echo (ping) request id=0
37865	12172.539957	10.0.222.159	10.0.222.54	ICMP	74	Echo (ping) reply id=0

```
> Frame 37865: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0
> Ethernet II, Src: 0a:b9:f9:07:6f:68 (0a:b9:f9:07:6f:68), Dst: 0a:a0:78:7c:21:9e (0a:a0:78:7c:21:9e)
> Internet Protocol Version 4, Src: 10.0.222.159, Dst: 10.0.222.54
> Internet Control Message Protocol

0000  0a a0 78 7c 21 9e 0a b9 f9 07 6f 68 08 00 45 00  ..x|!... ..oh..E-
0010  00 3c 2c ce 00 00 80 01 3d 1d 0a 00 de 9f 0a 00  <,..... =.....
0020  de 36 00 00 55 53 00 01 00 08 61 62 63 64 65 66  -6..US.. ..abcdef
0030  67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76  ghijklmn opqrstuv
0040  77 61 62 63 64 65 66 67 68 69                    wabcdefg hi
```

Host B

The screenshot shows the Wireshark interface on Host B. The filter bar is set to `ip.src==10.0.222.54 or ip.dst==10.0.222.54`. The packet list shows several ICMP Echo (ping) requests and replies between 10.0.222.54 and 10.0.222.159. Packet 62996 is selected, and its details pane shows the Ethernet II, IPv4, and ICMP protocol layers. The packet bytes pane displays the raw data in hexadecimal and ASCII, with the ASCII portion circled in red, showing the text `..x|!... ..oh..E- <,..... =..... -6..US.. ..abcdef ghijklmn opqrstuv wabcdefg hi`.

No.	Time	Source	Destination	Protocol	Length	Info
62810	12166.691202	10.0.222.54	10.0.222.159	ICMP	74	Echo (ping) request id=0
62811	12166.691254	10.0.222.159	10.0.222.54	ICMP	74	Echo (ping) reply id=0
62902	12167.706817	10.0.222.54	10.0.222.159	ICMP	74	Echo (ping) request id=0
62903	12167.706862	10.0.222.159	10.0.222.54	ICMP	74	Echo (ping) reply id=0
62995	12168.722442	10.0.222.54	10.0.222.159	ICMP	74	Echo (ping) request id=0
62996	12168.722487	10.0.222.159	10.0.222.54	ICMP	74	Echo (ping) reply id=0

```
> Frame 62996: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0
> Ethernet II, Src: 0a:b9:f9:07:6f:68 (0a:b9:f9:07:6f:68), Dst: 0a:a0:78:7c:21:9e (0a:a0:78:7c:21:9e)
> Internet Protocol Version 4, Src: 10.0.222.159, Dst: 10.0.222.54
> Internet Control Message Protocol

0000  0a a0 78 7c 21 9e 0a b9 f9 07 6f 68 08 00 45 00  ..x|!... ..oh..E-
0010  00 3c 2c ce 00 00 80 01 00 00 0a 00 de 9f 0a 00  <,..... =.....
0020  de 36 00 00 55 53 00 01 00 08 61 62 63 64 65 66  -6..US.. ..abcdef
0030  67 68 69 6a 6b 6c 6d 6e 6f 70 71 72 73 74 75 76  ghijklmn opqrstuv
0040  77 61 62 63 64 65 66 67 68 69                    wabcdefg hi
```

[After applying IPsec]

The packet shows its encapsulation after applying IPsec as below.

Host A

The screenshot shows a Wireshark capture on Host A. The filter is `ip.src==10.0.222.159 or ip.dst==10.0.222.159`. The packet list shows several ESP packets. The selected packet (No. 34481) has the following details:

- Frame 32711: 90 bytes on wire (720 bits), 90 bytes captured (720 bits) on interface 0
- Ethernet II, Src: 0a:a0:78:7c:21:9e (0a:a0:78:7c:21:9e), Dst: 0a:b9:f9:07:6f:68 (0a:b9:f9:07:6f:68)
- Internet Protocol Version 4, Src: 10.0.222.54, Dst: 10.0.222.159
- Encapsulating Security Payload

The packet bytes pane shows the following hex and ASCII data:

```
0000 0a b9 f9 07 6f 68 0a a0 78 7c 21 9e 08 00 45 00  ....oh...x|!...E-
0010 00 4c 4a 25 40 00 80 32 df 84 0a 00 de 36 0a 00  .LJ%@...2...6...
0020 de 9f 77 6f 7c 74 00 00 00 64 00 00 00 00 00 00  .wo|t...d.....
0030 00 64 01 88 c6 4a 5d dd 66 f9 1e 03 ee b0 b7 3e  .d...J]..f.....>
0040 85 45 49 f4 87 f4 46 bb 8b de 9f 5e 71 0d 41 01  .EI...F...^q.A-
0050 78 69 73 7c d8 ce 14 aa b2 71  .xis|....g
```

Host B

The screenshot shows a Wireshark capture on Host B. The filter is `ip.src==10.0.222.54 or ip.dst==10.0.222.54`. The packet list shows several ESP packets. The selected packet (No. 59880) has the following details:

- Frame 59880: 102 bytes on wire (816 bits), 102 bytes captured (816 bits) on interface 0
- Ethernet II, Src: 0a:a0:78:7c:21:9e (0a:a0:78:7c:21:9e), Dst: 0a:b9:f9:07:6f:68 (0a:b9:f9:07:6f:68)
- Internet Protocol Version 4, Src: 10.0.222.54, Dst: 10.0.222.159
- Encapsulating Security Payload

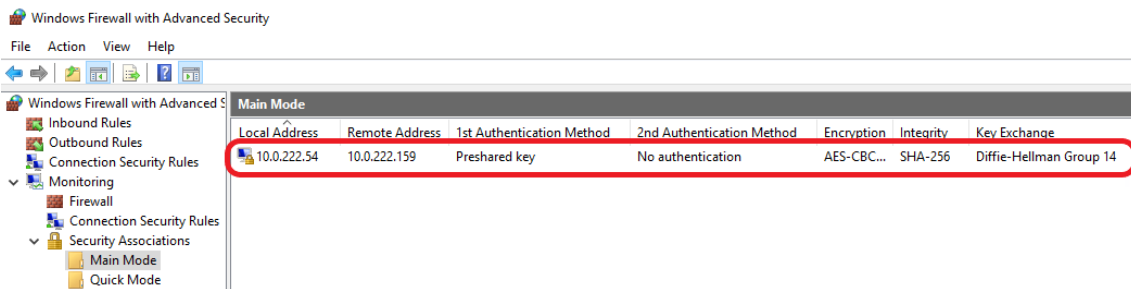
The packet bytes pane shows the following hex and ASCII data:

```
0000 0a b9 f9 07 6f 68 0a a0 78 7c 21 9e 08 00 45 00  ....oh...x|!...E-
0010 00 58 4a 3c 40 00 80 32 df 61 0a 00 de 36 0a 00  .XJ<@...2...a...6...
0020 de 9f 77 6f 7c 74 00 00 00 7b 00 00 00 00 00 00  .wo|t...{.....
0030 00 7b 83 a5 21 a6 9f 89 d9 b7 e4 91 32 ea c8 9a  .{...!...2...
0040 57 69 f3 ff 87 c3 8e 7d 52 5f 0f 67 f9 dd 6a 14  .wi.....}R_g..j.
0050 52 fa 96 9a 6f 4d ca 99 21 50 d5 39 3b ff 40 91  .R...oM...!P;.@-
0060 64 54 c9 11 81 0f  .dT....
```

3. Verify SA

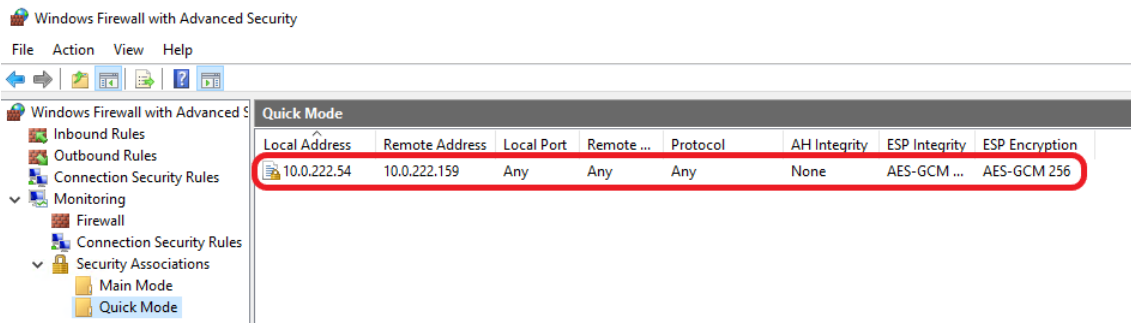
Main mode

Go to [Monitoring] → [Security Associations] → Main Mode



Quick mode

Go to [Monitoring] → [Security Associations] → Main Mode



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