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Graduation project
SD-WAN Implementation

Objectives

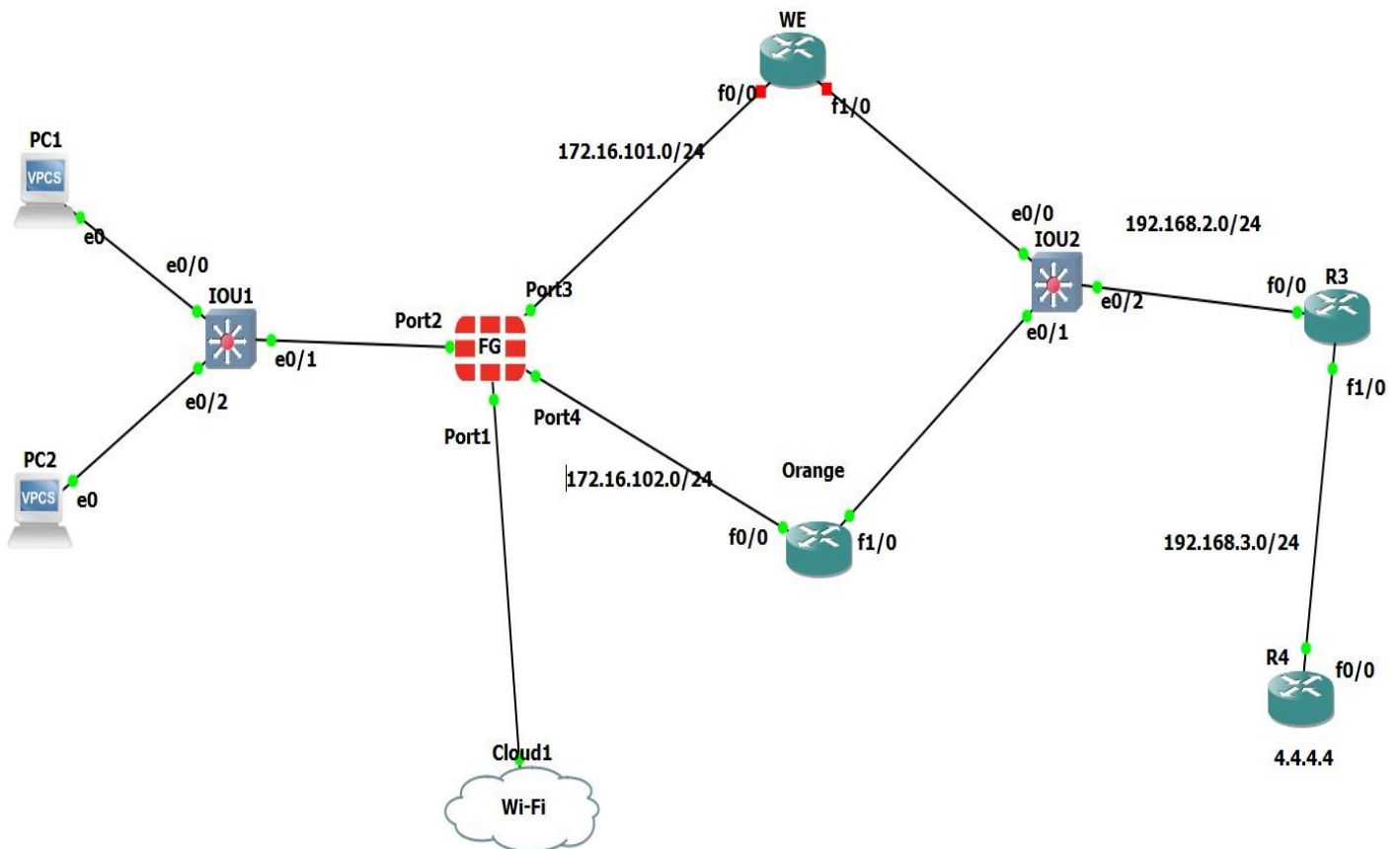
- Configure SD-WAN members and an SD-WAN zone
- Configure routes
- Configure SD-WAN rules for an internet service
- Configure firewall policies
- Verify SD-WAN traffic distribution and event

Used Devices

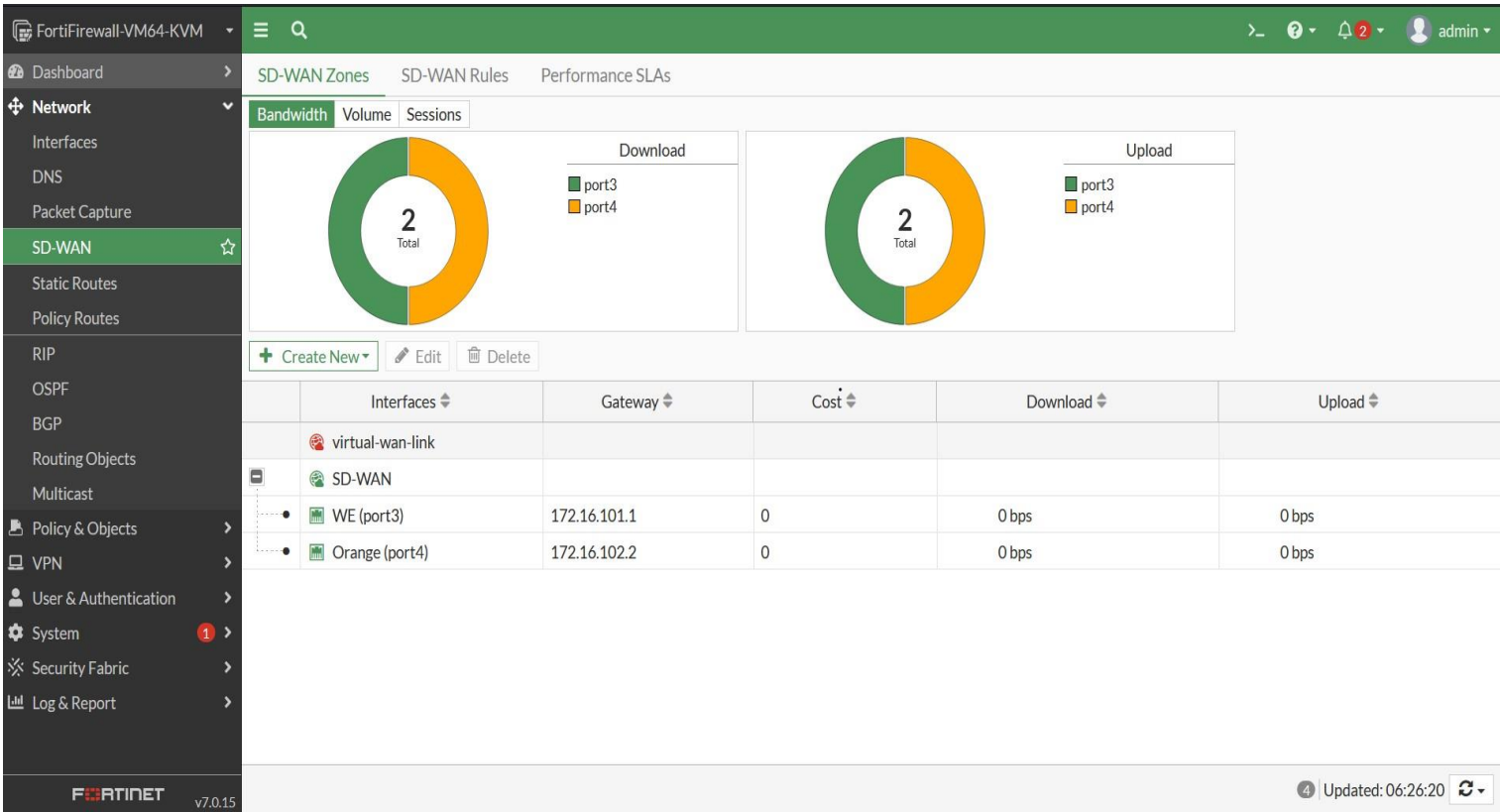
- 4- cisco routers
- 2- cisco switches
- 1- FortiGate firewall
- 2 virtual PCs

Implementation of SD-WAN configuration and test.

This part includes the topology of the network and the used devices to test the SD-WAN and verify it's working.



This picture show the SD-WAN zone created and it’s two members of the ISP (We, Orange)



Priority Rule

Name

Test

Source

Source address

LAN

User group

Destination

Address

all

Protocol number

TCP

UDP

ANY

Specify

0

Internet Service

Application

Outgoing Interfaces

Select a strategy for how outgoing interfaces will be chosen.

☐ Manual

Manually assign outgoing interfaces.

☒ Best Quality

The interface with the best measured performance is selected.

OK

Cancel

Additional Information

API Preview

SD-WAN Rules Setup Guides

Implicit Rule

Best Quality

Lowest Cost (SLA)

Maximize Bandwidth (SLA)

Documentation

Online Help

Video Tutorials

Configuring the priority role for the SD-WAN zone

Priority Rule

Application

Outgoing Interfaces

Select a strategy for how outgoing interfaces will be chosen.

Manual

Manually assign outgoing interfaces.

Best Quality

The interface with the best measured performance is selected.

Lowest Cost (SLA)

The interface that meets SLA targets is selected. When there is a tie, the interface with the lowest assigned cost is selected.

Maximize Bandwidth (SLA)

Traffic is load balanced among interfaces that meet SLA targets.

Interface preference

WE (port3)

Orange (port4)

+

Zone preference

+

Forward DSCP

☐

Reverse DSCP

☐

Status

Enable

Disable

Additional Information

API Preview

SD-WAN Rules Setup Guides

Implicit Rule

Best Quality

Lowest Cost (SLA)

Maximize Bandwidth (SLA)

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OK

Cancel

SD-WAN Zones

SD-WAN Rules

Performance SLAs

Packet Loss

Latency

Jitter

No data

Create New

Edit

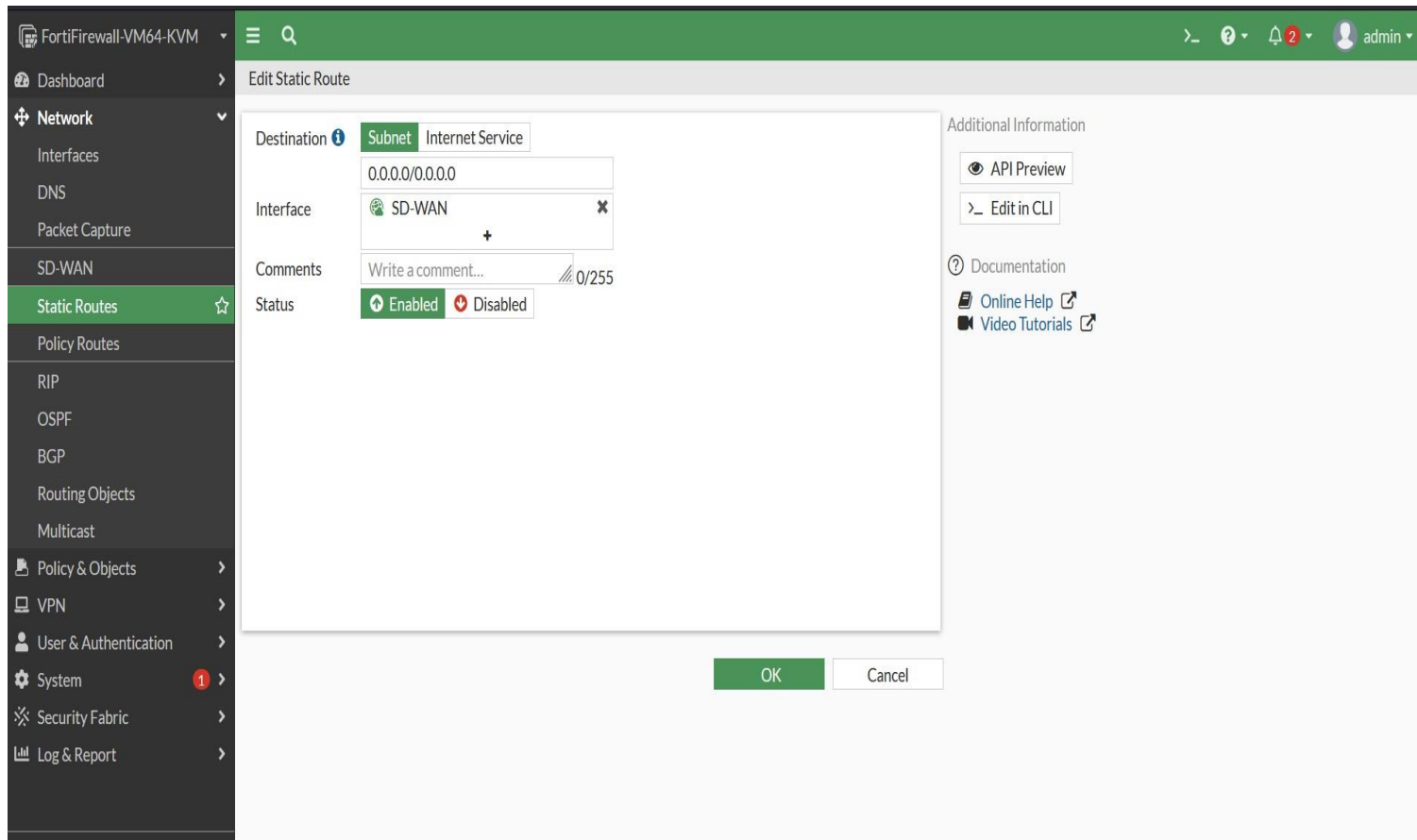
Delete

Search

Name	Detect Server	Packet Loss	Latency	Jitter	Failure Threshold	Recovery Threshold
Default_DNS	96.45.45.45 96.45.46.46 (System DNS)				5	10
Default_FortiGuard	http://fortiguard.com/				5	10
Default_Gmail	gmail.com				5	10
Default_Google Search	http://www.google.com/				5	10
Default_Office_365	http://www.office.com/				5	10
Test	4.4.4.4	WE (port3): 0.00% Orange (port4): 1.14%	WE (port3): 46.04ms Orange (port4): 46.09ms	WE (port3): 4.56ms Orange (port4): 4.07ms	5	5

100%

Create a static route



Create a policy to allow the traffic from Lan to Wan (port2 ==> port1)

Search

Interface Pair View By Sequence

Name	Source	Destination	Schedule	Service	Action	NAT	Log	Bytes
Lan (port2) → SD-WAN ①								
LAN-WAN	all	all	always	ALL	ACCEPT	Enabled	Enabled	840 B
Implicit ①								

② Updated: 06:39:07

Test ISP1 We

```
PC1 - SecureCRT
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
FG IOU2 R1 R2 R3 R4 PC1 x PC2
sleep [seconds] [TEXT] Print TEXT and pause running script for seconds
trace HOST [OPTION ...] Print the path packets take to network HOST
version Shortcut for: show version

To get command syntax help, please enter '?' as an argument of the command.

PC1> trace 4.4.4.4
trace to 4.4.4.4, 8 hops max, press Ctrl+C to stop
 1 10.0.0.100 3.823 ms 1.360 ms 2.496 ms
 2 172.16.101.1 7.120 ms 9.778 ms 9.221 ms
 3 192.168.2.3 30.777 ms 30.656 ms 30.267 ms
 4 *192.168.3.4 51.431 ms (ICMP type:3, code:3, Destination port unreachable)
)

PC1>
```

Ready Telnet::1 15, 6 15 Rows, 80 Cols VT100 CAP NUM

Test ISP2 Orange

```
PC1 - SecureCRT
File Edit View Options Transfer Script Tools Window Help
Enter host <Alt+R>
FG IOU2 R1 R2 R3 R4 PC1 x PC2
PC1>
PC1>
PC1>
PC1>
PC1>
PC1>
PC1>
PC1>
PC1>
PC1> trace 4.4.4.4
trace to 4.4.4.4, 8 hops max, press Ctrl+C to stop
 1 10.0.0.100 2.487 ms 1.821 ms 1.277 ms
 2 172.16.102.2 5.796 ms 9.335 ms 9.935 ms
 3 192.168.2.3 30.550 ms 29.723 ms 29.863 ms
 4 *192.168.3.4 52.553 ms (ICMP type:3, code:3, Destination port unreachable)
)

PC1>
```

Ready Telnet::1 17, 6 17 Rows, 80 Cols VT100 CAP NUM