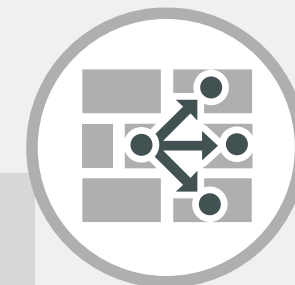




CONSTRUCTING A SECURE SD-WAN ARCHITECTURE



Constructing a Secure SD-WAN Architecture



SD WAN

Objectives

- Understanding SD-WAN Trends and Challenges
- Fortinet Secure SD-WAN
- Secure SD-WAN use cases
- SD-WAN Assessment Program
- Customer Success Stories
- Configuring Secure SD-WAN



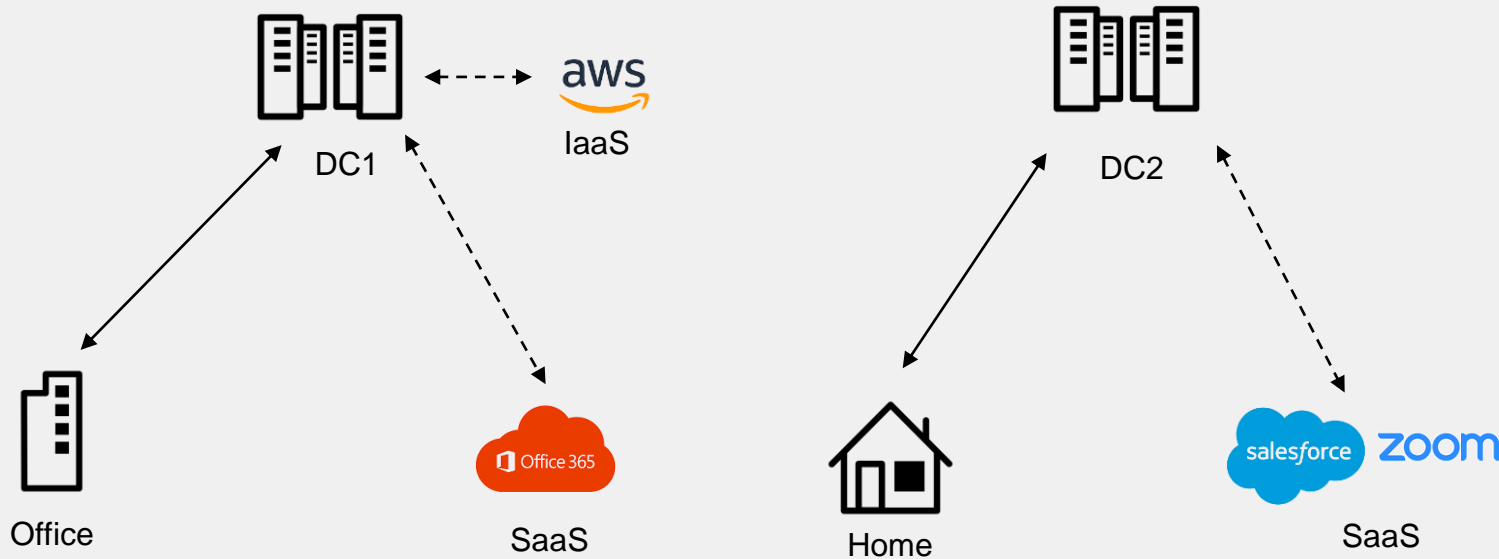


Understanding WANEdge Trends & Challenges



Traditional WAN Impacts User Productivity

Creating Obstacles for Digital Innovations



Hybrid Workforce and lack of Modern Infrastructure

Main Challenges

- Poor User Experience
- High WAN Cost
- Complex Operations

The Network Transformation Trends



IP-Based

Application Driven



Reactive

Predictive Analytics



Manual

Automated Operations



Work from Office

Work From Anywhere



Business Value of Moving to SD-WAN

01

Improve User Experience



Direct internet access for business applications instead backhauling to HQ

02

Instant ROI Benefits



More bandwidth for users, consolidate networking and security point products

03

Simplified Operations



Enhance business agility with end-to-end visibility and automation



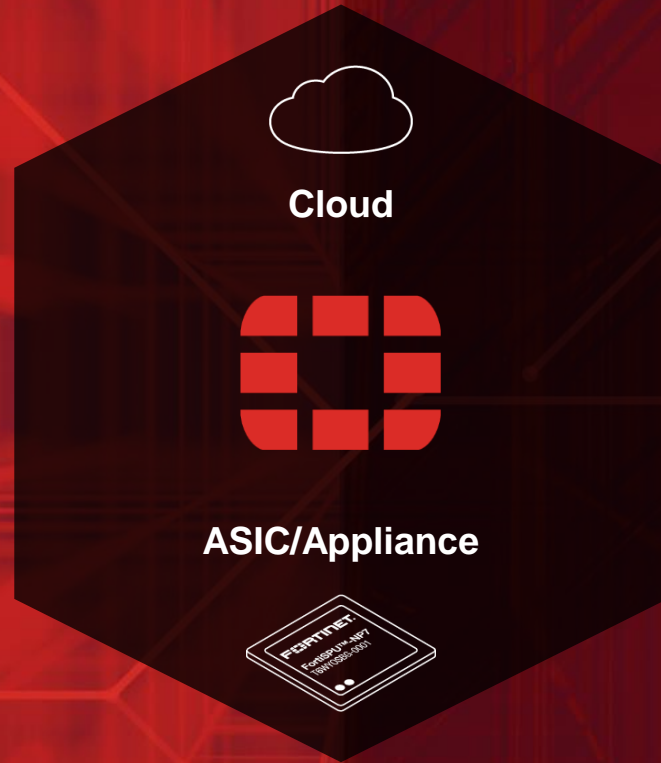
Fortinet Secure SD-WAN



Security-Driven Networking

The Next Era of Networking and Security Convergence

**WIDE AREA
NETWORKING**



**NETWORK
SECURITY**

Flexible, anywhere and anytime security

Fortinet's Comprehensive Secure SD-WAN Solution

Industry's leading Organically developed Secure SD-WAN Solution

01

**Application
Driven**



Broadest application steering with accurate identification for better user experience

02

**Accelerated
Convergence**



Industry's only SD-WAN ASIC powered WAN Edge with advanced routing, SD-WAN and NGFW for flexible deployments

03

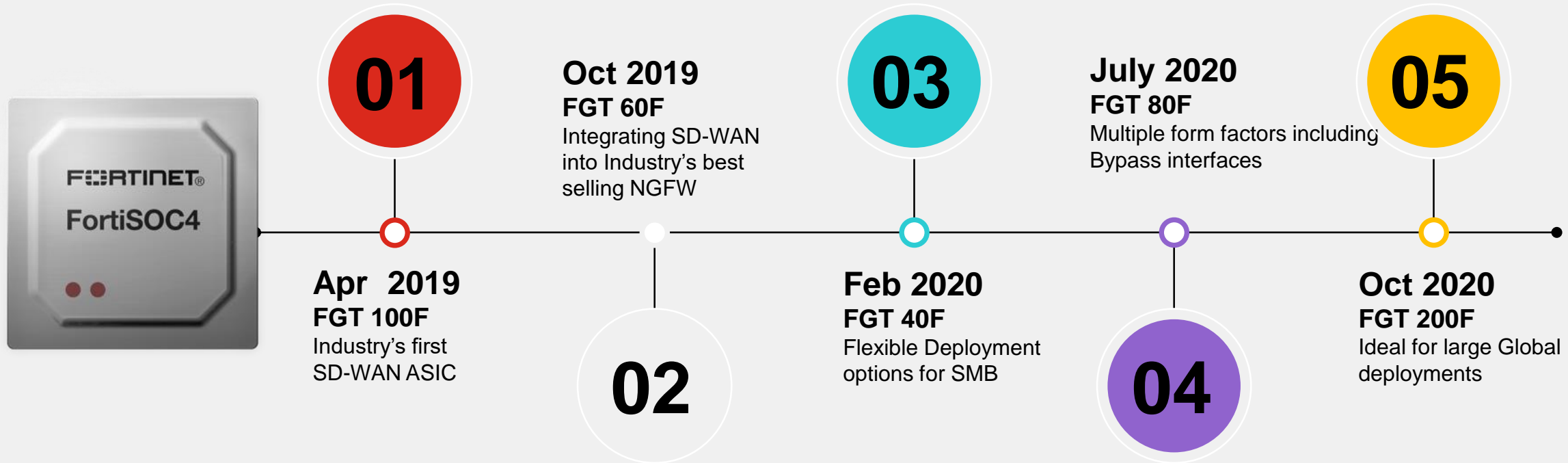
**Efficient
Operations**



Centralized orchestration and analytics with end-to-end scalable ZTP for SD-WAN and SD-Branch



High-performing Portfolio powered by SD-WAN ASIC



Multiple variants
for every deployment



Built-in LTE



Built-in Wireless



Built-in POE



Built-in Bypass

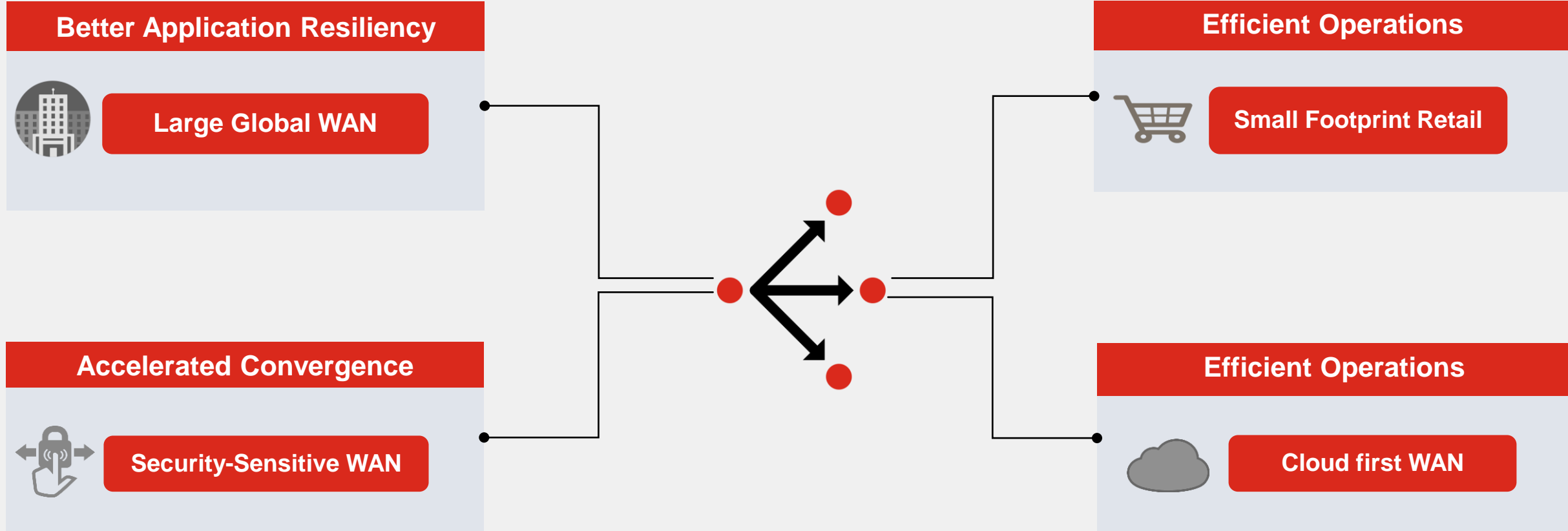




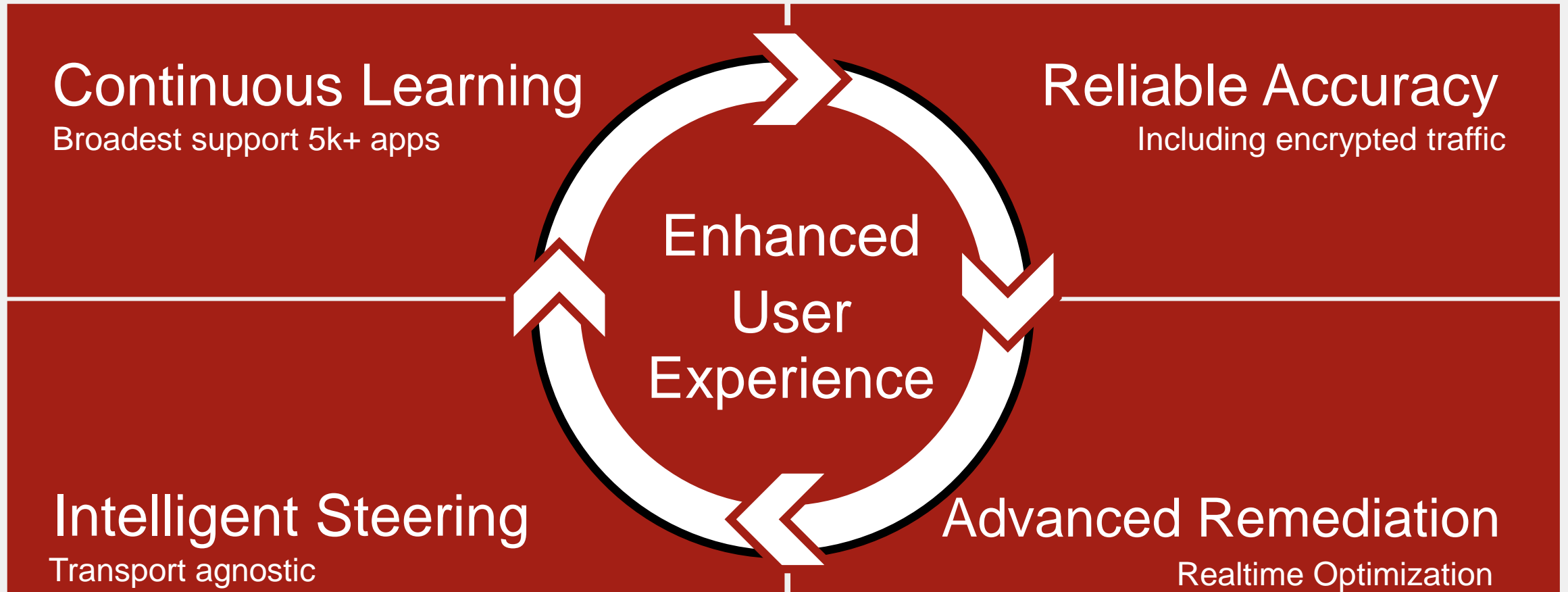
Secure SD-WAN Use cases



Fortinet Secure SD-WAN Leading Use-cases



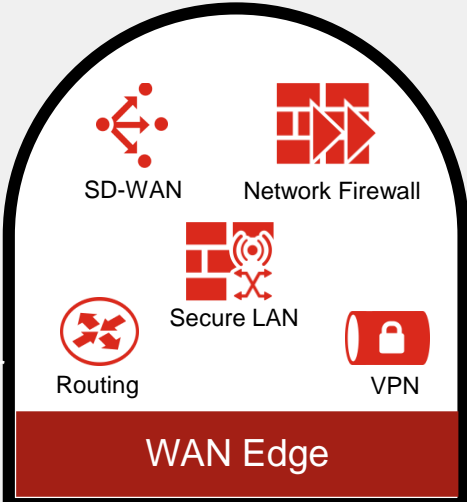
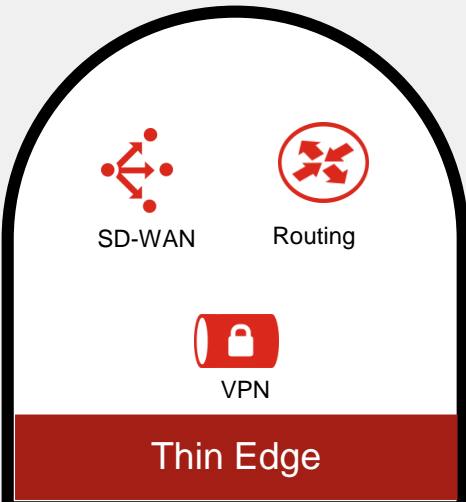
Enabling Application Driven Networks



Accelerated Convergence for every Network Edge



Accelerated & Flexible Deployment for both Thin & WAN Edges



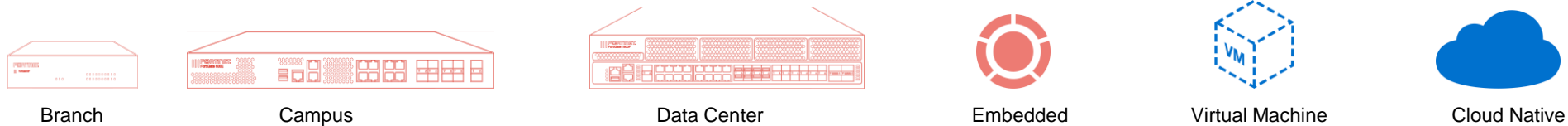
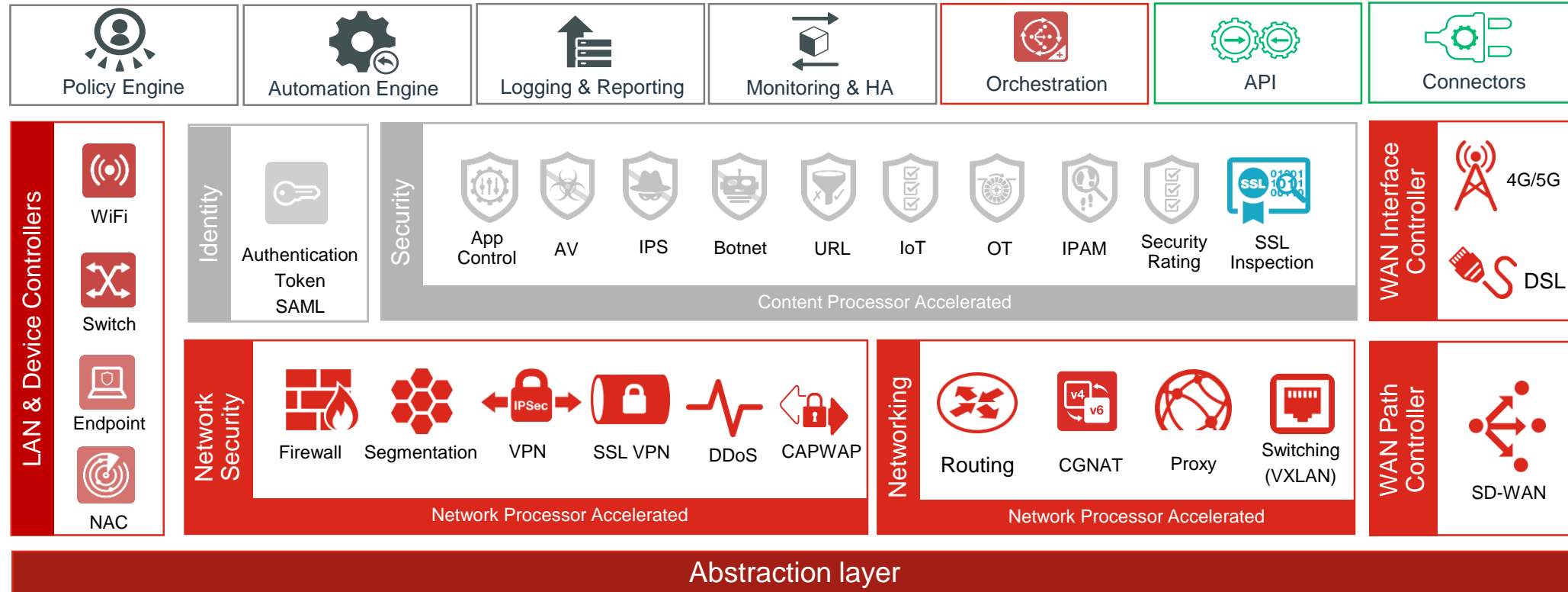
Virtual Router



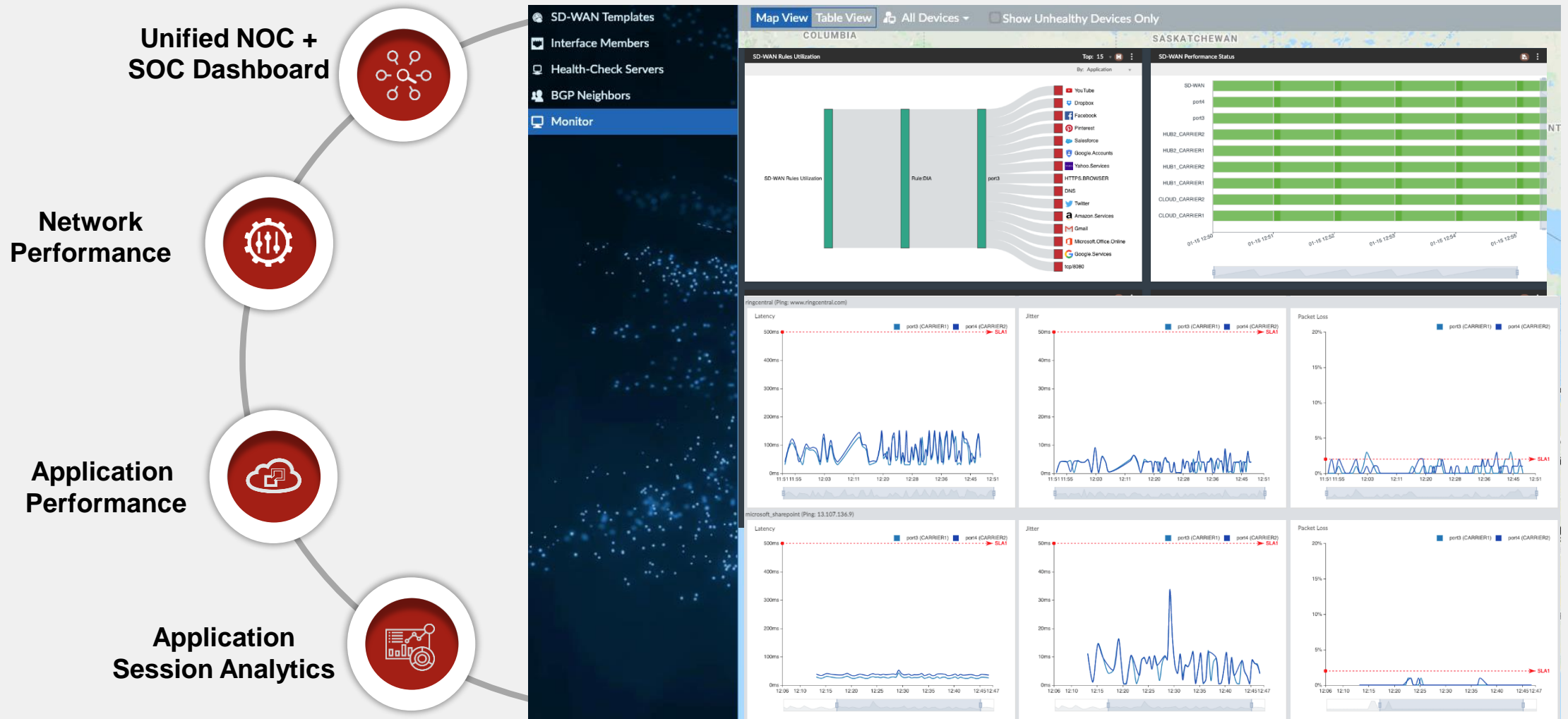
Unified SD-WAN + NGFW from same platform powered by purpose-built ASIC



FortiOS Innovative Network Operating System



Efficient Operations with Centralized Management

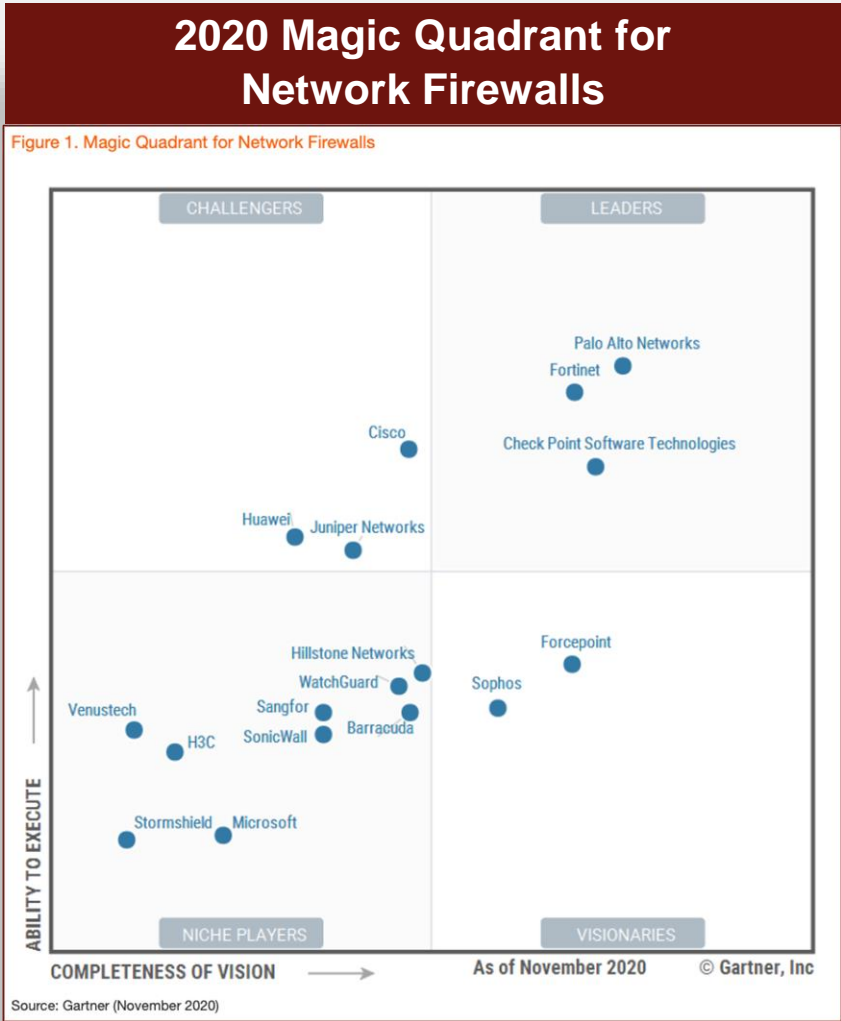




Fortinet SD-WAN Validation



Recognized As a Leader for Network Firewalls and WAN Edge Infrastructure



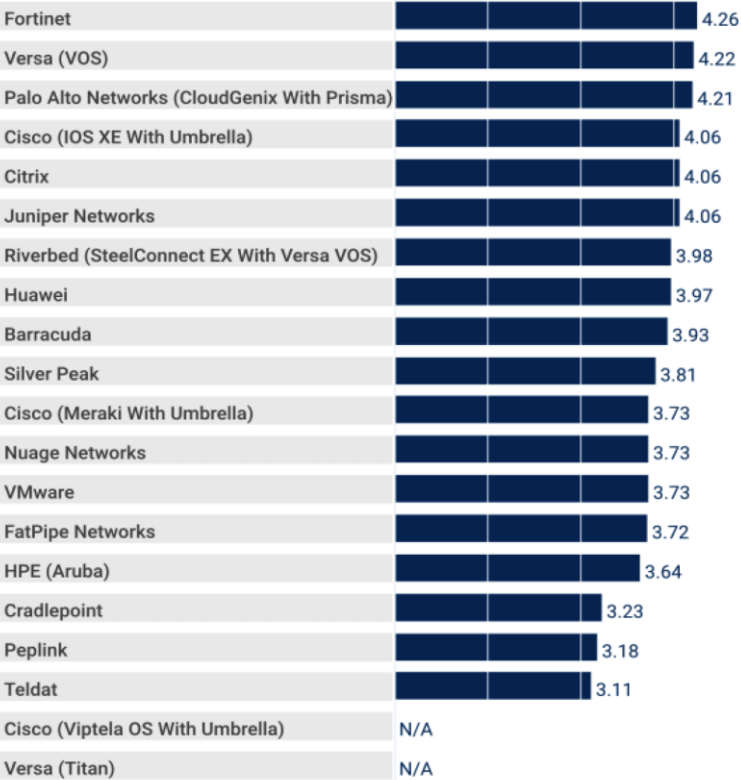
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Gartner's Critical Capabilities for WAN Edge Infrastructure

Security-Sensitive WAN Use-case

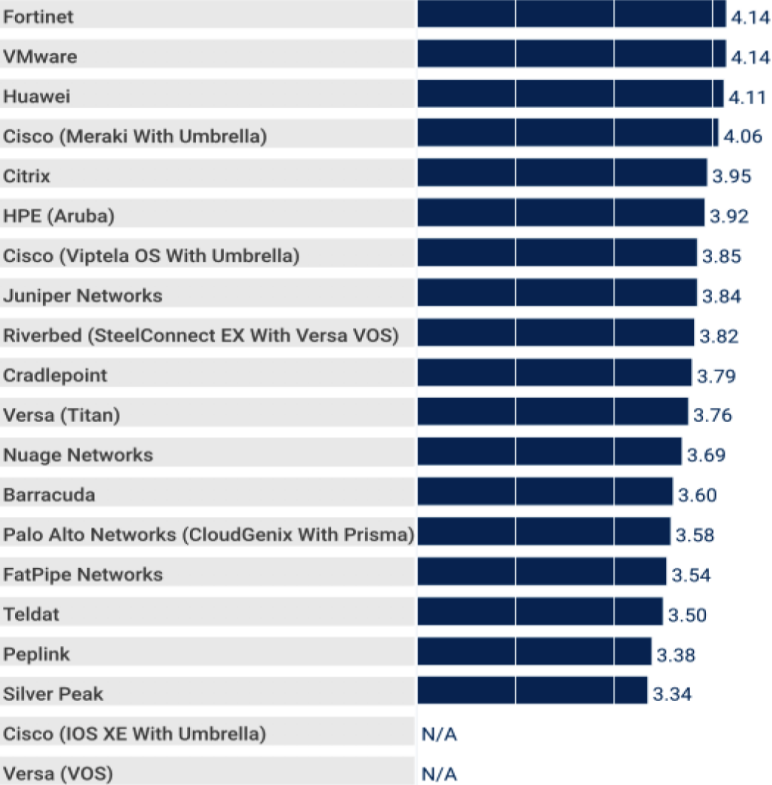
Product or Service Scores for Security-Sensitive WAN



Fortinet is ranked **Highest** in the Security-Sensitive WAN and Small Footprint Retail WAN Use Cases

Small Footprint Retail Use-case

Product or Service Scores for Small Footprint Retail WAN



Gartner Critical Capabilities for WAN Edge Infrastructure, Jonathan Forest, Mike Toussaint, Mark Fabbri, 30 September 2020

This graphic was published by Gartner, Inc. as part of a larger research document and should be evaluated in the context of the entire document. The Gartner document is available upon request from Fortinet

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A Gartner Peer Insights Customers' Choice™

Highest Customer Reviews Received for WAN Edge Infrastructure Segment



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Customer Success



Global SD-WAN Customer Success Examples



- **Fortune 500 – Large Enterprise**
- 1200 locations in North America
- 65% Cost reduction with consolidation
- Deployed sites in 9 months with ZTP

Fortinet won against

- *Cisco ISR Router*
- *Cisco Meraki*



- **Global 1000 – Large Enterprise**
- 700 locations in 50 Countries
- 10X Improved user experience
- 50%+ reduced network set-up time

Fortinet won against

- *Cisco ISR Router*
- *VMWARE VeloCloud, Versa*



- **1800 locations in Europe**
- 50% reduction in MPLS cost
- 99% increased business continuity
- Expanded to SD-Branch

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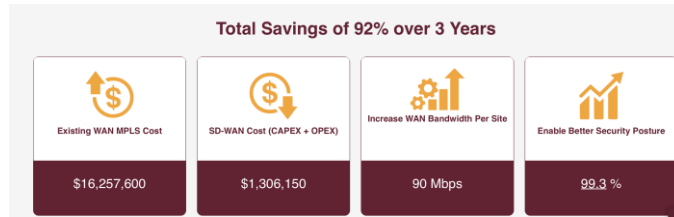
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SD-WAN Tools and Resources

ROI CALCULATOR



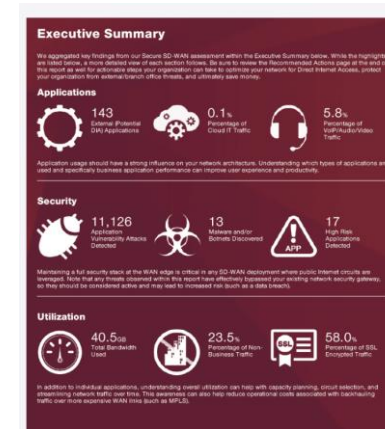
Fortinet SD-WAN
Real-World [ROI Study](#)

CUSTOMER WINS



30+ Global Customer
[Case studies](#)

CTAP ASSESMENT



400+ customers
completed SD-WAN
[Assessment](#)

Configuring Secure SD-WAN

Configuring Secure SD-WAN

- Basic steps
 - Setup the VPNs
 - VPN Manager > IPsec VPN
 - Configure shared resources
 - Interface members
 - Health-check servers
 - BGP neighbors
 - Input interfaces
 - Create templates
 - Assign templates to devices

The screenshot displays the Fortinet SD-WAN configuration interface. On the left is a sidebar menu with categories: Device Manager, Device & Groups, Scripts, Provisioning Templates (including System, IPsec Tunnel, Static Route, Certificate, Threat Weight, and CLI Templates), SD-WAN Templates (highlighted), Firmware Templates, and Monitors. The main panel is titled 'Install Wizard' and 'Create New SD-WAN Template'. It includes input fields for 'Name' and 'Description', an 'SD-WAN Status' toggle set to 'ON', and three tables: 'Interface Members' (with one entry 'virtual-wan-link'), 'Performance SLA' (showing 'No record found'), and 'SD-WAN Rules' (with one entry 'sd-wan' for 'ALL' source).

| ID | Interface Member | Status |
|--------------------------|------------------|--------|
| <input type="checkbox"/> | virtual-wan-link | |

| Name | Health-Check Server | Detect Protocol |
|------------------|---------------------|-----------------|
| No record found. | | |

| ID | Name | Source |
|--------------------------|--------|--------|
| <input type="checkbox"/> | sd-wan | ALL |

Performance SLA—Link Health Monitor

Create New Performance SLA

Name

IP Version

Detect Protocol

Health-Check Server

Participants [Specify](#)

Enable Probe Packets ☒

SLA

[+ Create New](#) [Edit](#) [Delete](#) [Column Settings](#)

| <input type="checkbox"/> | ID | Latency Threshold (Millisecond) | Jitter Threshold (Millis) |
|--------------------------|----|---------------------------------|---------------------------|
| No record found. | | | |

Link Status

Interval

Failure Before Inactive

Restore Link After

Ping

...

TCP ECHO

UDP ECHO

HTTP

TWAMP

DNS

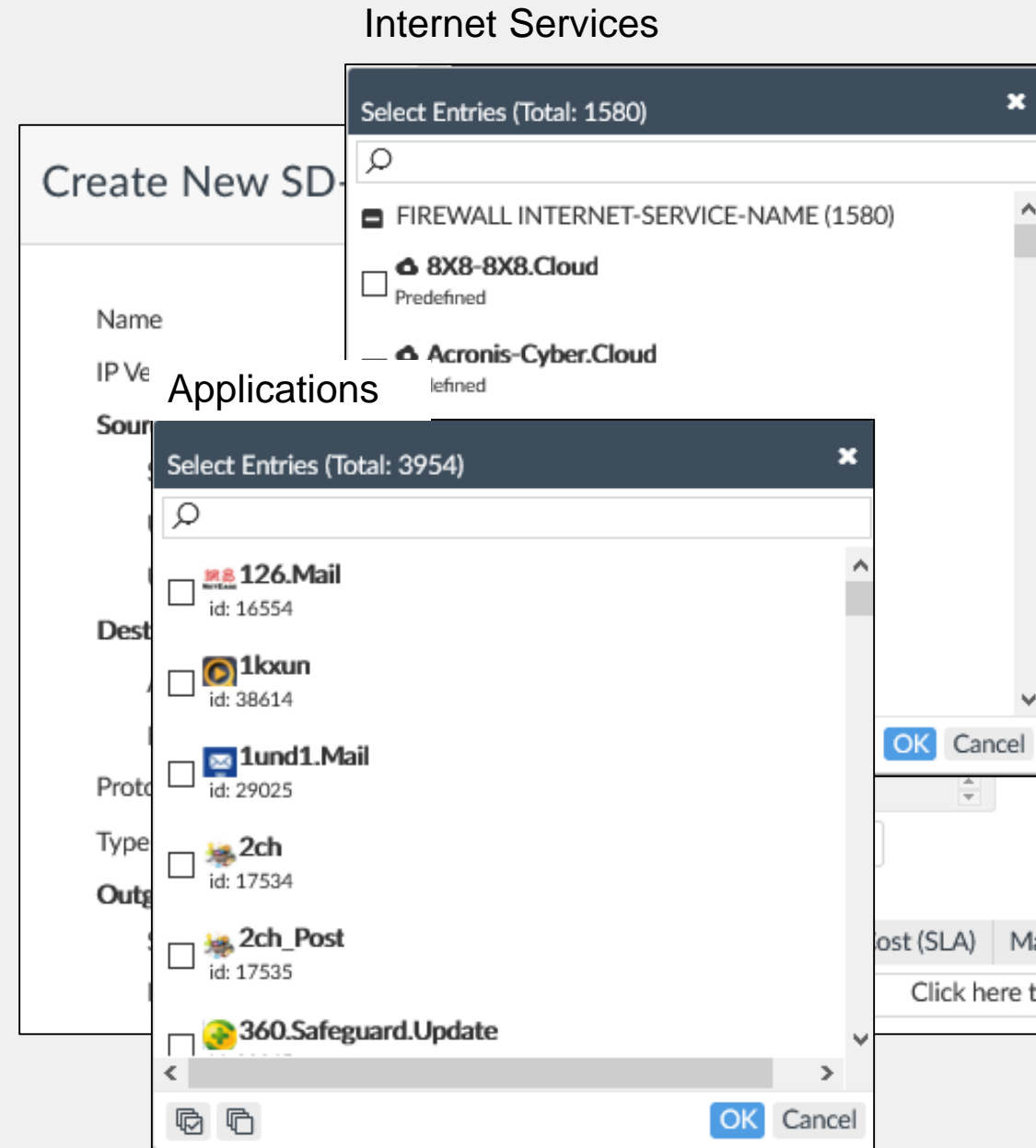
TCP CONNECT

FTP

- FortiManager link health monitor options:
 - DNS, HTTP, PING, TCP echo, UDP echo, TWAMP, TCP Connect, and FTP

SD-WAN Rules

- Rules can match traffic based on:
 - Source IP address, destination IP address, or port number
 - Internet services database (ISDB) address object
 - Users or user groups
 - Type of service (ToS)
- Use rules to route traffic through the member interfaces that best fit your needs
- Rules can be created for specific Internet Services or Applications



SD-WAN Rules—Manual

Outgoing Interfaces

| | | | | |
|----------------------|---------------------------------------------------|--------------|-------------------|--------------------------|
| Strategy | Manual | Best Quality | Lowest Cost (SLA) | Maximize Bandwidth (SLA) |
| Interface Preference | <input type="text" value="Click here to select"/> | | | |

- Introduced in FortiOS 6.2
- Use a manual rule to pin one or more applications to a specific SD-WAN member interface

SD-WAN Rules—Best Quality

| | |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Outgoing Interfaces | |
| Strategy | Manual Best Quality Lowest Cost (SLA) Maximize Bandwidth (SLA) |
| Interface Preference | <div><input type="text"/></div> <div><div><div>ISP_1</div><div>ISP_2</div></div><div>2 Entries Selected</div></div> |
| Measured SLA | SLA_1 |
| Quality Criteria | Latency |

Latency

Jitter

Packet Loss

Inbandwidth

Outbandwidth

Bibandwidth

Custom-profile-1

Custom-Profile-1

Link quality = (a*latency)+(b*jitter)+(c*packet loss)+(d/bandwidth)



SD-WAN Rules—Lowest Cost (SLA)

Outgoing Interfaces

Strategy: Manual Best Quality **Lowest Cost (SLA)** Maximize Bandwidth (SLA)

Interface Preference

Required SLA Target

| | |
|--------------------|---|
| ISP_1 | × |
| ISP_2 | × |
| 2 Entries Selected | |

| | |
|------------------|---|
| SLA_1#1 | × |
| 1 Entry Selected | |

- All of the traffic that matches the rule will be directed to a single interface
- Uses the cost value of the SD-WAN member interface

SD-WAN Rules—Maximize Bandwidth (SLA)

Outgoing Interfaces

Strategy: Manual | Best Quality | Lowest Cost (SLA) | **Maximize Bandwidth (SLA)**

Interface Preference

Required SLA Target

| Interface Preference | Required SLA Target |
|----------------------|---------------------|
| ISP_1 | SLA_1#1 |
| ISP_2 | |

2 Entries Selected

1 Entry Selected

- Introduced in FortiOS 6.2
- Load balances multiple sessions across participating SD-WAN members that meet the SLA

Conclusions:

- Customers want WAN with local internet breakout
 - SD-WAN enables local internet breakout but this means added security risks
 - Most SD-WAN vendors do not have robust NGFW security
 - Many SD-WAN vendors recommend multiple devices for SD-WAN and security
 - Multiple devices add to the complexity and cost
- What customers need is Secure SD-WAN
 - A single device handles both the security and the SD-WAN needs

Key Takeaway

- FortiGate changes the conversation from SD-WAN to Secure SD-WAN
 - Best of breed integrated SD-WAN networking and security capabilities in a single device reduces TCO
- FortiGate is SD-WAN ready:
 - Purpose-built security processor (ASIC) for high reliability
 - Enhanced application aware WAN path controller for QoS
 - Security Fabric ready for easy visibility and control
 - FortiManager enables single pane management across thousands of enterprise branches
 - 360 Protection is the most comprehensive protection bundle

Fortinet Fast Track Training Qualifies for (ISC)² credits

Earn 1 credit for every hour of Fast Track training, up to 8 hours per day towards maintaining your CISSP certification.

Log into your (ISC)² CPE Portal to claim your credits:

- **Ask your instructor for a course completion certificate**
- **Course Name:** Constructing a Secure SD-WAN Architecture
- **Number of training hours:** 4 hours
- **(ISC)² CISSP Domain 4:** Communication and Network Security
- Provide the **date** you completed the training



Fortinet provides ILT Training

Log into <https://training.fortinet.com> to find out more:

- **A full range of Instructor led, product based training courses leading to certification, based on lectures and labs.**
- **Free Cybersecurity Training**
 - **Advanced training** for security professionals.
 - Technical training** for IT professionals.
 - Awareness training** for teleworkers.

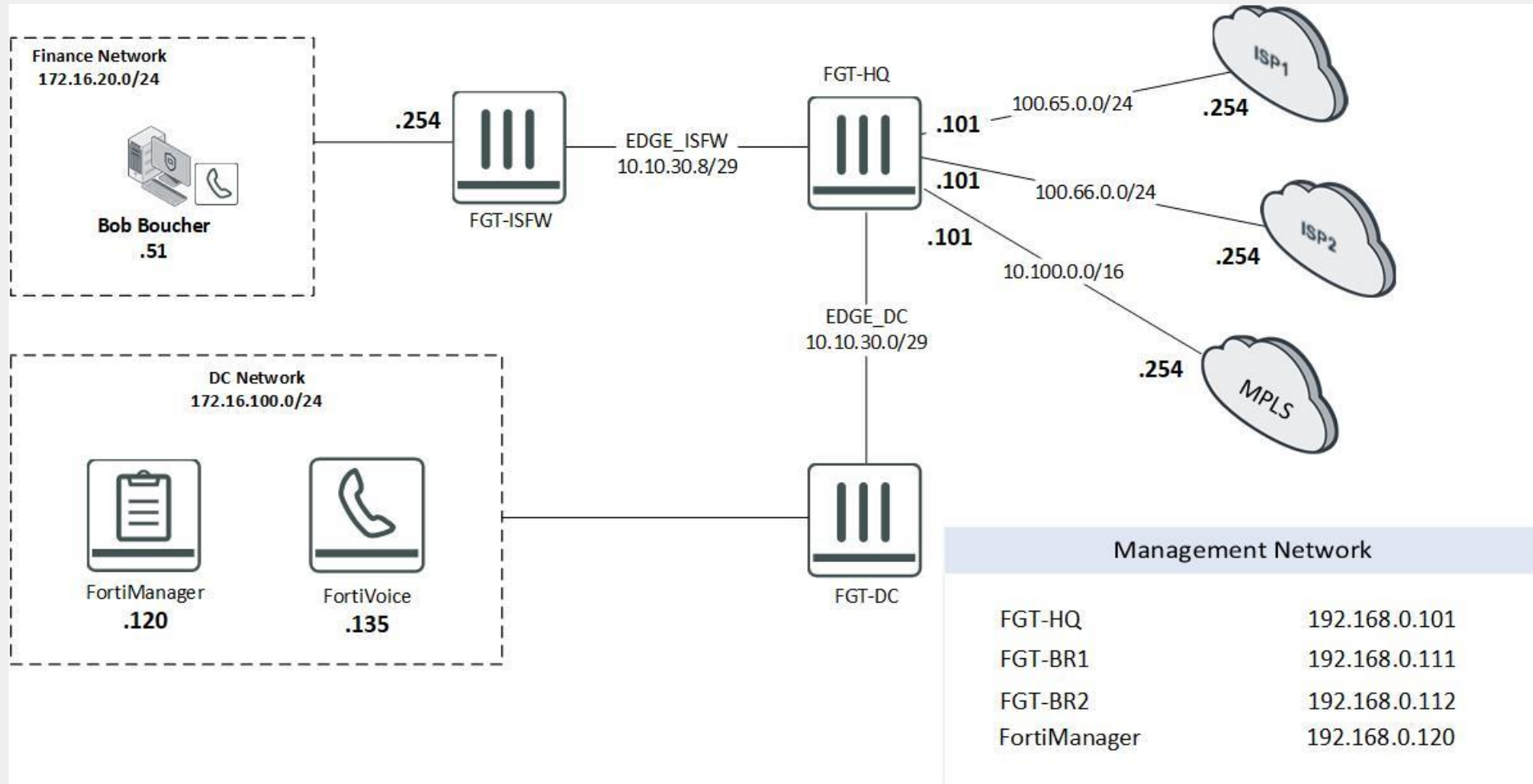




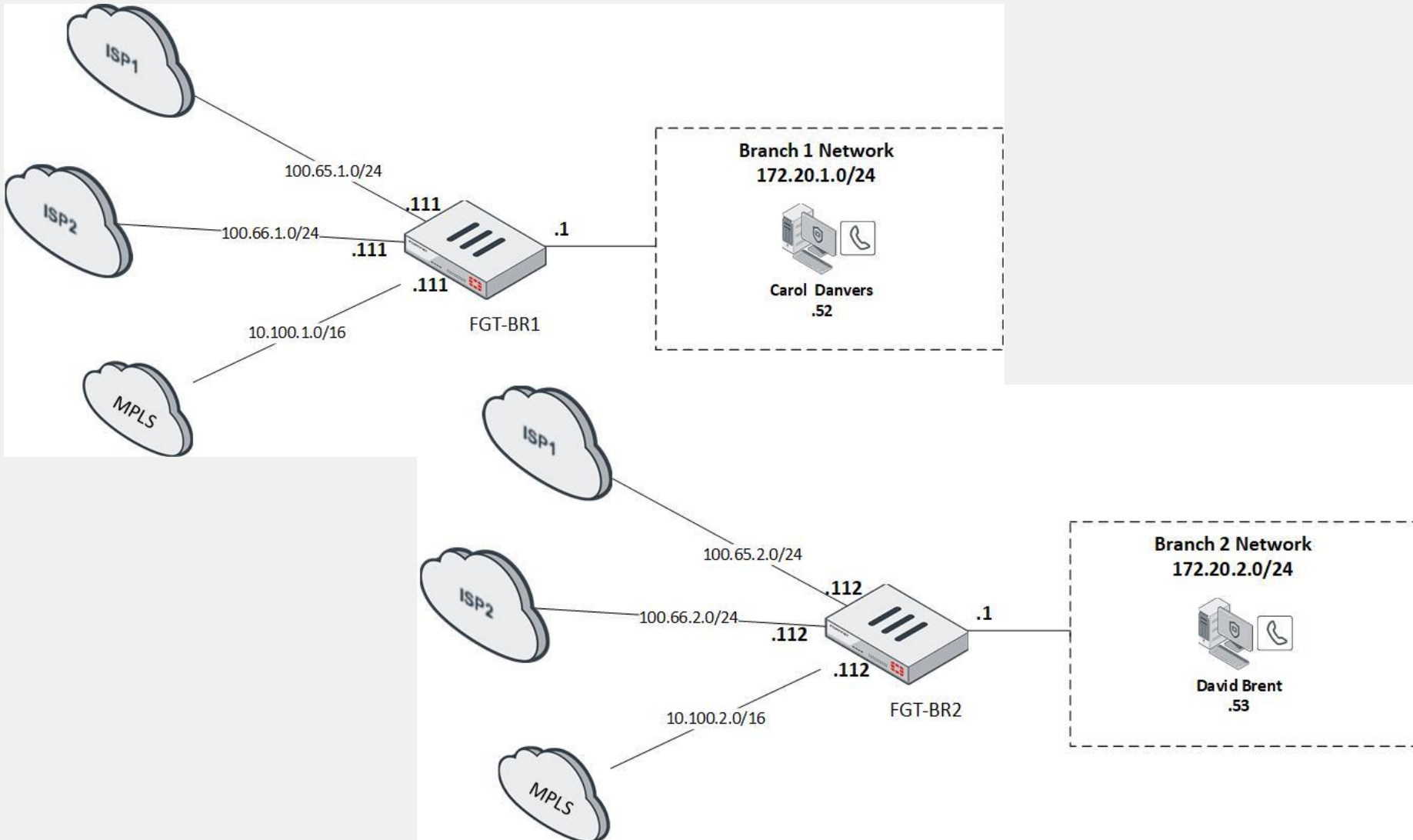
Lab Exercise: SD-WAN



Lab—Network Diagram



Lab—Network Diagram



Instructor Notes

Instructor Notes

- The following slides are informational and can be used for the following:
 - To remind instructors how to interact with the Fast Track labs
 - To help students get started using the hands-on lab
- Feel free to use some, all, or none of the slides as part of your session
- The interfaces should be fairly intuitive; therefore, it is recommended to keep the initial instruction short and then assist students individually as needed



Student Access

- The student course link and enrolment key is provided via email after the session has been approved



- Instructions for access can be forwarded to students

[SCHEDULED] [Dynamic Cloud Security] Advanced Email Security S...
Do not reply to this email <noreply-training@fortinet.com>
To: Chris Pratico 9:34 AM
Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.
Phish Alert + Get more add-ins

Christopher Pratico,

Your course request for [Dynamic Cloud Security] Advanced Email Security Solution with FortiMail v6.4 has been scheduled.

Course: [\[Dynamic Cloud Security\] Advanced Email Security Solution with FortiMail v6.4 \(Fast Track Session\) - December 30, 2020](#)
Start date: Wednesday, 30 December 2020 at 9:30 AM EST

Student access information

Please provide the following link to your students for accessing their course:

Course link: <https://training.fortinet.com/course/view.php?id=>
Enrolment key: 19ab05 (Not required if enrolled manually)

Student instructions (with Learning Platform account):

1. In the upper-right corner of the screen click Login and select account type.
2. Partners should access through 'Partner'.
3. End users should access through 'Public'.

Student instructions (without Learning Platform account):

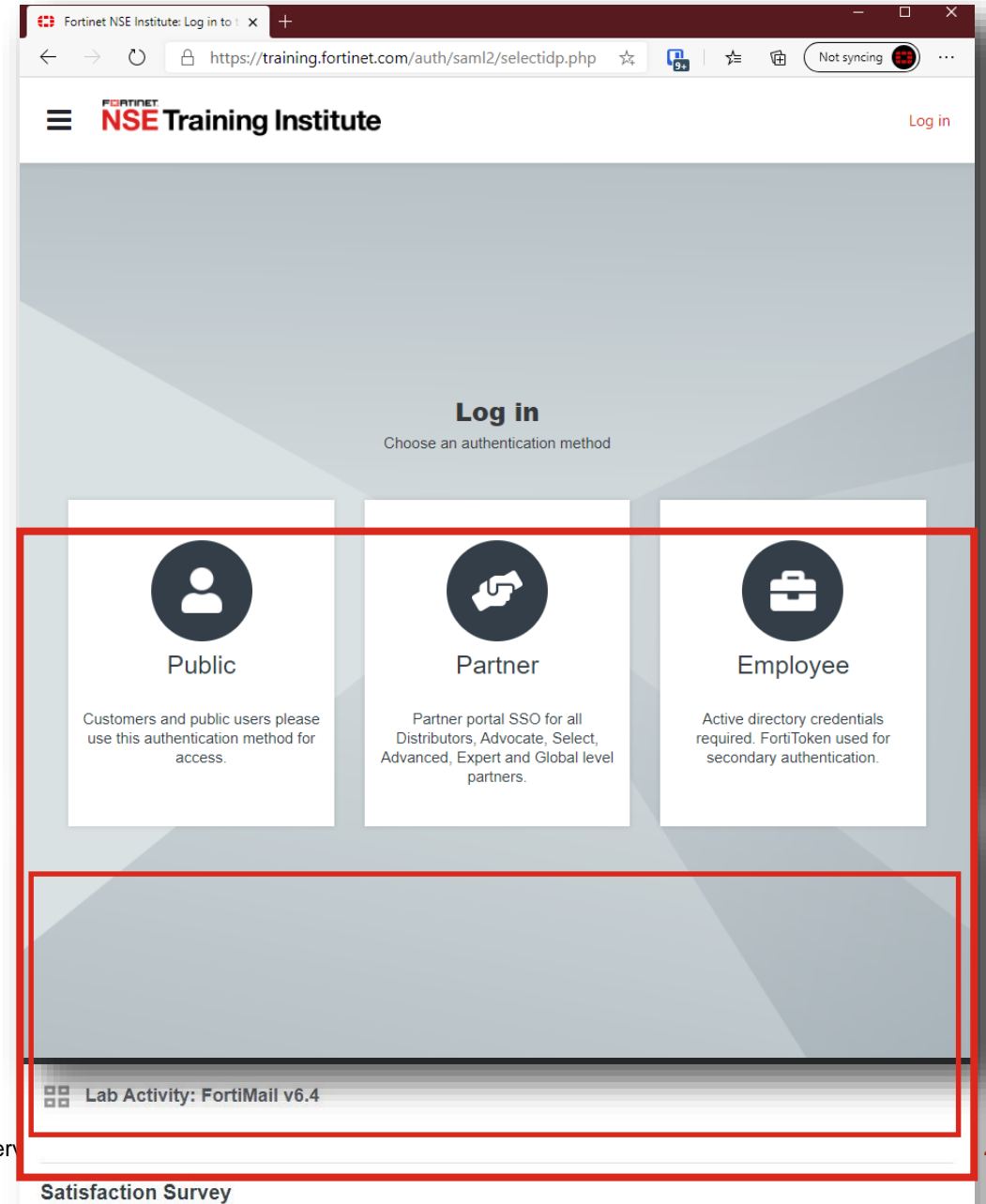
1. In the upper-right corner of the screen click Login and select 'Public' account type.
2. Click the Sign Up button at the bottom of the page.
3. Complete mandatory fields and click Submit.

Once logged in, students may self-register in the course after input of the enrolment key provided above.

To view your upcoming lab courses visit your lab dashboard .

Fast Track Course

- Log in via the appropriate authentication method
- Enter the provided enrolment key
- The hands-on Lab accessible from **Lab Activity** link
- Course content is available for download after completing the hands-on lab and short survey



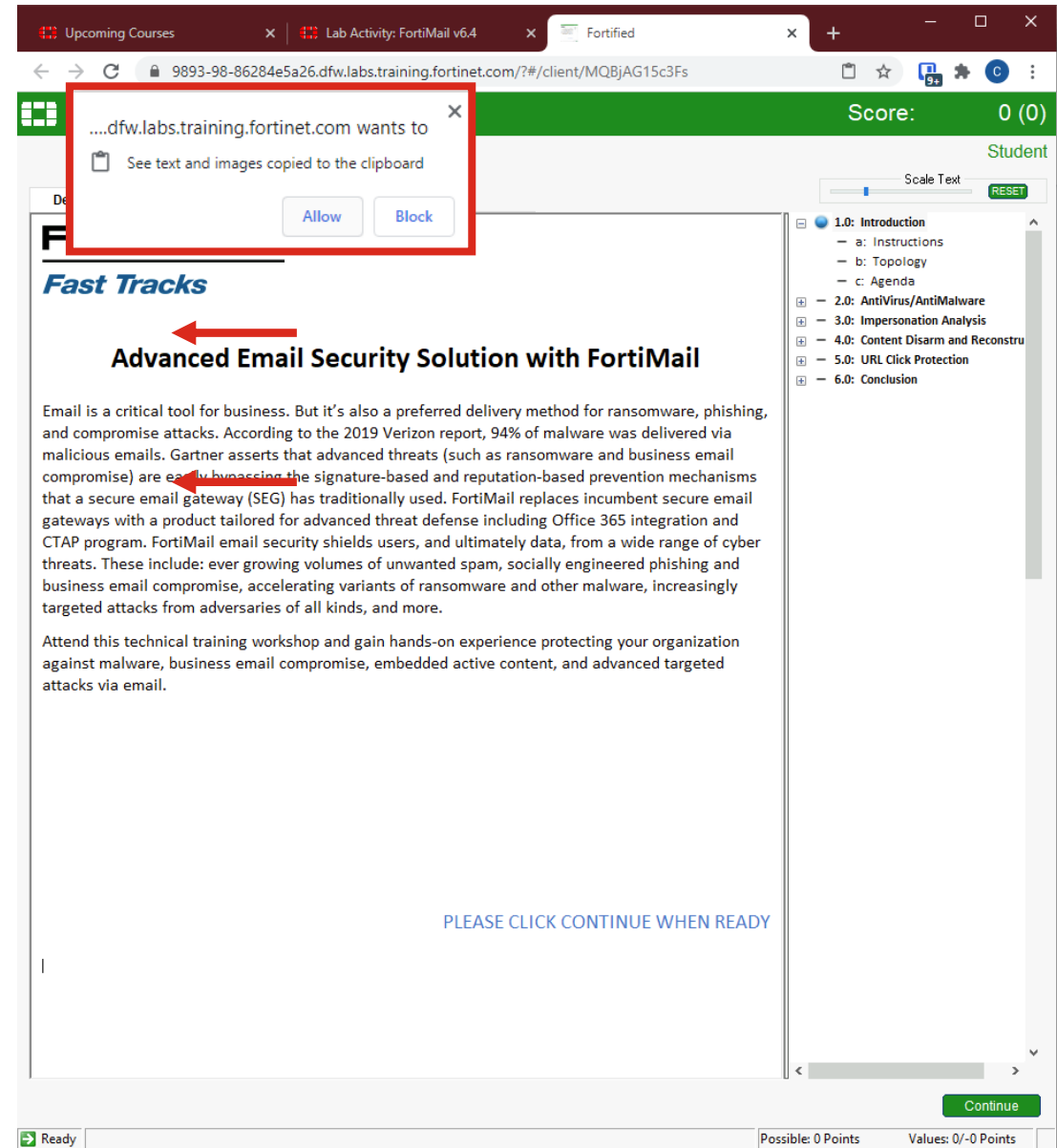
Lab Activity

- Students individual hands-on lab environment
- Reference lab topology
- Online **FortiFIED** lab guide
- Direct access to lab devices

The screenshot shows the Fortinet NSE Training Institute website. The browser address bar displays 'training.fortinet.com/mod/lab/view.php?id=95476'. The page title is 'Lab Activity: FortiMail v6.4'. The left sidebar contains a navigation menu with sections: GUIDE (FortiFIED), DMZ (FortiMail), SALES (Alice), and MISC (Jumpbox). The main content area is titled 'Lab Activity: FortiMail v6.4' and includes instructions: 'The side navigation menu presents all the devices used in this lab.', 'Click the device item to display which services available.', 'Click the device service to open that connection in a new tab.', and 'Return to this **Lab Activity** page to access additional devices.' Below the instructions is a 'Lab Topology' diagram. The diagram shows a network topology with components: Management (Jumpbox), DMZ (FortiMail), Internet, Alice (Mail Client), FortiGate (FW), FortiGate (Edge), FortiGate (DC), Datacenter (FortiManager, Mail Server), and Kali Linux (Attacker). The diagram is enclosed in a red box.

FortiFIED Lab Guide Access

1. From the **Lab Activity** page click **FortFIED** on the navigation sidebar.
2. Click the **RDP** connection to open a new tab containing the lab guide.
3. If displayed, allow the browser to copy/paste tab contents to the clipboard.



FortiFIED Interactive Lab Guide

Stop and Think Objective

- Enter a name
- Application banner
- Objectives list
- Display tabs
- Rich text
- Answer choice
- Continue button
- Status bar
- Scale text slider
- Resize display bar
- Hints



The screenshot displays the FortiFIED Interactive Lab interface for the AntiVirus/AntiMalware Log Analysis section. The interface is divided into several key areas:

- Header:** Shows the section name "AntiVirus/AntiMalware" and the current score "Score: 10 (10)".
- Log Analysis:** The main content area, which includes a description of the log files and a large blue box with the text "PLEASE CLICK CONTINUE WHEN READ".
- Objectives List:** A sidebar on the right listing the objectives for the lab, including "1.0: Introduction", "2.0: AntiVirus/AntiMalware", "3.0: Impersonation Analysis", "4.0: Content Disarm and Reconstruction", "5.0: URL Click Protection", and "6.0: Conclusion".
- Question:** A multiple-choice question asking for the correct answer based on the log files. The options are:
 - a. The email was sourced from a spoofed email address.
 - b. The default action for the antivirus profile applied was set to 'Reject' emails infected with any virus/malware.
 - c. The email contained virexe attachment that was infected with virus EICAR_TEST_FILE.
 - d. The email was infected with malicious/phishing website links.
- Bottom Bar:** Contains a "Request Hint (1)" button, a "Next hint will cost" indicator, and a "Continue" button.

FortiFIED Interactive Lab Guide

Task Objective

- Task success is determined by script after clicking **Continue**
- **Success** or **Failure** will be indicated on the **status bar**
- **Solve** may be available on some objectives (use with caution)

The screenshot displays the FortiFIED Interactive Lab interface. The browser window shows the URL `9893-98-86284e5a26.dfw.labs.training.fortinet.com/?#/client/MQBjAG15c3Fs`. The page title is 'AntiVirus/AntiMalware' with a score of 0 (0). The main content area is titled 'Providing Protection Against Emerging Virus/Malware' and contains the following text:

Description

Background
Alice is a sales manager at Acme Corp sitting on the Windows Client machine. The attacker wants to infect Alice's machine by sending her an EICAR virus executable file in an email attachment.

Goal
For this objective, you will be working on the **FortiMail**, which can be accessed using the **HTTPS** link under the **DMZ** section on the sidebar.

Note: Unless otherwise indicated all username/passwords for the various web consoles are:

Username: admin **Password:** Fortinet1!

The goal of this lab exercise is to configure FortiMail to protect Alice alice@acmecorp.net against the EICAR virus attack sent by the attacker via email. Perform all configuration tasks within the *acmecorp.net* domain.

Success
In order to successfully complete this objective, you will need to use your knowledge of antivirus profiles and the recipient policy to reject any virus-based attacks against acmecorp.net.

PLEASE CLICK CONTINUE WHEN READY

The right sidebar shows a table of contents with the following items:

- 1.0: Introduction
 - a: Instructions
 - b: Topology
 - c: Agenda
- 2.0: AntiVirus/AntiMalware
 - a: Providing Protection Against Emerging Virus/M
 - b: Log Analysis
- 3.0: Impersonation Analysis
- 4.0: Content Disarm and Reconstruction
- 5.0: URL Click Protection
- 6.0: Conclusion

The bottom of the interface features a status bar with the following elements:

- Request Hint (2)** button
- Solve** button
- Continue** button
- Ready** status indicator
- Possible: 10 Points** and **Values: 10/-2 Points** display



Device Access

- Status
 - Active / Inactive / Unknown
- Services
 - RDP / HTTPS / SSH
 - Click to open in a new tab
- Actions
 - Power on / Shutdown / Revert
- Credentials
 - Click to copy to clipboard

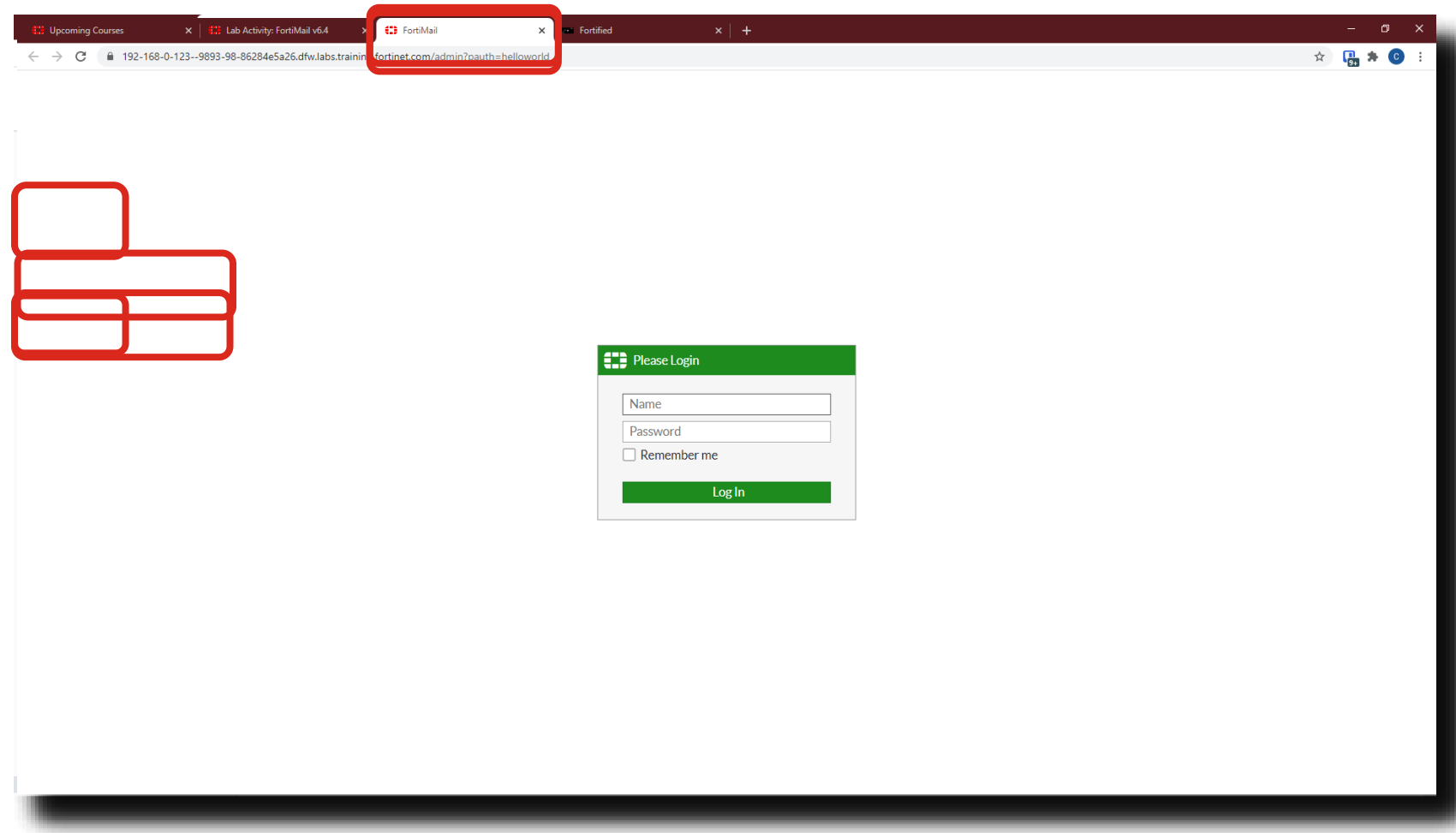
The screenshot displays the FortiMail v6.4 Lab Activity page. The sidebar on the left contains the following sections:

- DMZ**: FortiMail (ACTIVE)
- SERVICES**: HTTPS
- ACTIONS**:
 - Power on: Power on the device.
 - Shutdown: Shutdown the device.
 - Revert: Shutdown and revert to original state.
- CREDENTIALS**:
 - Username: admin
 - Password: *****

The main content area is titled "Lab Activity: FortiMail v6.4" and includes a "Lab Topology" diagram. The diagram illustrates the network architecture, showing the FortiMail v6.4 device in the DMZ, connected to the Internet and a Kali Linux (attacker) machine. It also shows the FortiGate DC (Data Center) and the FortiGate ISW (Internet Service Web) components.

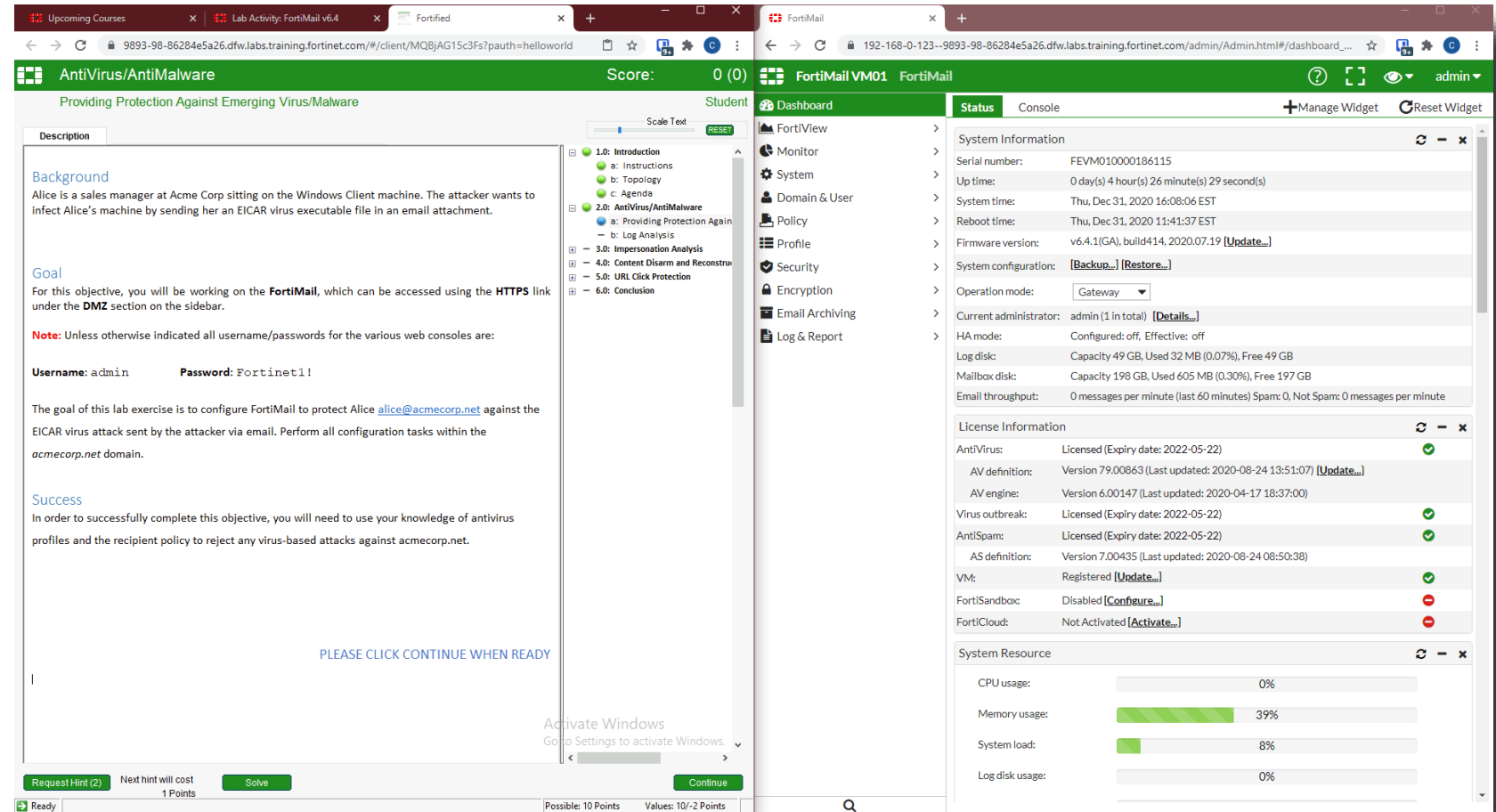
Window Adjustments

- Access the FortiFIED lab guide
- Access any other device



Window Adjustments for Single Monitors

- Drag tab from browser to separate
- Place windows side-by-side according to personal preference
- Complete hands-on lab



Use Tablet as a Secondary Monitor

- Open the browser and go to <https://training.fortinet.com>
- Log in and find your Fast Track course that is in progress
- Access devices as normal



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