

## MARCO Federal Managed Computer Services



Cybersecurity Maturity Model Certification Initiative



ONOPA Project Management Information System Administration Handbook

Document No ONOPA IT-100

Effective Date	Review Date	Version	Page No.
7/19/2021	7/20/2021	4	Live Doc]

MOJVII 301-00 Access Control Policy
MOJVII 302-00 Security Awareness Training Policy
MOJVII 303-00 Audit Accountability Policy

MOJVII 305-00 Configuration Management Policy
MOJVII 306-00 Contingency Planning Policy
MOJVII 307-00 Identification and Authentication Policy
MOJVII 308-00 Incident Response Policy
MOJVII 309-00 IT Maintenance Policy
MOJVII 310-00 Media Protection Policy

MOJVII 313-00 Physical and Environmental Protection MOJVII 314-00 Risk Assessment Policy

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ONOPA 301 Access Control Policy
ONOPA 302 Security Awareness Training Policy

ONOPA 303 Audit Accountability Policy

ONOPA 310-00 Media Protection

ONOPA 305 Configuration Management Policy
ONOPA 306 Contingency Planning Policy
ONOPA 307 Identification and Authentication Policy
ONOPA 308 Incident Response Policy
ONOPA 309 IT Maintenance Policy

ONOPA 313-00 Physical & Environmental Protection

Element			
Essential Practices Statement	OPMIS	CMMC	
1. General Operations			
Hardware and Software Inventories			
Maintain current hardware and software inventories.			
Reason:			
Hardware inventories should be maintained to identify assets.  Inventories should be used to facilitate:			
• resource sharing,			
• software distribution and maintenance,			
• asset control,			
hardware security, and			
• repair or replacement of hardware.			
Software inventories should be maintained to identify assets.  Inventories should be used to identify:			
software for replacement or upgrades,			
authorized users,			
• license compliance, and			
• unauthorized software.			
Software Licensing			
Maintain current software licensing and enforcecompliance with licensing agreements.			
Reason:			
Software licensing and compliance with licensing requirements			
minimizes the legal and financial risks associated with using			
unlicensed software. As noted above under inventories, an inventory			
of all software is a key component to controlling this issue, as are			
detection and protection techniques.			

Equipment Removal/Data Destruction			
Establish formal procedures and controls for the secure			
removal and disposal of information assets. Essential			
controls include:			
<ul> <li>Requiring authorization for removal of</li> </ul>			
equipment, information, or software.			
<ul> <li>Ensuring all data and software are removed</li> </ul>			
ordestroyed prior to equipment disposal.			
<ul> <li>Ensuring information and equipment to be</li> </ul>			
removedor destroyed is stored in a secure area.			

Operations				
Element				
Essential Practices Statement	OPMIS	CMMC		
Information can be compromised through careless disposal orreuse of equipment. Therefore, storage devices containing sensitive information, as defined by the institution's data classification system, should be physically destroyed or securely overwritten.  These actions help protect the institution from liability by providing security for confidential information, as well as compliance with licensing agreements.				
2. Network Operations	2. Network Operations			
Intrusion Detection				
Establish processes to detect, correct, and report unauthorized system access. Essential elements of the process include:				
<ul> <li>Detecting external and internal intrusions,</li> </ul>				
Logging incidents,				
<ul> <li>Real-time monitoring,</li> </ul>				
<ul> <li>Reporting to management and FCA,</li> </ul>				
<ul> <li>Conducting an impact analysis,</li> </ul>				
<ul> <li>Establishing an intrusion response process and team, and</li> </ul>				
Updating and maintaining the system.				

Reason: Using an Intrusion Detection System (IDS) enhances an institution's ability to determine if its preventive and protective measures are performing as expected. An IDS also provides some protection against legal liability as it can show an institution took "reasonably" expected steps to prevent damage, loss, or theft of privileged information.	
Web Site Monitoring	
Review the web site to detect unauthorized changes and implement corrective action if necessary.  Reason: Ensure the web site is available and its integrity is maintained and	
reputation risk is minimized.	
ternet Use Monitoring	
Establish, monitor, and enforce Internet Usage policies and procedures.	
<u>Reason</u> :	
Ongoing monitoring of internet usage allows management to:	
<ul> <li>Protect corporate resources (e.g., employee time, network resources);</li> </ul>	

Operations		
Element		
<b>Essential Practices Statement</b>	OPMIS	CMMC
<ul> <li>Prevent inappropriate use (e.g., gambling, pornography, stock trading, downloading files, etc.);</li> <li>Limit legal liability; and</li> <li>Minimize reputation risk.</li> </ul>		

# **Internet Data Transmissions** Identify and classify all internet transmissions. Secure data transmissions of confidential and sensitive information as defined in the institution's data classification system. Reason: *Unless encrypted, information sent via the internet is exposed to* disclosure, theft or modification and creates potential legal exposure and reputation damage. To address these concerns FCA issued Regulation 609.950(c) – Electronic Communications in May 2002. This regulation requires institutions to ensure electronic communications represent "good business practices." **Network Traffic Monitoring** Monitor networkfaults, performance, configuration, security, and accounting management. Reason: The network system is an integral part of communications infrastructure. Problems affect many or all users quickly and visibly. Projections of future capacity requirements should be made to ensure that adequate processing power and storage are available. A network administrator should monitor network efficiency statistics, ensure that files are backed up regularly and stored off-site, establish and maintain adequate virus protection, review network activity reports, and react to networkalerts and alarms. Monitoring Network and Firewall Exploits Regularly review the technical alerts/advisories and recommended solutions provided to monitor new threats and implement timely corrective measures to firewalls, network operating systems, and applications. Reason: To protect the confidentiality, integrity, and availability of data and systems, network administrators must constantly monitor new exploits and ensure that measures to protect against them are applied to systems. Computer hackers and intruders continue to exploit newly discovered holes in firewalls

and network systems and devise new attacks.

Operations			
Element			
Essential Practices Statement	OPMIS Reference	СММС	
Patch Management	T		
Implement a patch management program that includes:			
<ul> <li>Monitoring vulnerabilities and patches for all software identified in the systems inventory.</li> <li>Evaluating the impact of the patches on the institution's information technology systems and environment,</li> <li>Testing the patches to validate expected functionality, and</li> <li>Installing the patches throughout the network.         Reason:     </li> </ul>			
Inadequate patching of software vulnerabilities exposes an institution to significant risk. Although software vendors often develop an update or "patch" to correct identified weaknesses, it is the software user's responsibility to update systems or install patches in a timely manner. Flaws in software code that could cause a program to malfunction generally result from programming errors that occur during software development. The increasing complexity and size of software programs contribute to the growth in software flaws. By exploiting software vulnerabilities, hackers and others who spreadmalicious code can			
Network Architecture	1		
Maintain current diagram of network architecture.			
Reason: The network diagram depicts the current network layout and design. It is a tool that the network administrator uses to identify inter-relationships, enforce security, detect problems, minimize risk, and help restore operations.			

Element		
Essential Practices Statement	OPMIS Reference	СММС
General Operations		
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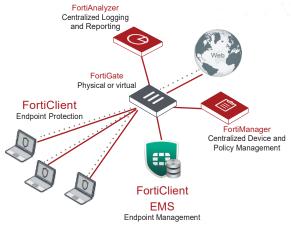


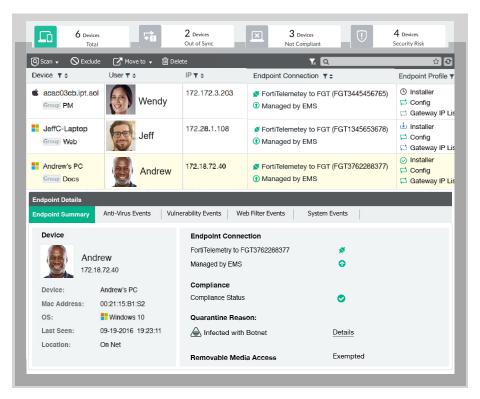
# **FortiClient**

Lock down visibility and control of your software and hardware inventory across the entire security fabric. Identify vulnerable or compromised hosts and track all details of systems and user profiles across your attack surface.

FortiClient's Security Fabric Integration, ensures that all fabric components – FortiGate, FortiAnalyzer, EMS, Managed AP, Managed Switches, Sandbox – have a unified view of endpoints in order to provide tracking & awareness, compliance enforcement and reporting.

Advanced Threat Protection automates prevention of known and unknown threats through built-in host-based security stack and integration with FortiSandbox. Easy to use Secure Remote Access & Mobility via SSL and IPsec VPN. FortiClient connects every endpoint to form a cohesive security fabric.







- Simple & User Friendly UI
- Remote FortiClient Deployment
- Realtime Dashboard
- Software Inventory Management
- · Active Directory Integration
- · Central Quarantine Management
- · Automatic Group Assignment
- · Automatic Email Alerts
- Supports Custom Groups
- Remote Triggers

#### FortiClient Benefits:

**Unified** endpoint features including compliance, protection, and secure access into a single, modular lightweight client.

**End-to-end** threat visibility and control by natively integrating endpoint into the Security Fabric architecture.

**Advanced** threat protection against exploits and advanced malware, powered by FortiGuard along with FortiSandbox integration.

**Integrated** patch management and vulnerability shielding to harden all endpoints.

**Simplified** management and policy enforcement with Enterprise Management Server (EMS) and FortiGate, respectively.

#### Advanced Threat Protection

As a next-generation endpoint protection solution, FortiClient helps connect endpoints to FortiSandbox, which uses **behavior-based analysis** to automatically analyze in real-time all files downloaded to FortiClient endpoints. Millions of FortiClient and FortiSandbox users worldwide share information about known and unknown, malware with cloud-based **FortiGuard**. FortiGuard automatically shares the intelligence with other FortiSandbox units and FortiClient endpoints to **prevent attacks** from known and unknown malware.

#### Security Fabric Integration

As a key piece of the Fortinet Security Fabric, FortiClient integrates the endpoints into the Fabric for early detection and prevention of advanced threats and delivers endpoint visibility, compliance control, vulnerability management and automation. With 6.0, FortiOS & FortiAnalyzer leverages FortiClient endpoint telemetry intelligence to identify Indicator of Compromise (IoC). With the Automation capability, admins can investigate real-time and set policies to automate responses including quarantining suspicious or compromised endpoints to contain incidents and stem outbreaks. Fortinet's endpoint compliance & vulnerability management features simplifies the enforcement of enterprise security policies preventing endpoints from becoming easy attack targets.

#### Secure Remote Access & Mobility

FortiClient uses SSL and IPSec VPN to provide **secure**, **reliable access** to corporate networks and applications from virtually any internet connected remote location. FortiClient simplifies remote user experience with built-in **auto-connect and always-up** VPN features. Two-Factor authentication can also be used to provide additional layer of security. Feature like, VPN auto-connect, Always up, Dynamic VPN Gateway Selection and split-tunneling ensures smooth user experience on all device types connecting from home or public places.

### Anti-Exploit

This behavioral-based detection technology **protects against zero-day attacks** that target applications with zero-day or unpatched vulnerabilities.



**Protects against zero-day** attacks targeting undiscovered or unpatched application vulnerabilities

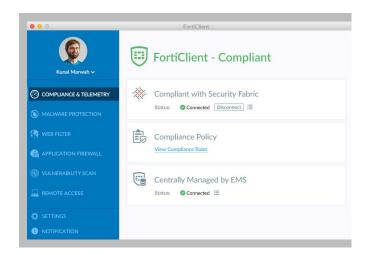
**Detects various memory techniques** used in an exploit, such as ROP, HeapSpray, bufferoverflow

File-less Attacks powershell & other scripted attacks

**Shields web browsers,** Java/Flash plug-ins, Microsoft Office applications, and PDF Reader

**Identifies and Blocks** exploit kits, prevents drive-by downloads

Signature-less solution



## Feature Highlights

EMS provides ability to centrally manage Windows, Mac, Linux, Chrome, iOS and Android endpoints



FortiGate provides awareness and control over all your endpoints



#### Remote FortiClient Deployment

that allows administrators to remotely deploy endpoint software and perform controlled upgrades.

Centralized Client Provisioning makes depoying FortiClient configuration to thousands of clients an effortless task with a click of a button.

**Software Inventory Management** provides visibility into installed software applications and licence management to improve security hygiene. You can use inventory information to detect and remove unnecessary or outdated applications that might have vulnerabilities to reduce your attack surface.

Windows AD Integration helps sync organisations AD structure into EMS so same OUs can be used for endpoint management.

Realtime Endpoint Status always provides current information on endpoint activity & security events.

Vulnerability Dashboard helps manage organizations attack surface. All vulnerable endpoints are easily identified for administrative action.

**Telemetry** provides real-time endpoint visibility (including user avatar) on FortiGate console so administrators can get a comprehensive view of the whole network. Telemetry also ensures that all fabric components have a unified view of the endpoints.

Compliance Enforcement can be used to enforce organisations security policies. Only authorized and compliant endpoints with no security risks are granted access.

#### **Endpoint Quarantine**

helps to quickly disconnect a compromised endpoint from the network and stop it from infecting other assets.

#### **Automated Response**

helps detect and isolate suspicious or compromised endpoints without manual intervention

## FortiClient EMS and FortiGate Endpoint Licenses

	FORTICLIENT EMS LICENSE	FORTIGATE ENDPOINT TELEMETRY & COMPLIANCE LICENSE
PROVISIONING		
Centralized Client Provisioning	<	
Client Software Updates	<b>Ø</b>	
Windows AD Integration	<b>⊘</b>	
FortiTelemetry Gateway IP List	<b>Ø</b>	
Software Inventory	<b>Ø</b>	
Automatic Group Assignment	<b>Ø</b>	
COMPLIANCE ENFORCEMENT AND SECURITY FABRIC INTEGRA	ATION	
Fortinet Security Fabric Integration		<b>⊘</b>
Security Posture Check		<b>⊘</b>
Vulnerability Compliance Check		<b>⊘</b>
Minimum System Compliance		<b>⊘</b>
Authorized Device Detection		<b>Ø</b>
Automated Endpoint Quarantine	<b>⊘</b>	<b>⊘</b>
REMOTE CONTROL		
On-demand Antivirus Scan	<b>Ø</b>	
On-demand Vulnerability Scan	<b>Ø</b>	
Host Quarantine	<b>Ø</b>	<b>⊘</b>
TELEMETRY AND MONITORING		
Client Information (client version, OS IP/MAC address, profile assigned, user avatar)	<b>Ø</b>	<b>⊘</b>
Client Status	<b>Ø</b>	<b>⊘</b>
Reporting	(To FortiAnalzyer)	(To FortiAnalzyer)



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Information Security Policies are the foundation for information technology security at MARCO-ONOPA JVII. The policies set out the information security standards required by NIST 800-171, w...

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Information Security Policies are the foundation for information technology security at MARCOONOPA JVII (MOJVII). The policies set out the information security standards required by NIST 80...

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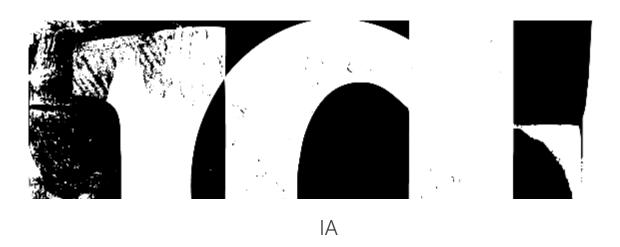


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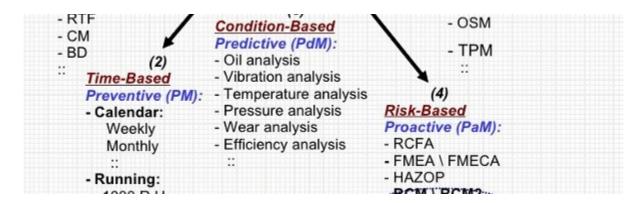


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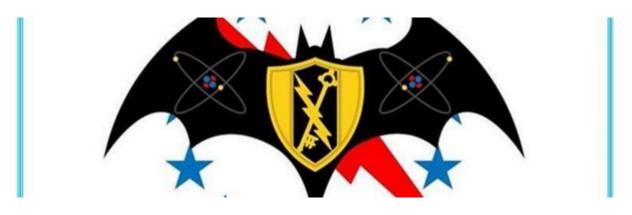
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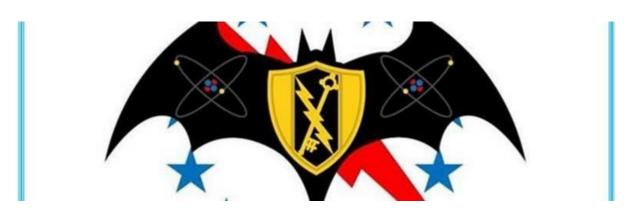
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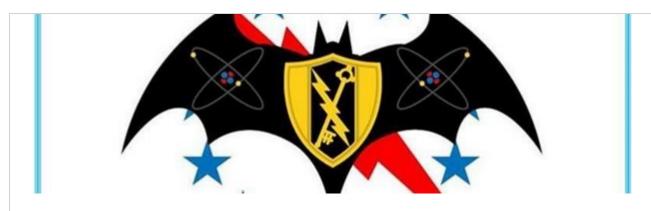
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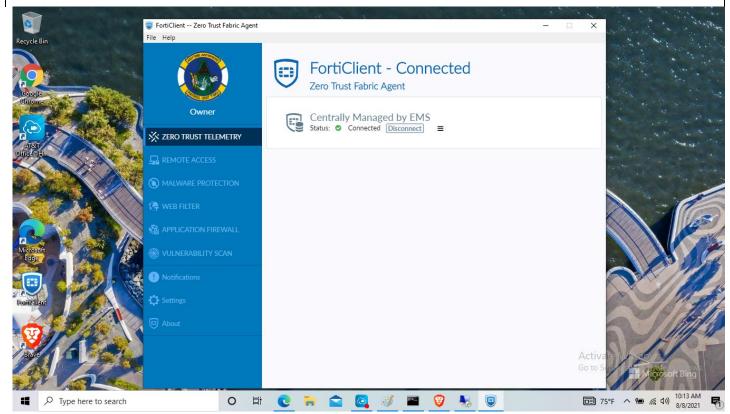
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Information Security Policies are the foundation for information technology security at MARCOONOPA JVII (MOJVII). The policies set out the information security standards required by NIST 80...

# **OPMIS Network Administrator Handbook**



## Conflicts with third party AV products

The AV feature in FortiClient is known to conflict with other similar products in the market.

- You should not use FortiClient's AV feature with other AV products.
- If not using FortiClient's AV feature, you should exclude the FortiClient installation folder from scanning for the third-party AV product.

During a new installation of FortiClient, the installer searches for other registered third-party software and, if any is found, warns users to uninstall them before proceeding with the installation. There is also an option to disable FortiClient Real Time Protection (RTP).

# Perimeter-based security zero-trust model

Every time a device or user is automatically trusted, it places an organization's data, applications, and intellectual property at risk. Organizations should implement a zero-trust strategy that focuses on three key elements:

- 1. Know every device on the network.
- 2. Know every user that accesses the network.

Know how to protect assets on and off the network



## Conflicting Antivirus Software



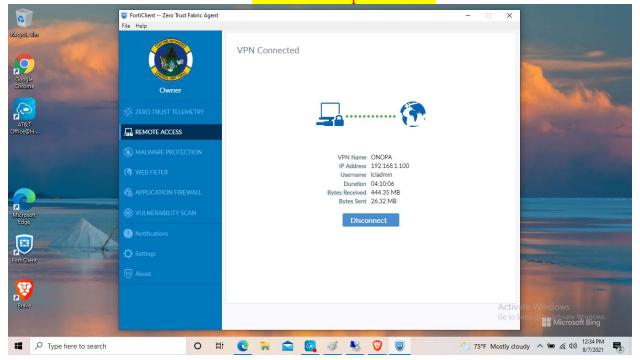
The following antivirus software has been detected on your computer. To maintain system stability, the conflicting antivirus should be uninstalled before installing FortiClient. Alternatively you can disable the FortiClient real-time protection feature. However, this is not recommended.

Avira Desktop

- Exit the current installation. I will uninstall all other antivirus product(s) before installing FortiClient.
- Disable FortiClient real-time protection.

Back Next Cancel

Only authorized ONOPA VPN users can access backend resouces, Remote Desktop Serives, TEAMS and Special Tools



# Fortinet Security Fabric

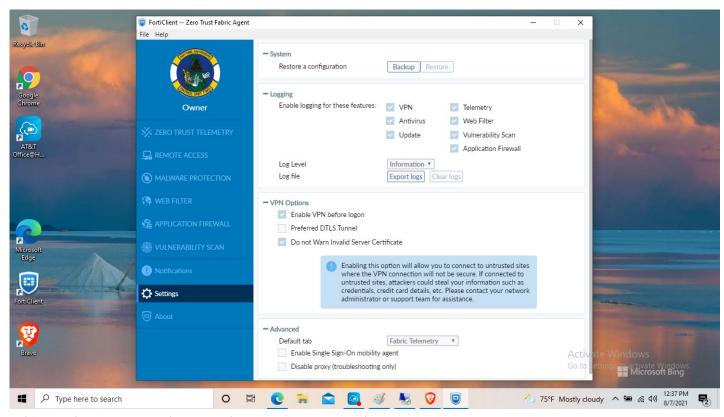
The <u>Fortinet Security Fabric</u> continuously assesses the risks automatically adjusts to provide comprehensive real-time across the digital attack surface and cycle.

Powered by FortiOS, the Fabric is the industry's highestintegrated cybersecurity platform with a rich ecosystem. enables consistent security across the extended digital surface. Seamless interoperability, complete visibility, and control are now possible for hybrid deployments including software, and X-as-a-Service across networks, endpoints,



and protection

performing The Fabric attack granular hardware, and clouds.



The Fabric is Built on Three Key Attributes



# Broad Reduce risk and manage the entire digital attack surface

Fortinet Security portfolio enables coordinated threat detection and policy enforcement across the entire digital attack surface and lifecycle with converged networking and security across edges, clouds, endpoints, and users.

## **Integrated**

## Close the security gaps and reduce complexity

Integrated and unified security, operations, and performance across different technologies, locations, deployments enables complete visibility. It also

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and tightens

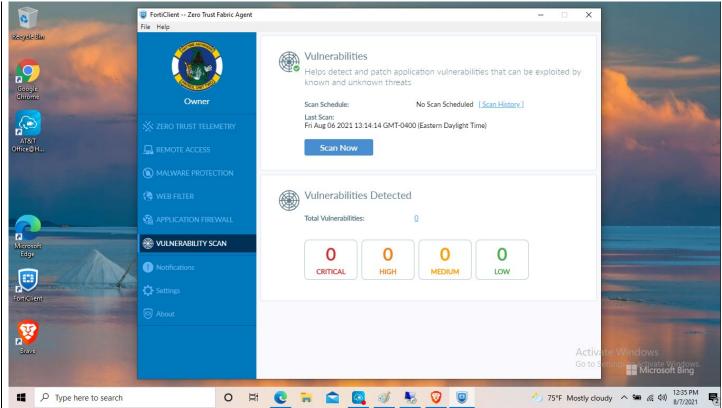
security of all form factors including hardware appliances, virtual machines, cloud-delivered, and X-as-a-Service. Fabric-ready Partner products are included in the Fabric ecosystem.



## **Automated**

## Faster time to prevention and efficient operations

A context aware, self-healing network and security posture leverages cloud-scale and advanced AI to automatically deliver near-real-time, user-to-application coordinated protection across the Fabric.





#### The Key Pillars of the Fortinet Security Fabric

One operating system drives the Fortinet Security Fabric, which supports more deployment models than any other solution. These include physical, virtual, cloud, and X-as-a-Service environments. And it encompasses the industry's broadest ecosystem and product portfolio, spanning endpoints, networks, and clouds.

## **Security-Driven Networking**

Security-Driven Networking enables digital innovation with the convergence of networking and security into a single, integrated system that can expand to any edge.

Fortinet was named a Leader in both the <u>November 2020 Gartner Magic Quadrant for Network</u>
<u>Firewalls</u> and the <u>September 2020 Gartner Magic Quadrant for WAN Edge Infrastructure</u>. Our FortiGate next-generation firewall is the single product that achieved Leader status in both reports. **Learn More** 



#### **Zero Trust Access**

Fortinet Zero Trust Access (ZTA) supports taking a zero-trust approach, verifying who and what is on your network. With the new updates in FortiOS 7.0 every FortiGate customer using the FortiClient Agent can now employ zero trust network access (ZTNA) capabilities right out of the box. Management is simplified by using the same adaptive, application access policy whether users are on or off the network.

**Learn More** 

#### **Adaptive Cloud**

Consistent, cloud native security with auto-scaling is provided across multi-cloud environments. Adaptive Cloud Security allows for usage of resources with auto-scaling, dynamic load-balancing, and user experience visibility. In addition, our context-aware policy is these environments providing coordinated threat response via with FortiGuard AI-powered security services.



and within effective application extended into integration

#### **Learn More**

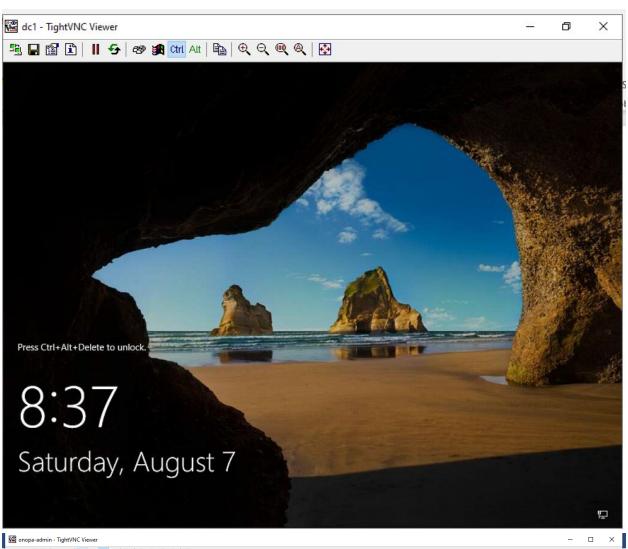
#### **Fabric-level Functions**

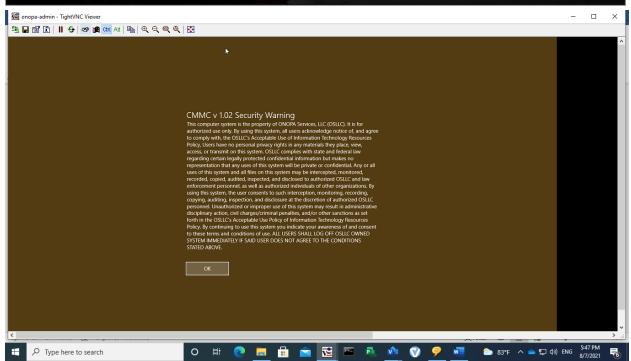
## **Fortinet Fabric Management Center**

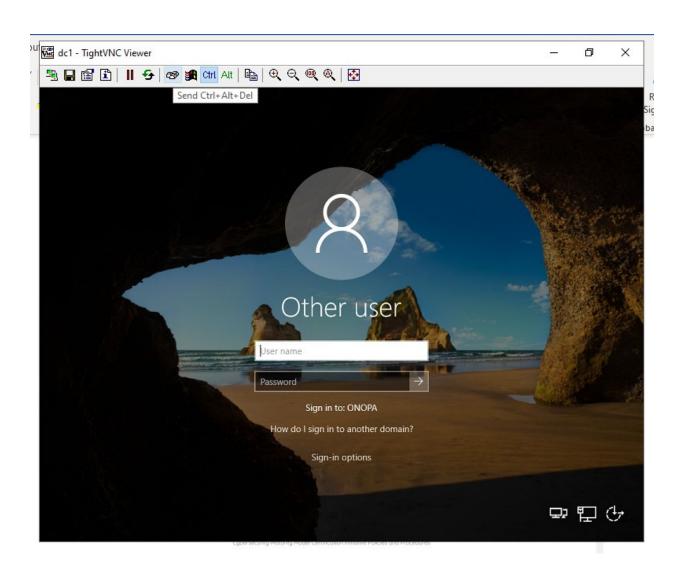


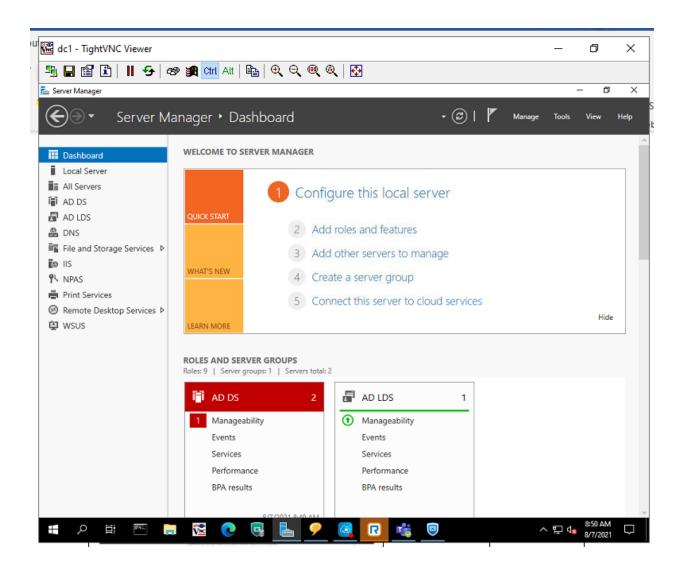
The Fabric Management Center enables centralized management, network automation and orchestration, and Security Fabric Analytics. A unified console across networks, endpoints, and clouds improves efficiency, reduces risk, and lowers total cost of ownership.

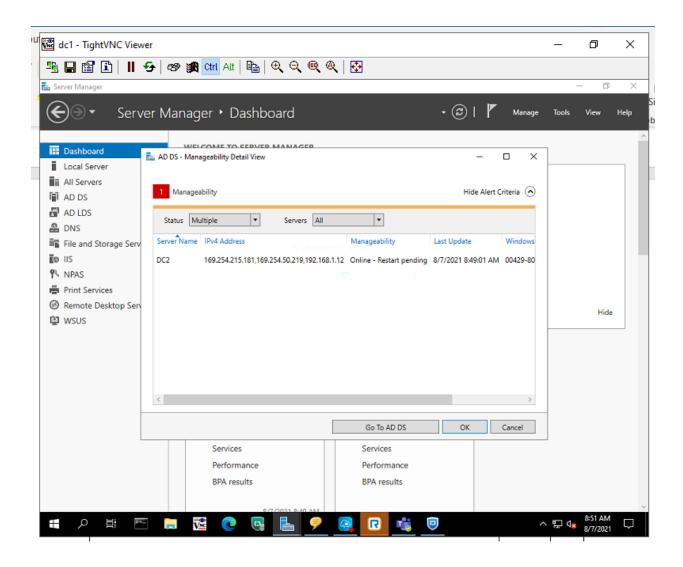
**Learn More - NOC** 

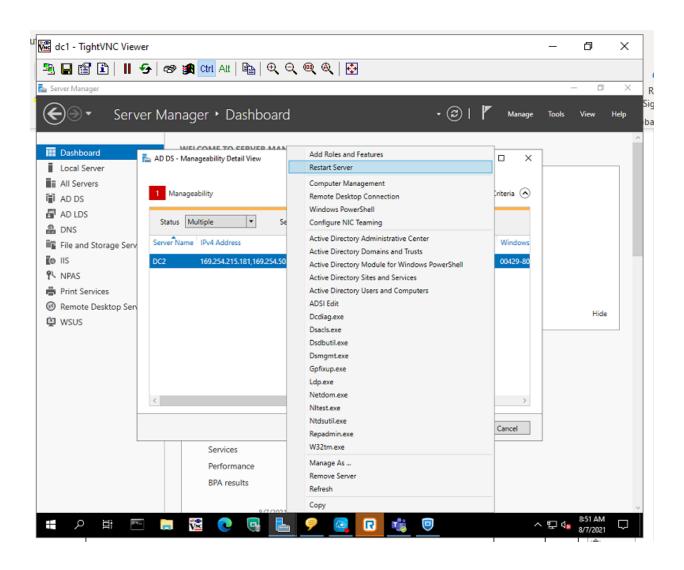


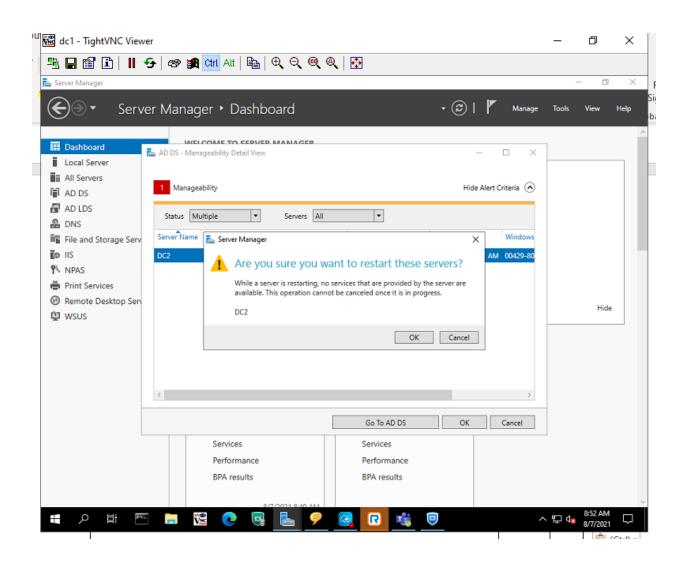


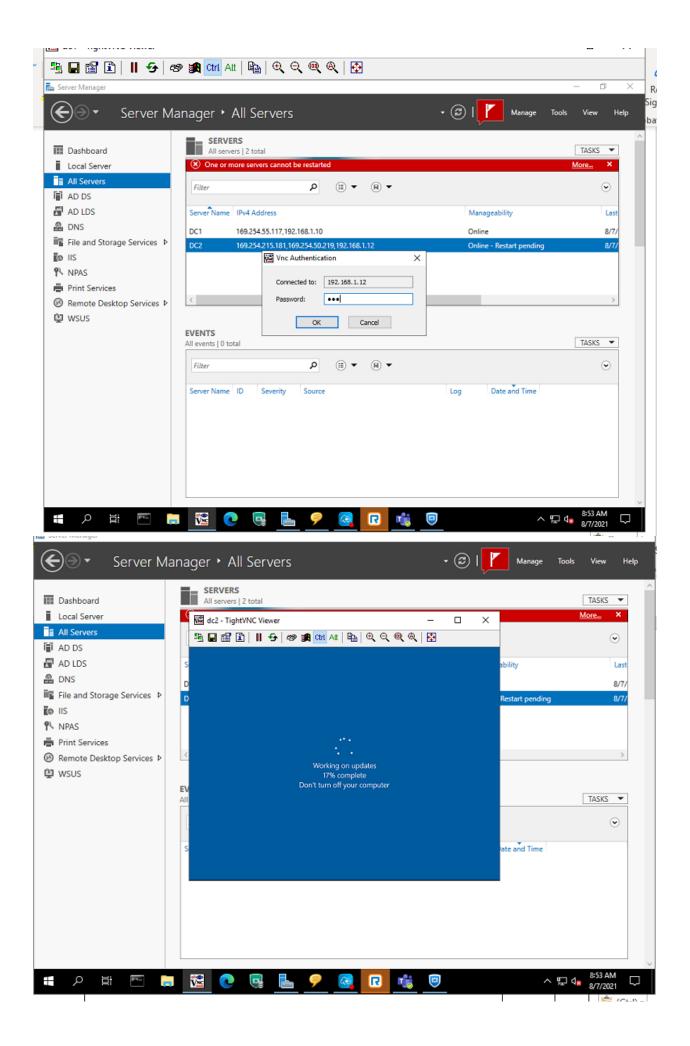




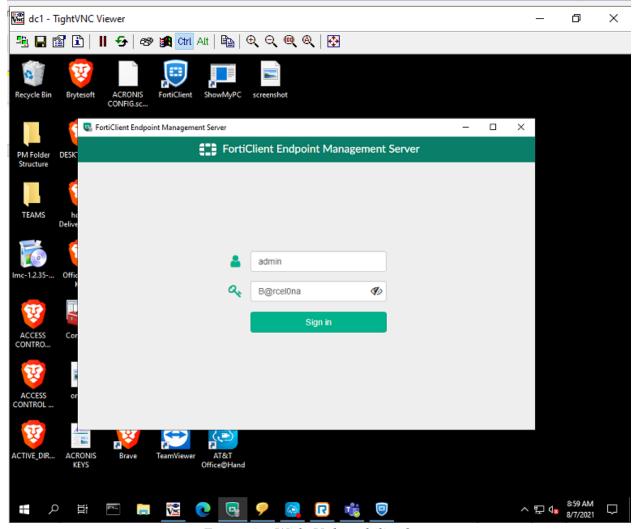




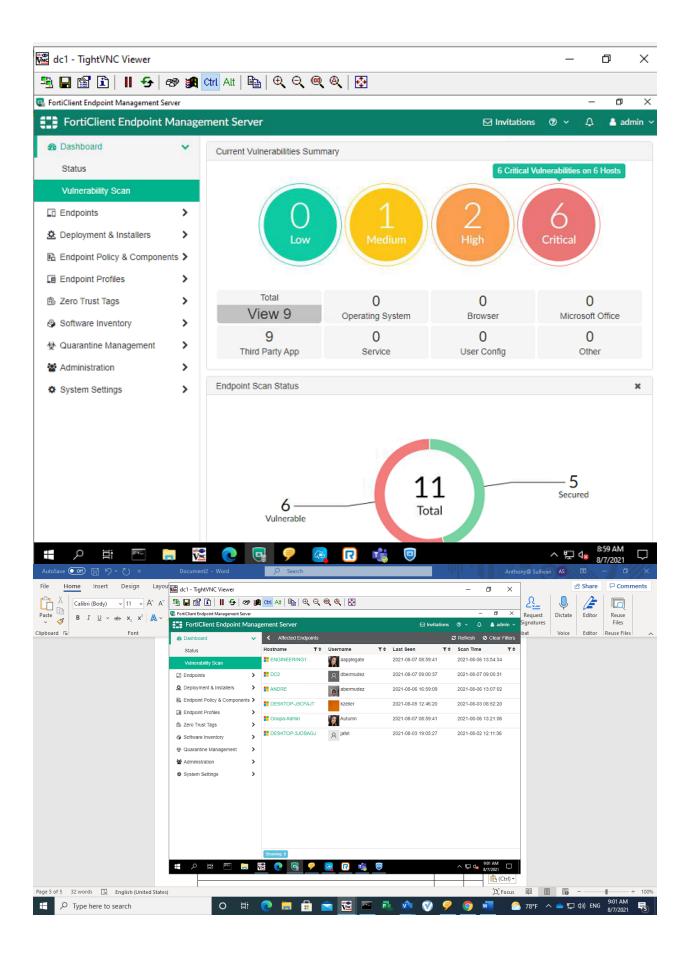


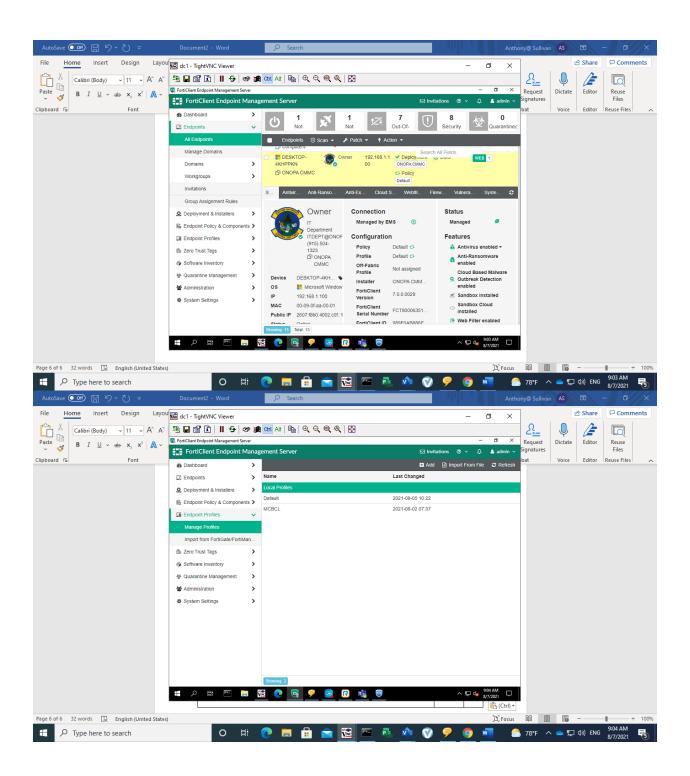


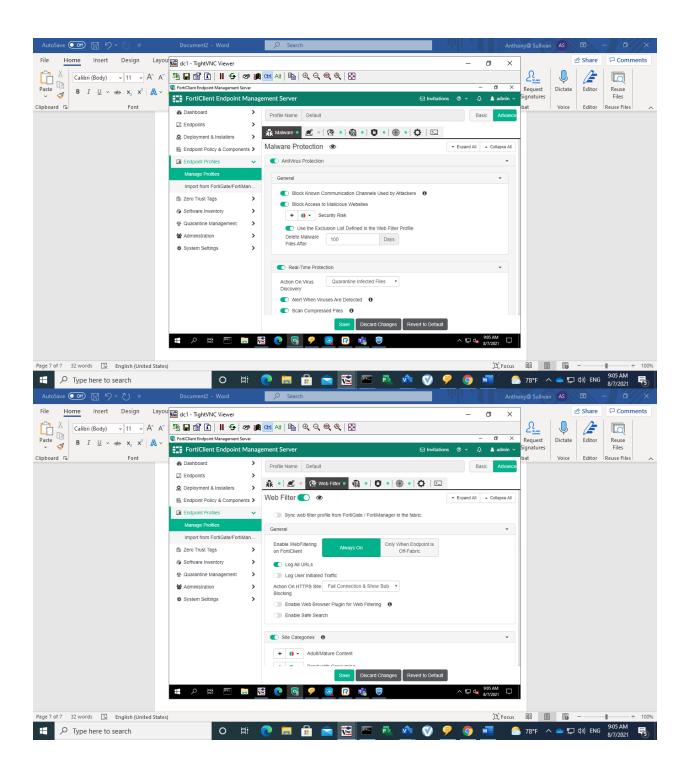
Fortinet End Point Management Server

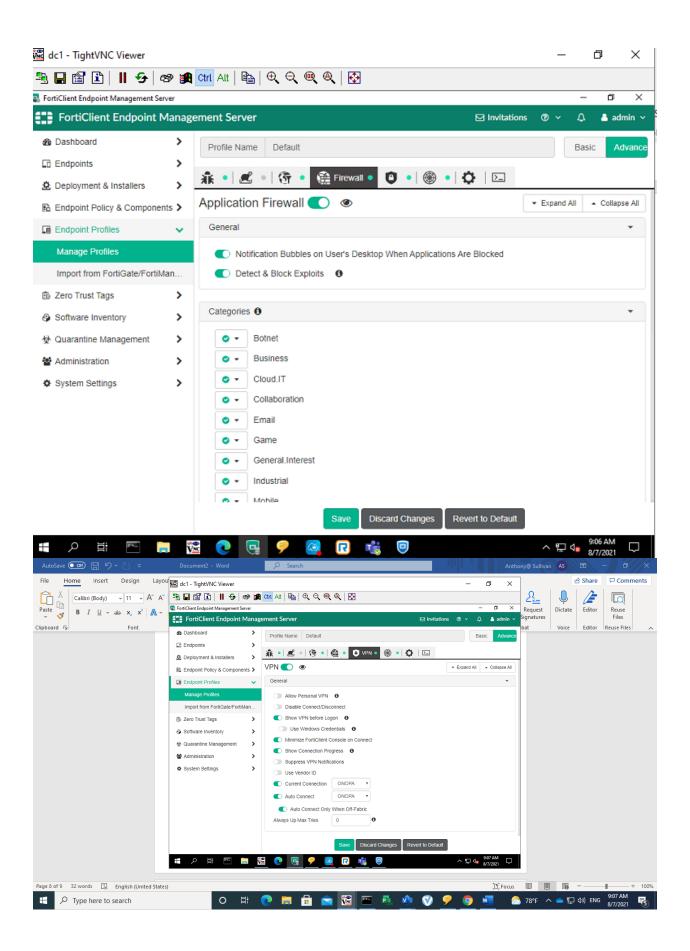


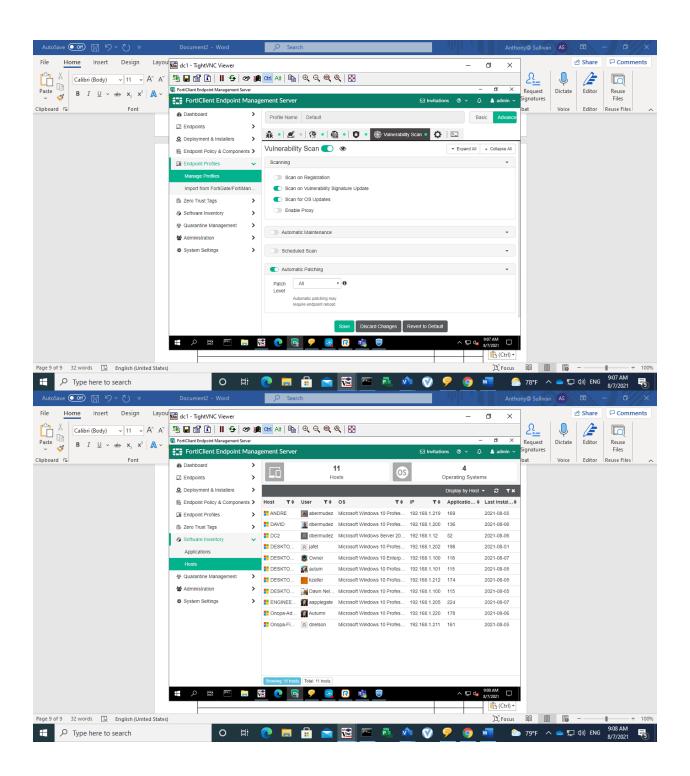
Enterprise Wide Vulnerability Scan

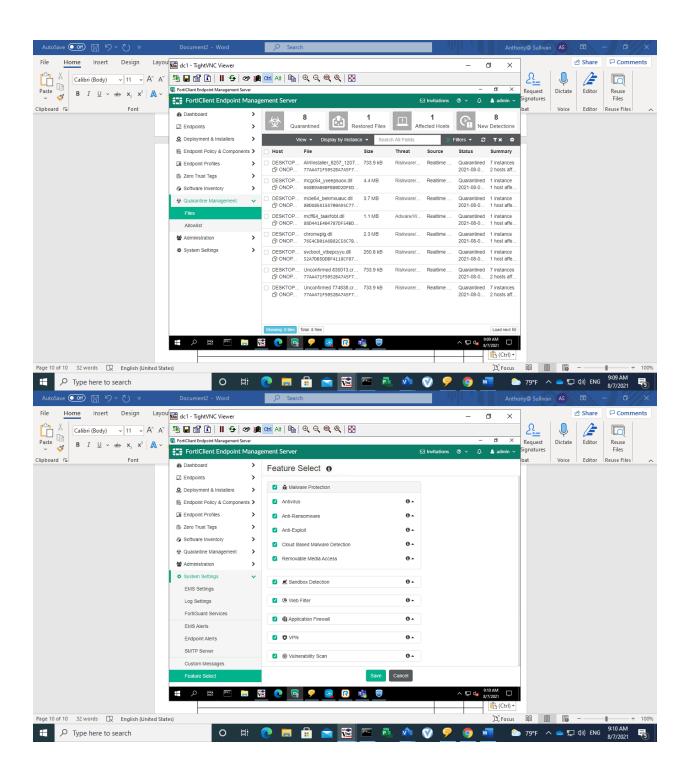


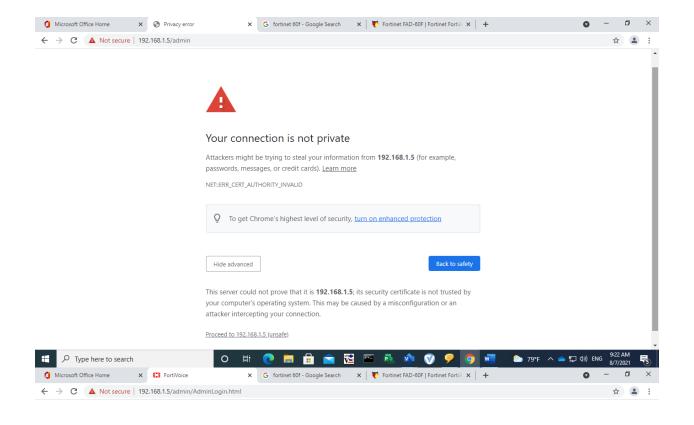






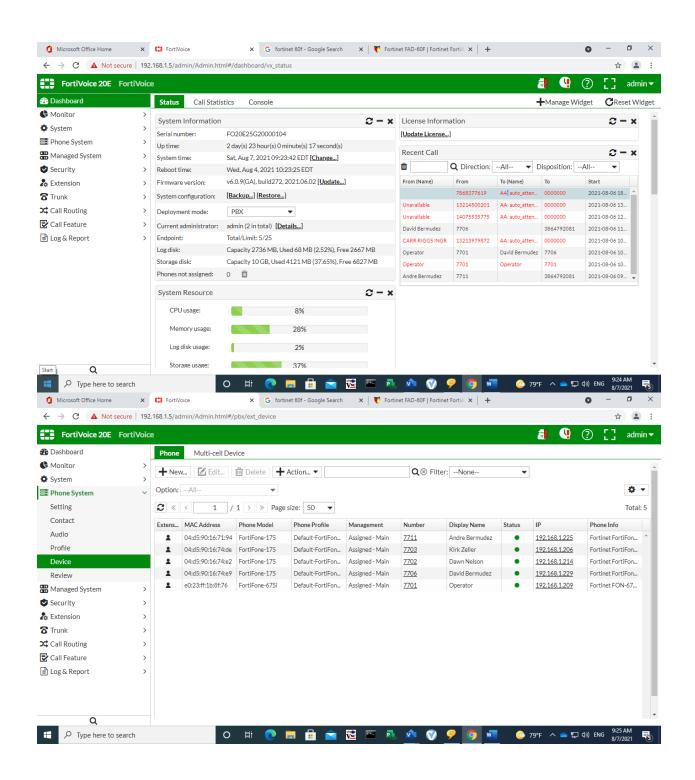


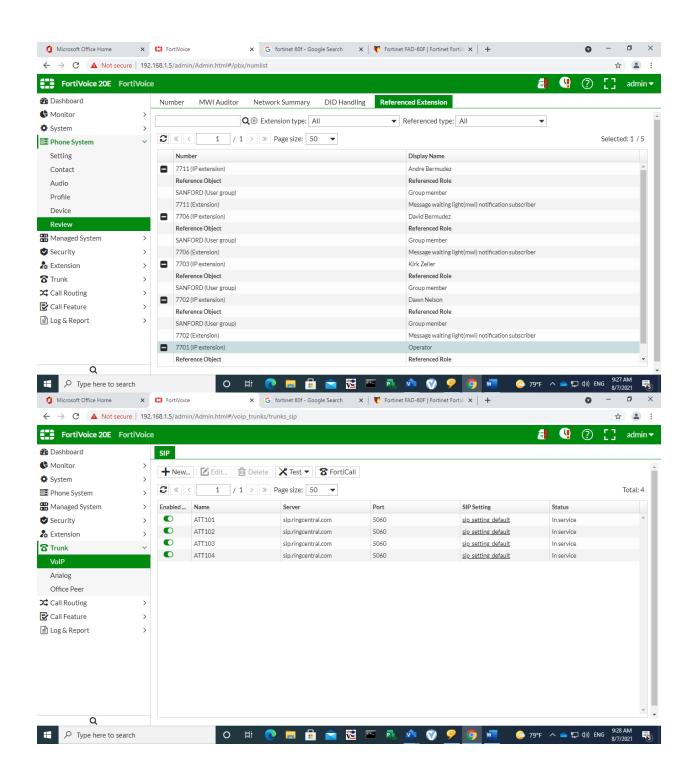


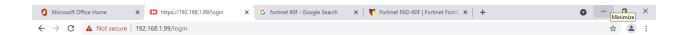




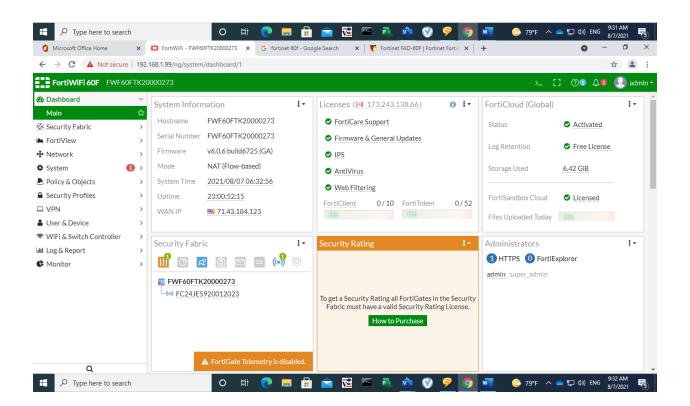


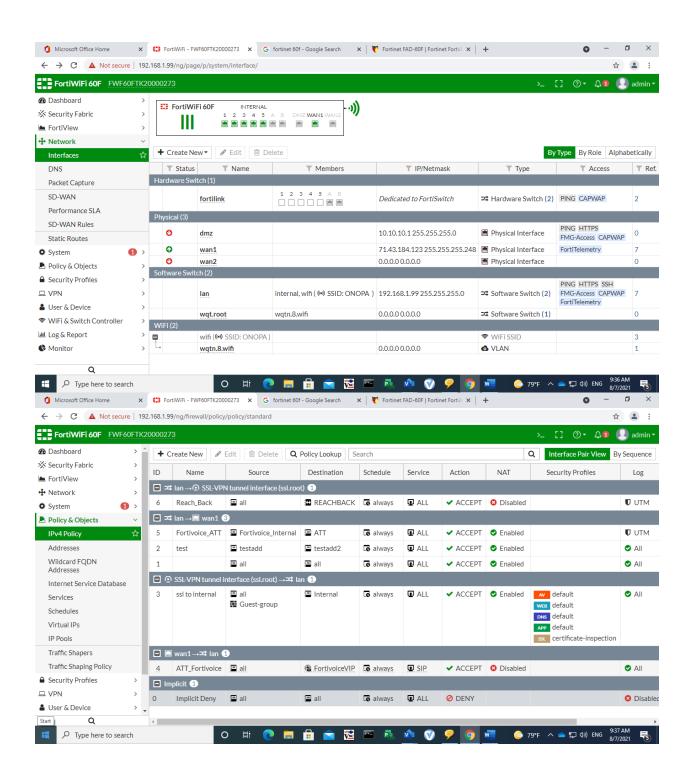


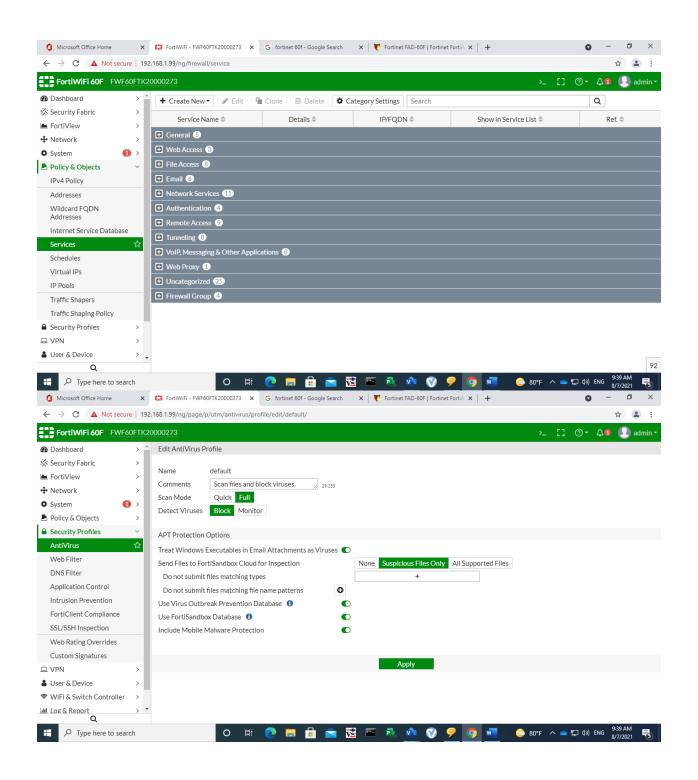


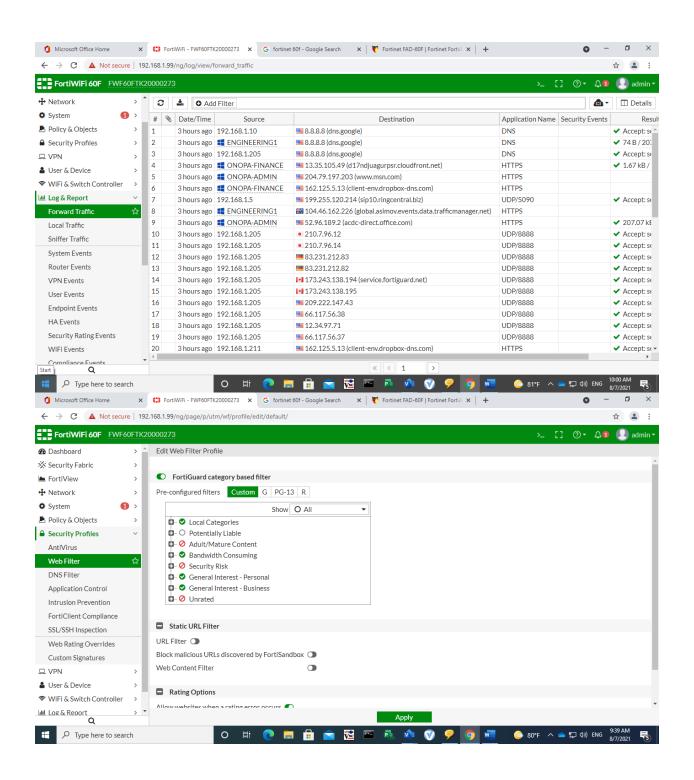


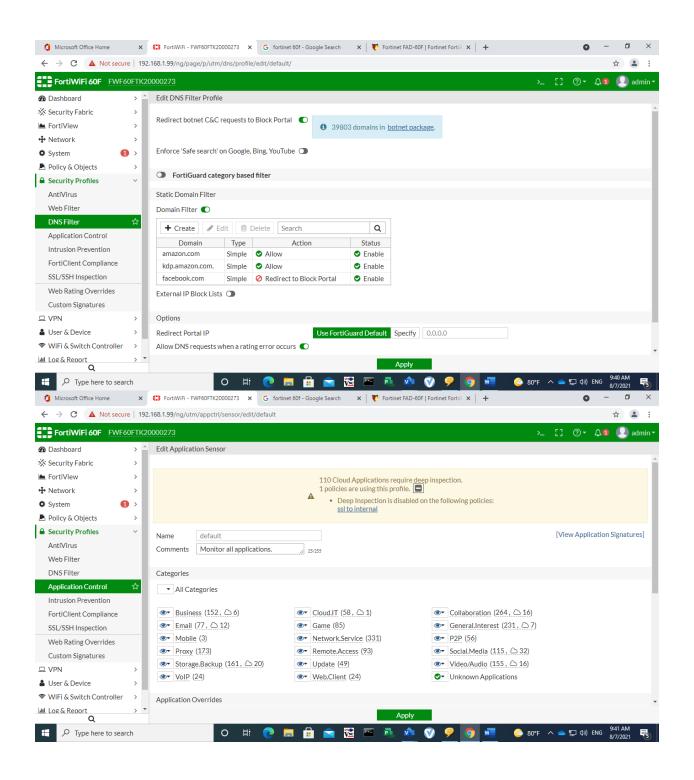


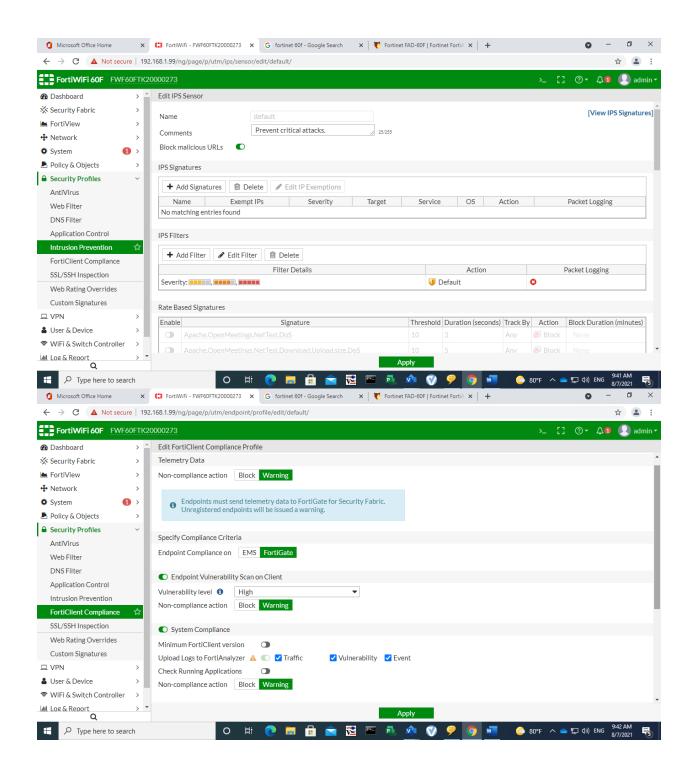


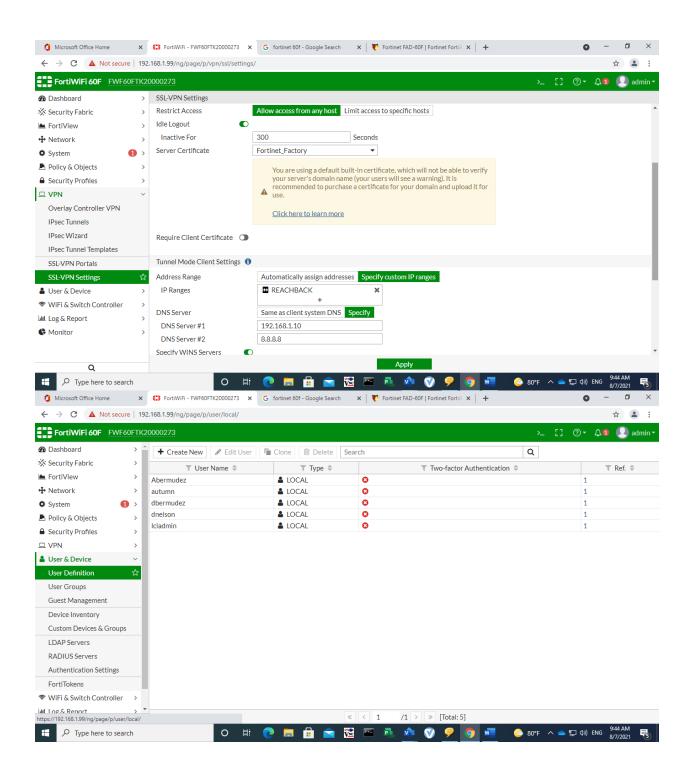


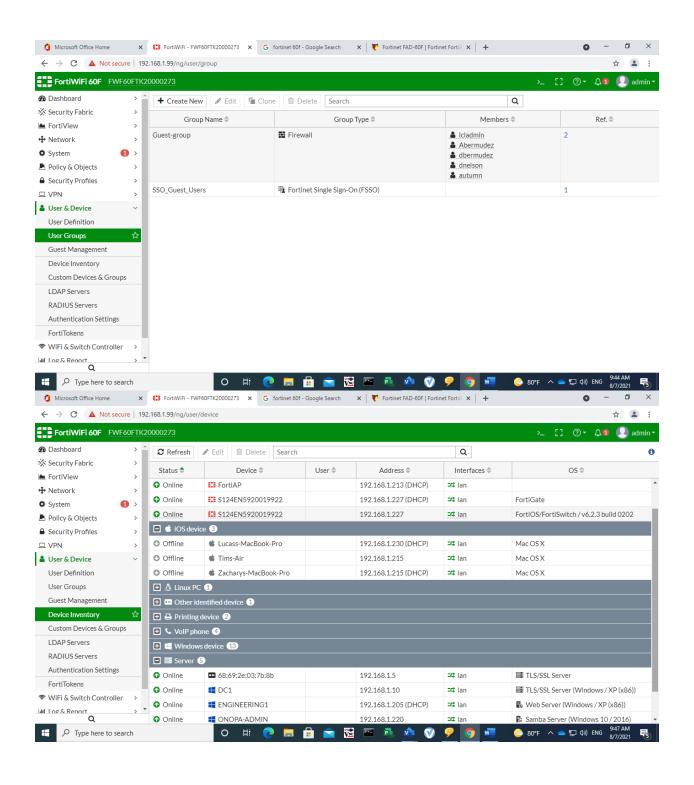


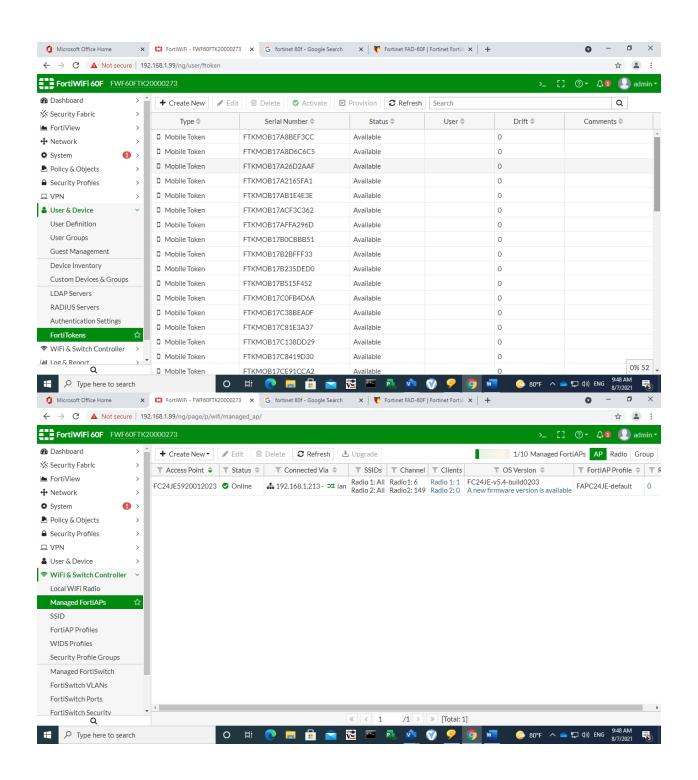


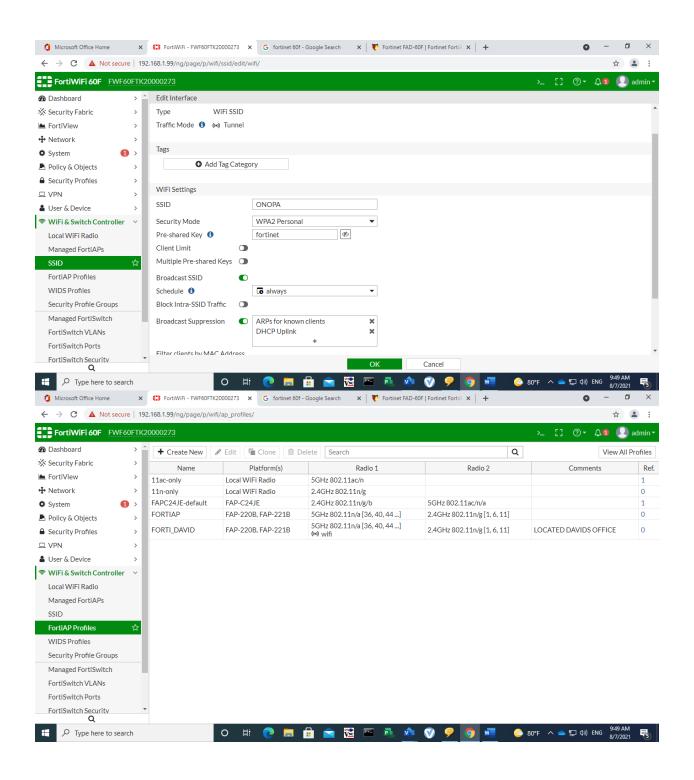


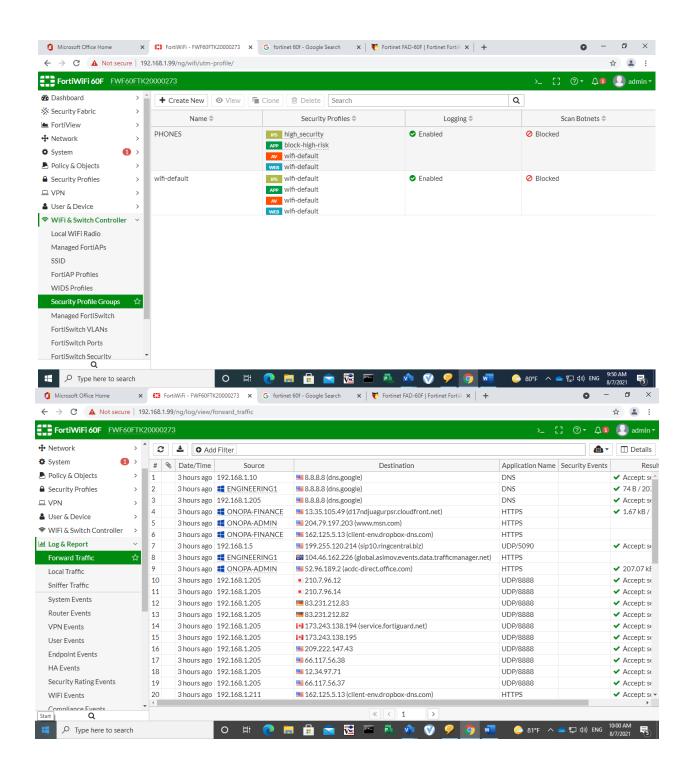


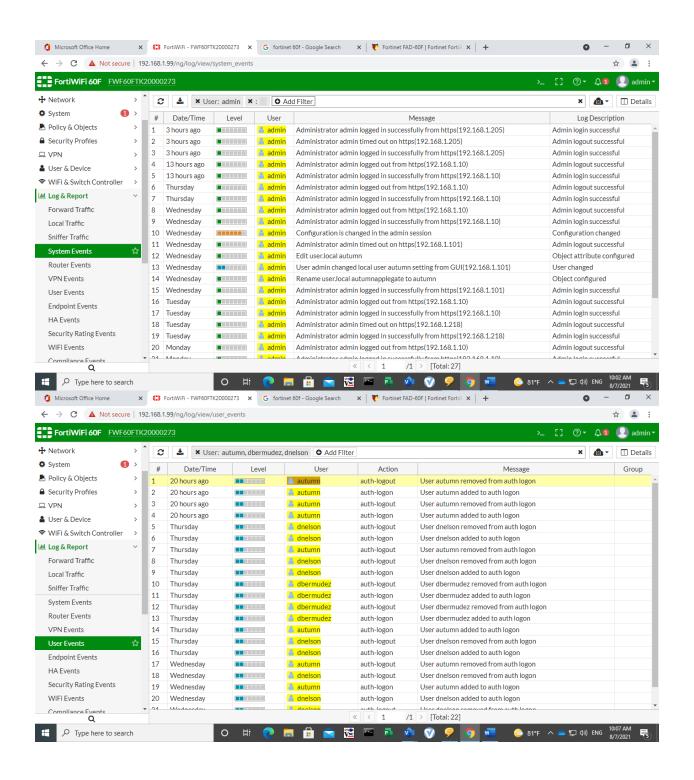


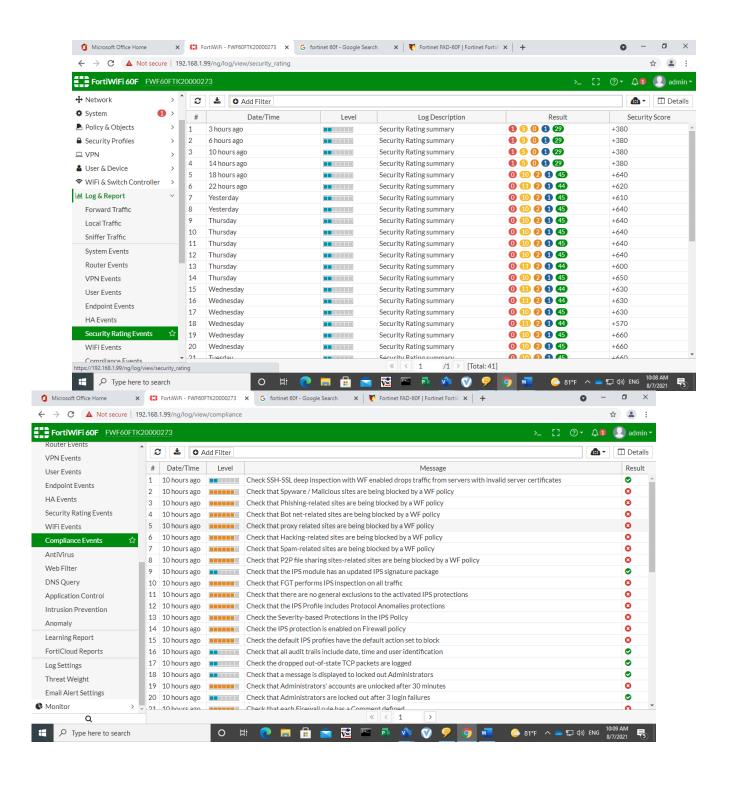


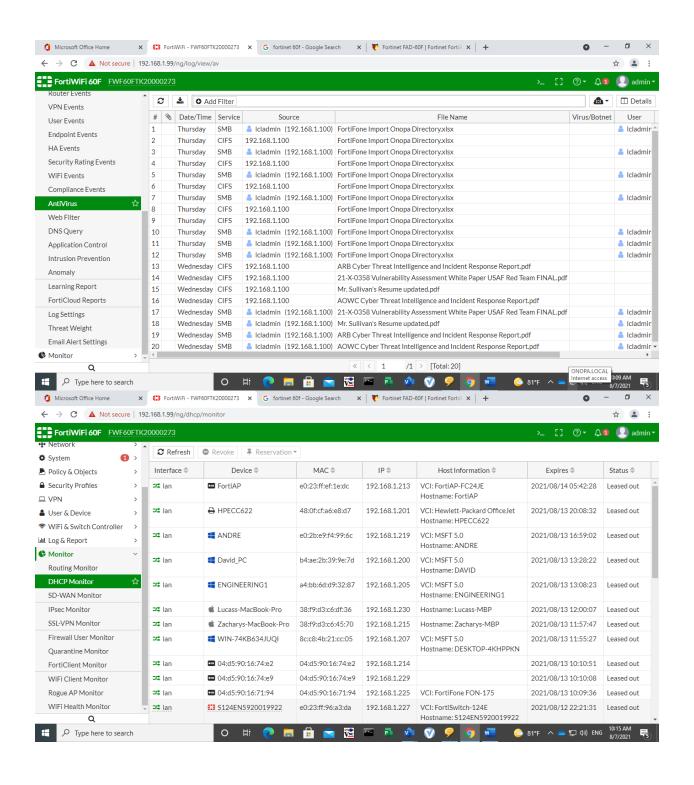


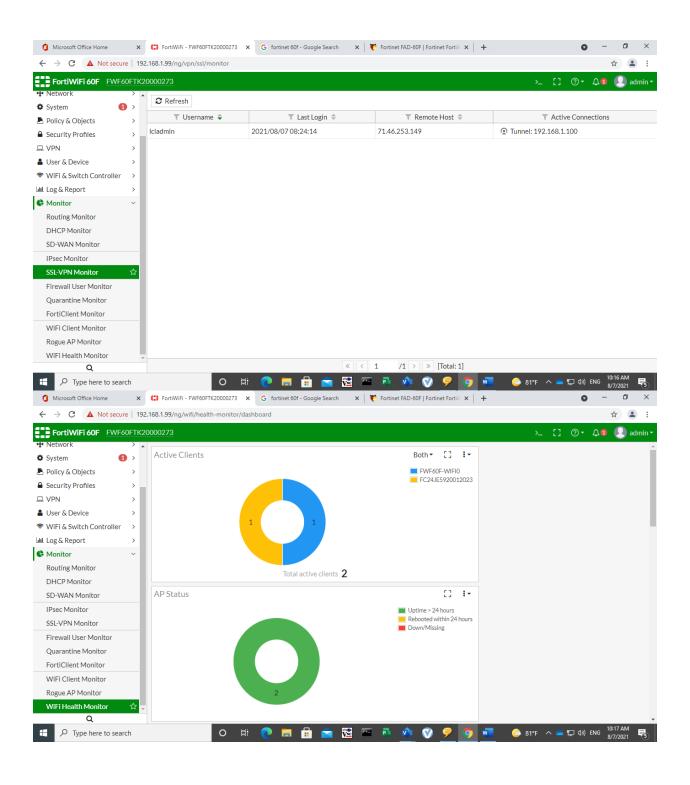


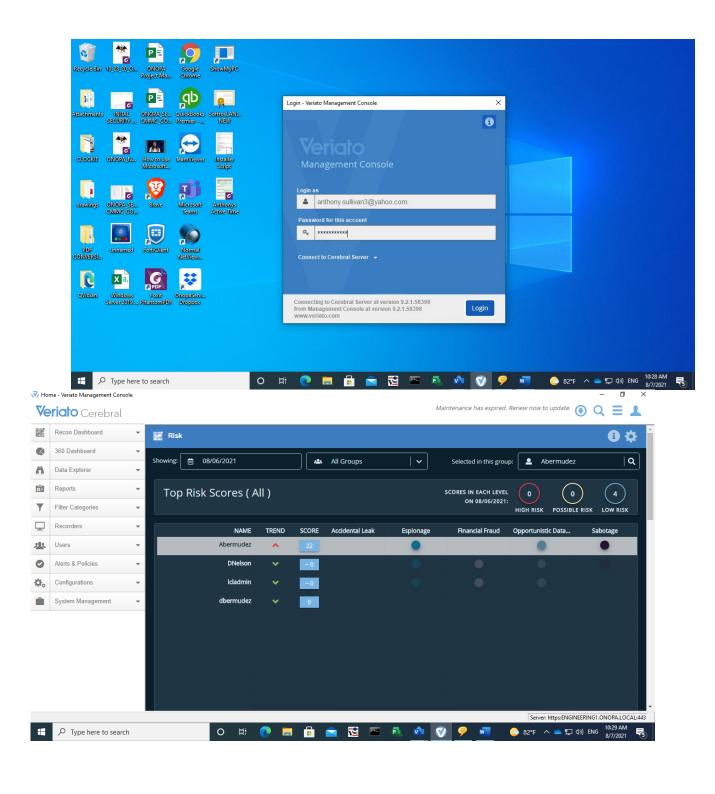


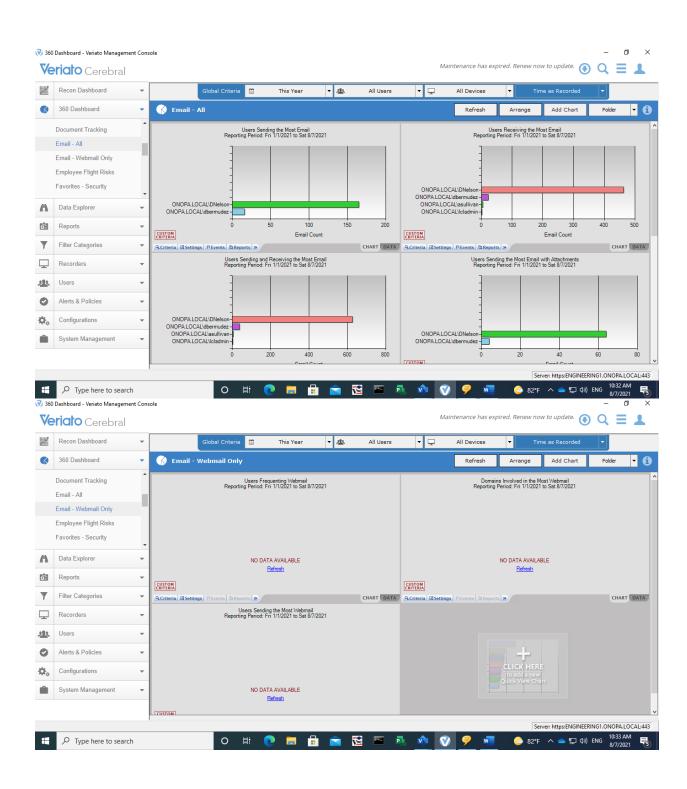


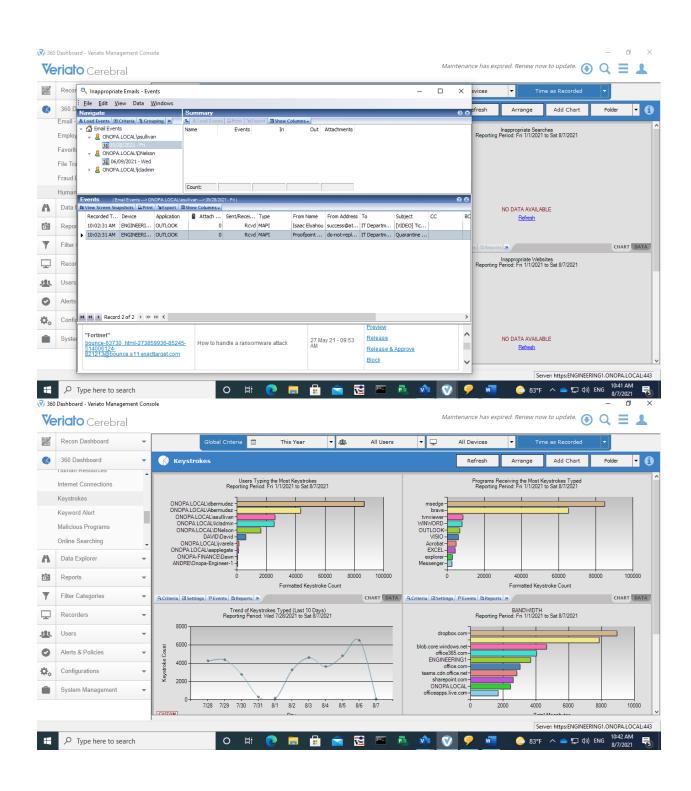


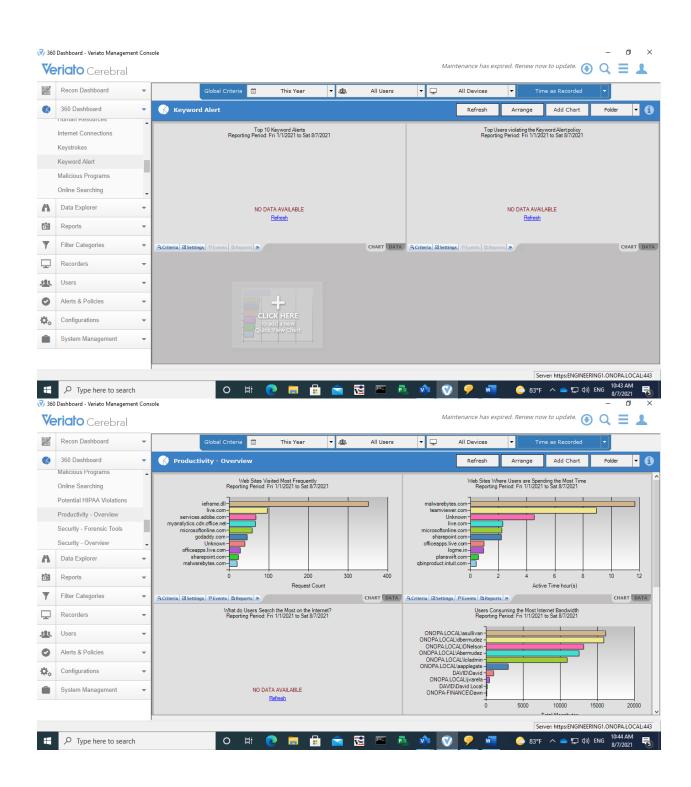


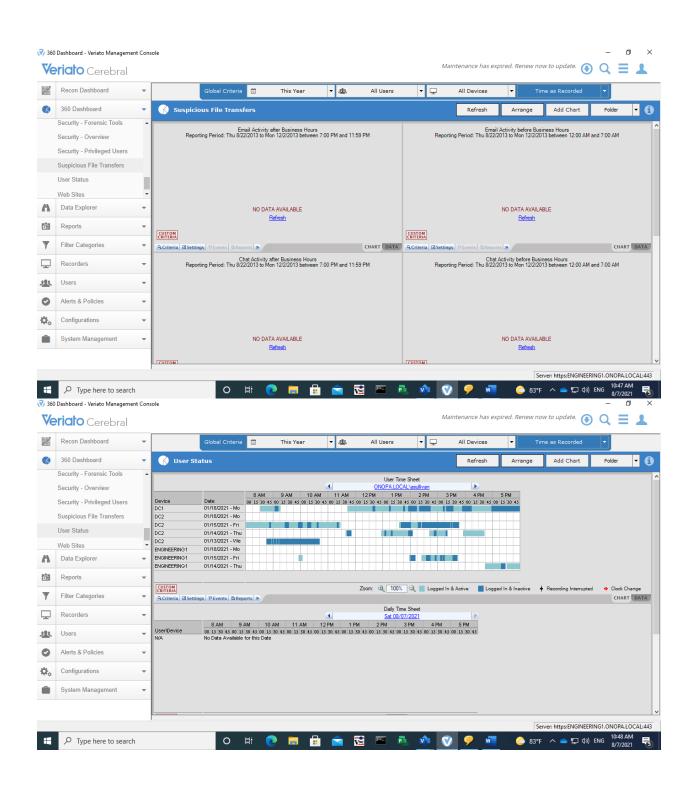


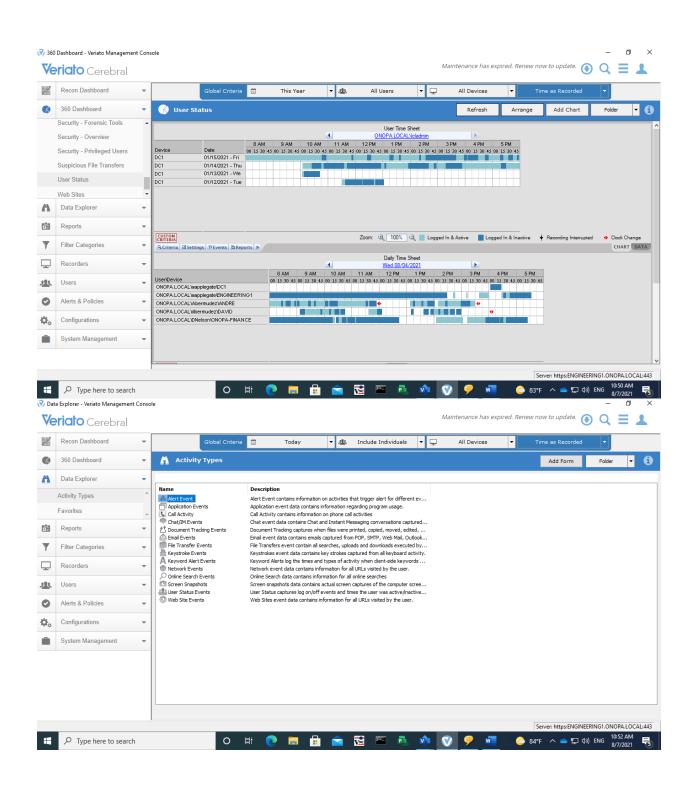


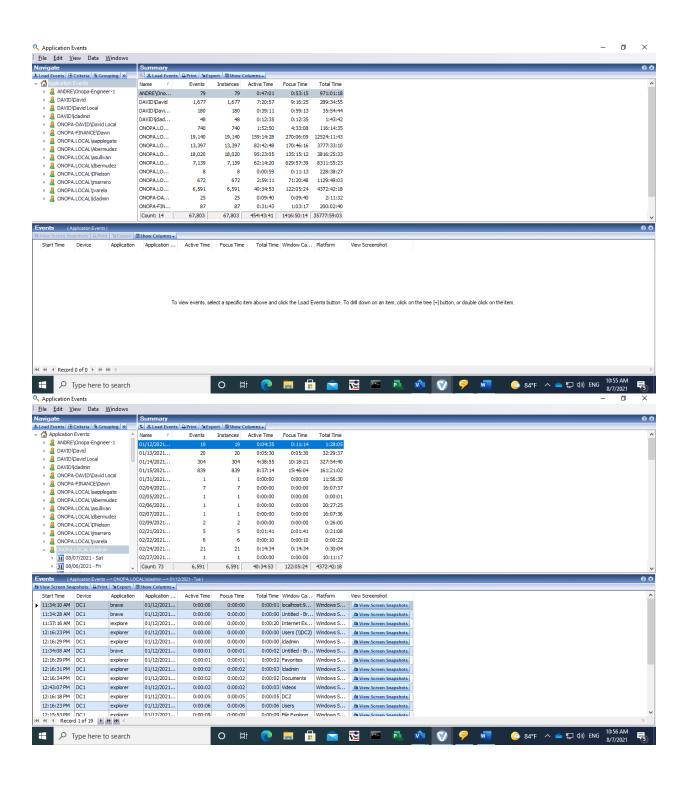


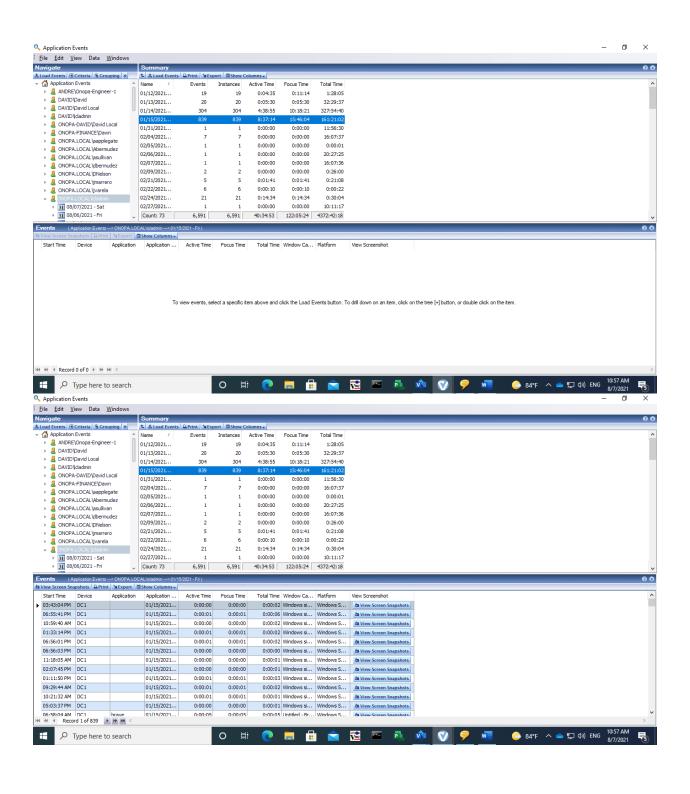


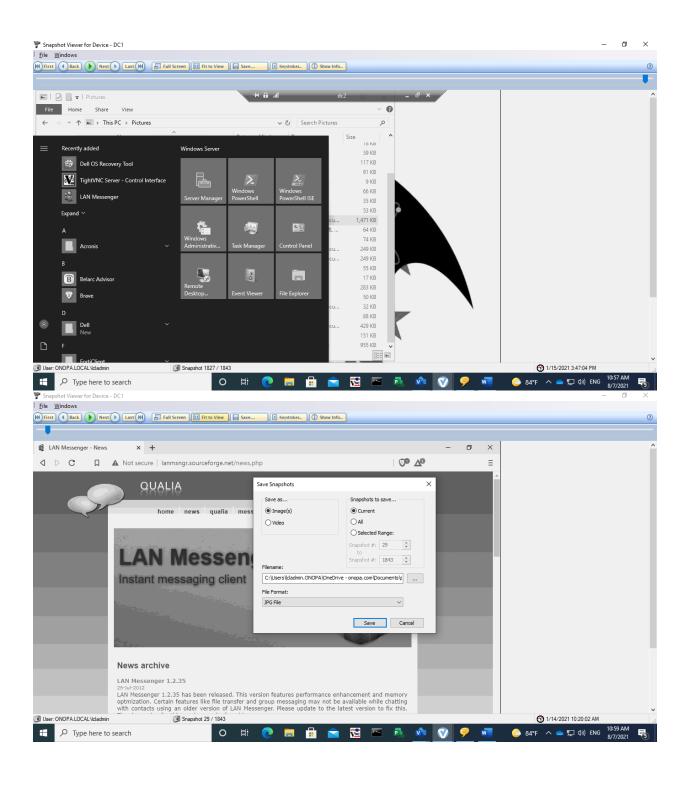


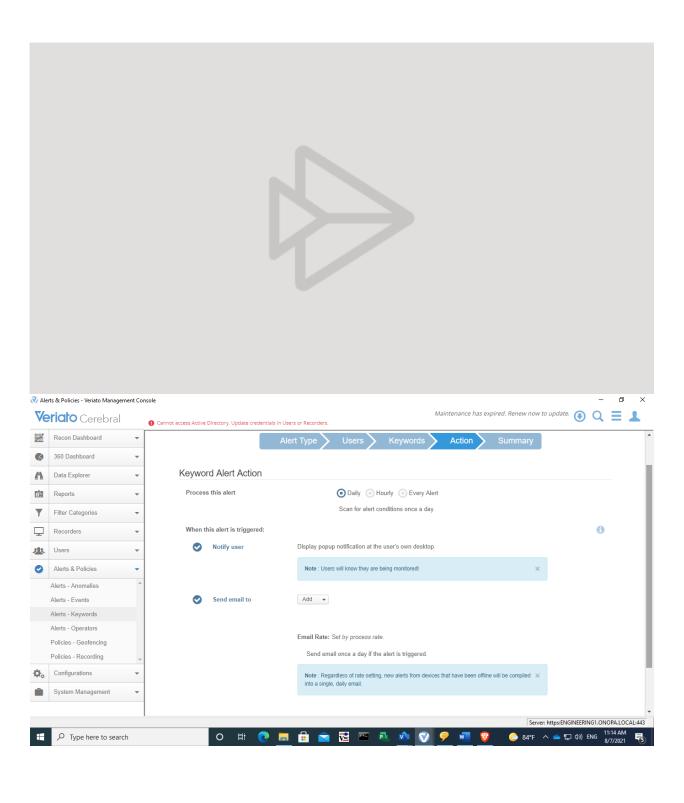


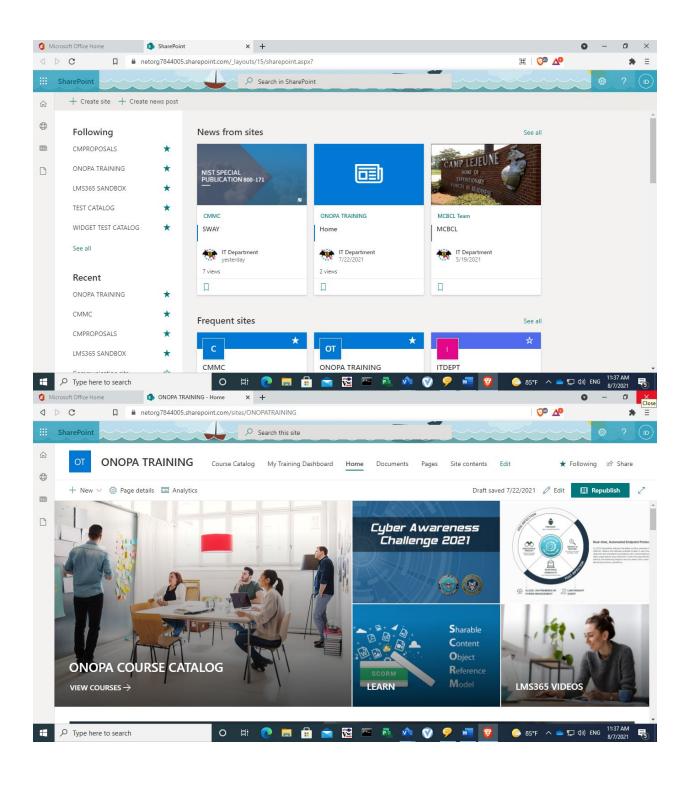


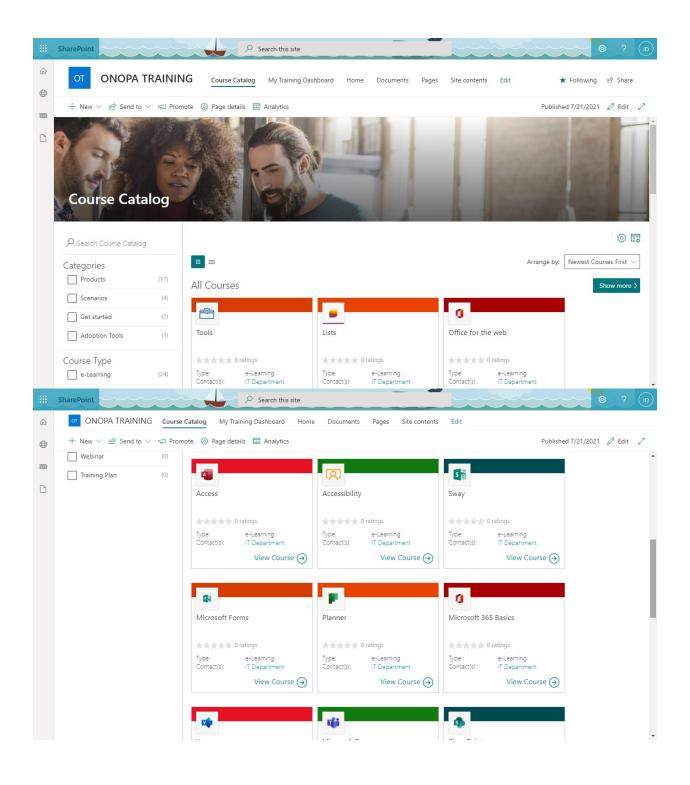


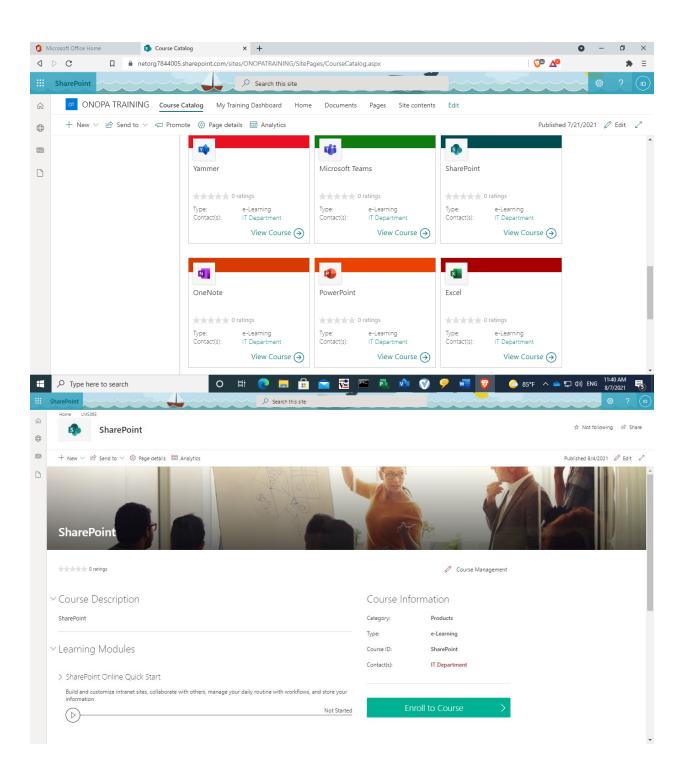


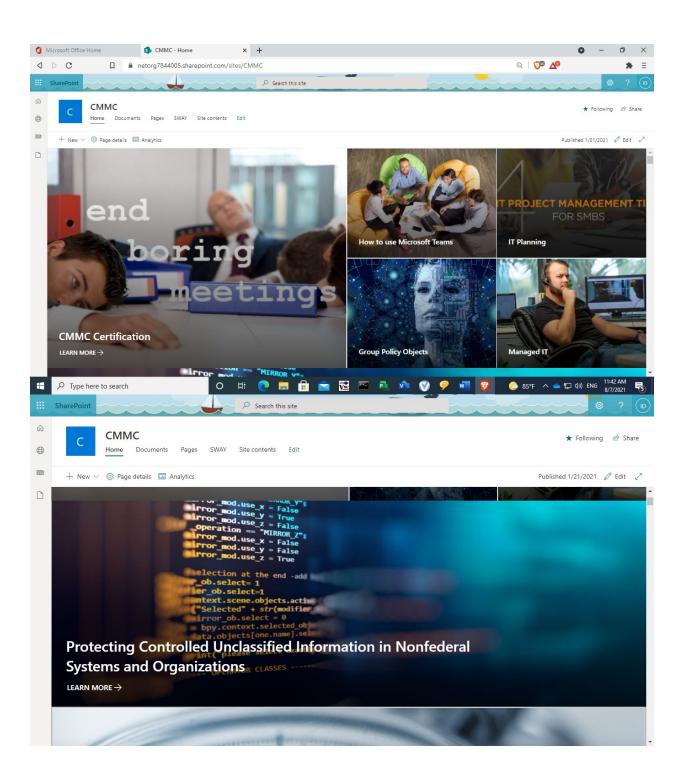


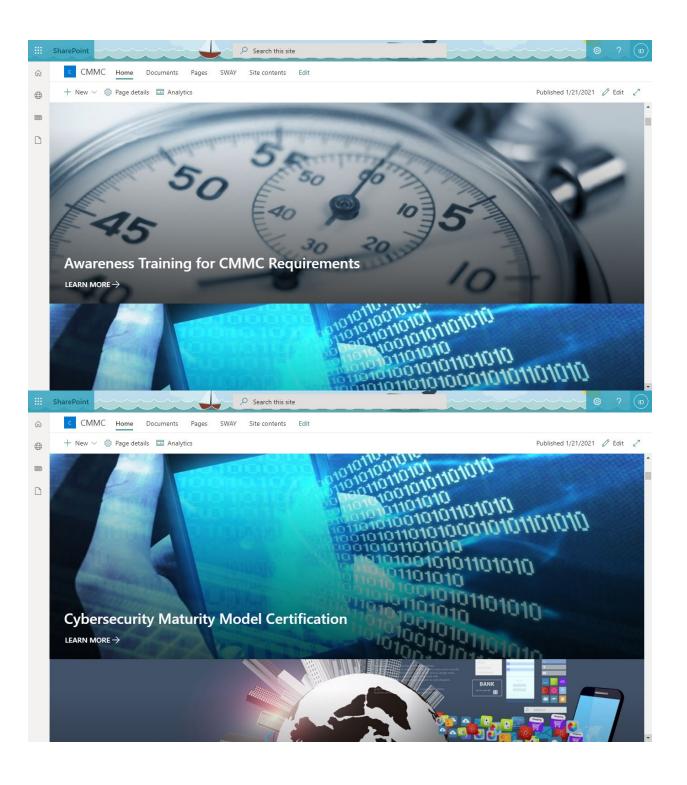


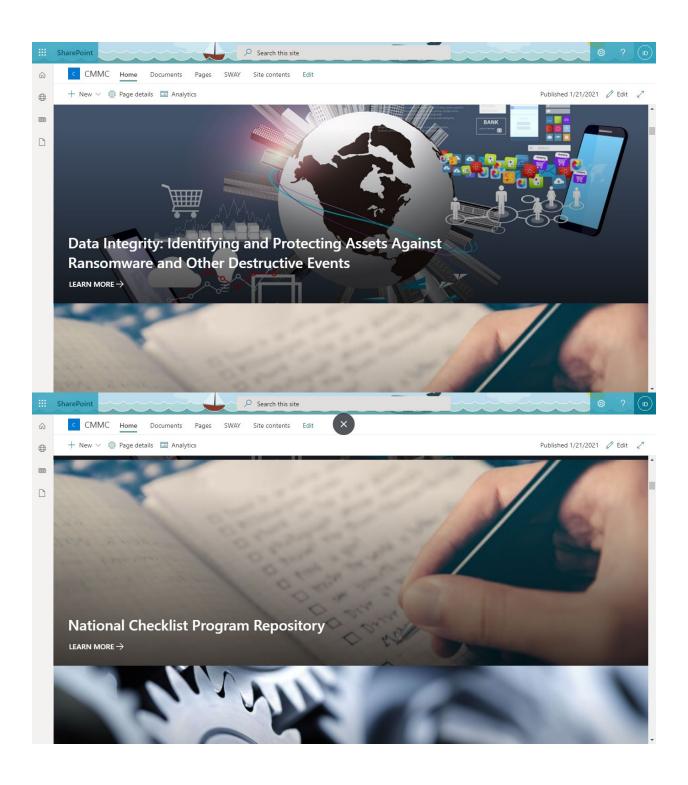


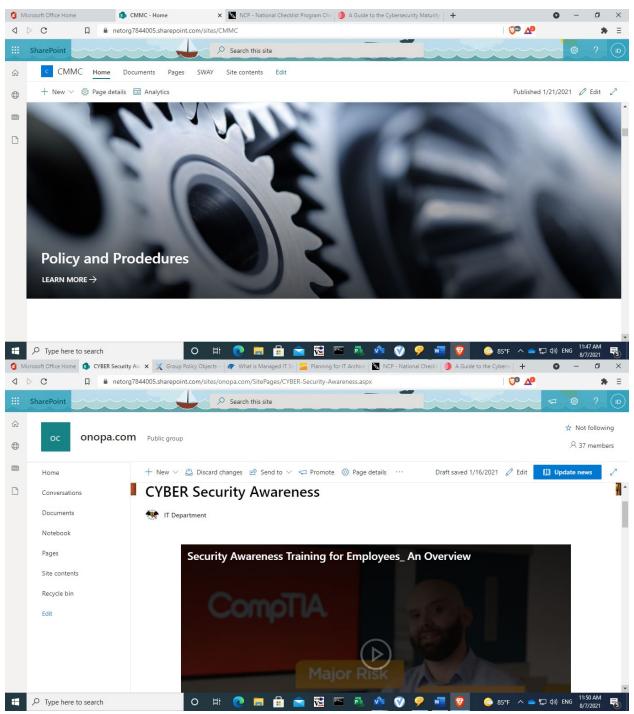




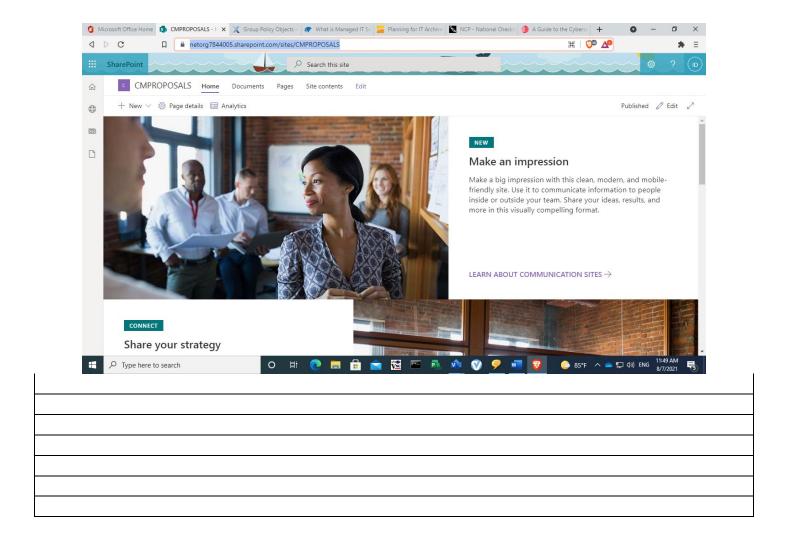








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## Module 1: Windows Server Administration Overview

This module describes how to distinguish different Windows Server 2019 editions and techniques for deployment, servicing, and activation. The module also introduces Windows Server Core and compares it with the Desktop Experience version. The module describes tools and concepts for administering Windows Server, such as Windows Admin Center, PowerShell, and delegation of privileges.

#### Lessons

- Overview of Windows Server administration principles and tools
- Introducing Windows Server 2019
- Windows Server Core Overview

### Lab: Deploying and configuring Windows Server

- Deploying and configuring Server Core
- Implementing and using remote server administration

After completing this module, students will be able to:

- Describe Windows Server as well as techniques for deployment, servicing, and activation.
- Describe Windows Server Core, its specifics, and ways to administer it.

## Module 2: Identity Services in Windows Server

This module introduces identity services and describes Active Directory Domain Services (AD DS) in a Windows Server environment. The module describes how to deploy domain controllers in AD DS, as well as the Azure Active Directory (AD) and the benefits of integrating Azure AD with AD DS. The module also covers Group Policy basics and how to configure group policy objects (GPOs) in a domain environment. Finally, the modules describe the role of Active Directory certificate services and certificate usage.

#### Lessons

- Overview of AD DS
- Deploying Windows Server domain controllers
- Overview of Azure AD
- Implementing Group Policy
- Overview of Active Directory Certificate Services

## Lab: Implementing identity services and Group Policy

- Deploying a new domain controller on Server Core
- Configuring Group Policy
- Deploying and using certificate services

After completing this module, students will be able to:

- Describe AD DS in a Windows Server environment.
- Deploy domain controllers in AD DS.
- Describe Azure AD and benefits of integrating Azure AD with AD DS.
- Explain Group Policy basics and configure GPOs in a domain environment
- Describe the role of Active Directory certificate services and certificate usage

### Module 3: Network Infrastructure services in Windows Server

This module describes how to implement core network infrastructure services in Windows Server. The modules cover how to deploy, configure and manage DNS and IPAM. The modules also describe how to use Remote Access Services.

#### Lessons

- Deploying and managing DHCP
- Deploying and managing DNS services
- Deploying and managing IPAM

### Lab: Implementing and configuring network infrastructure services in Windows Server

- Deploying and configuring DHCP
- Deploying and configuring DNS

## After completing this module, students will be able to:

- Describe, deploy, and configure DHCP service.
- Deploy, configure, and manage DNS.
- Describe, deploy, and manage IPAM.

# Module 4: File Servers and Storage management in Windows Server

This module describes how to configure file servers and storage in Windows Server. The module covers file sharing and deployment of Storage Spaces technology. The module describes how to implement data deduplication, iSCSI-based storage in Windows Server, and finally, how to deploy DFS.

#### Lessons

- Volumes and file systems in Windows Server
- Implementing sharing in Windows Server
- Implementing Storage Spaces in Windows Server
- Implementing Data Deduplication
- Implementing iSCSI
- Deploying Distributed File System

## Lab: Implementing storage solutions in Windows Server

- Implementing Data Deduplication
- Configuring iSCSI storage
- Configuring redundant storage spaces
- Implementing Storage Spaces Direct

## After completing this module, students will be able to:

- Implement sharing in Windows Server
- Deploy Storage Spaces technology
- Implement the data deduplication feature

- Implement iSCSI-based storage
- Deploy and manage Distributed File System (DFS)

## Module 5: Hyper-V virtualization and containers in Windows Server

This module describes how to implement and configure Hyper-V VMs and containers. The module covers key features of Hyper-V in Windows Server, describes VM settings, and how to configure VMs in Hyper-V. The module also covers security technologies used with virtualization, such as shielded VMs, Host Guardian Service, admin-trusted and TPM-trusted attestation, and KPS.

#### Lessons

- Hyper-V in Windows Server
- Configuring VMs
- Securing virtualization in Windows Server
- Containers in Windows Server
- Overview of Kubernetes

## Lab: Implementing and configuring virtualization in Windows Server

- Creating and configuring VMs
- Installing and configuring containers

After completing this module, students will be able to:

- Describe the key features of Hyper-V in Windows Server.
- Describe VM settings and deploy and configure VMs in Hyper-V.
- Explain the use of security technologies for virtualization.
- Describe and deploy containers in Windows Server.
- Explain the use of Kubernetes on Windows.

## Module 6: High Availability in Windows Server

This module describes current high availability technologies in Windows Server. The module describes failover clustering and considerations for implementing it, and how to create and configure failover clustering. The module also explains stretch clusters and options for achieving high availability with Hyper-V VMs.

#### Lessons

- Planning for failover clustering implementation
- Creating and configuring failover cluster
- Overview of stretch clusters
- High availability and disaster recovery solutions with Hyper-V VMs

### Lab: Implementing failover clustering

- Configuring iSCSI storage
- Configuring a failover cluster
- Deploying and configuring a highly available file server
- Validating the deployment of the highly available file server

## After completing this module, students will be able to:

- Describe failover clustering and the considerations for implementing it.
- Create and configure failover clusters.
- Describe stretch clusters.
- Describe options to achieve high availability with Hyper-V VMs.

## Module 7: Disaster recovery in Windows Server

This module describes disaster recovery technologies in Windows Server and how to implement them. The module covers how to configure and use Hyper-V Replica and describes Azure Site Recovery. The module also covers how to implement Windows Server backup and describes the Azure Backup service.

#### Lessons

- Hyper-V Replica
- Backup and restore infrastructure in Windows Server

# Lab: Implementing Hyper-V Replica and Windows Server Backup

- Implementing Hyper-V Replica
- Implementing backup and restore with Windows Server Backup

## After completing this module, students will be able to:

- Describe and implement Hyper-V Replica.
- Describe Azure Site Recovery.
- Describe and implement Windows Server backup.
- Describe the Azure Backup service.

# **Module 8: Windows Server security**

This module describes Windows Server security features and how to implement them. The module covers credentials used in Windows Server and explains how to implement privileged access protection. In addition to describing methods and technologies for hardening Windows Server security, the module explains how to configure Just Enough Administration (JEA) and how to secure SMB traffic. Finally, the module covers Windows Update, its deployment and management options.

#### Lessons

- Credentials and privileged access protection in Windows Server
- Hardening Windows Server
- Just Enough Administration in Windows Server
- Securing and analyzing SMB traffic
- Windows Server update management

### Lab: Configuring security in Windows Server

- Configuring Windows Defender Credential Guard
- Locating problematic accounts
- Implementing LAPS

### After completing this module, students will be able to:

- Describe credentials used in Windows Server.
- Explain how to implement privileged access protection.
- Describe methods and technologies to harden security in Windows Server.
- Describe and configure Just Enough Administration (JEA).
- Secure SMB traffic in Windows Server.
- Describe Windows Update and its deployment and management options.

# Module 9: Remote Desktop Services in Windows Server

This module describes key Remote Desktop Protocol (RDP) and Virtual Desktop Infrastructure (VDI) features in Windows Server. The modules covers how to deploy session-based desktops and describes personal and poled virtual desktops.

#### Lessons

- Remote Desktop Services Overview
- Configuring a session-based desktop deployment
- Overview of personal and pooled virtual desktops

## Lab: Implementing RDS in Windows Server

- Implementing RDS
- Configuring RemoteApp collection settings
- Configuring a virtual desktop template

## After completing this module, students will be able to:

- Describe Remote Desktop Services (RDS) in Windows Server.
- Describe and deploy session-based desktops.

• Describe personal and pooled virtual desktops.

### Module 10: Remote access and web services in Windows Server

This module describes how to implement virtual private networks (VPNs), Network Policy Server (NPS), and Microsoft Internet Information Services (IIS). The module provides an overview of remote access services and describes Always On VPN functionality, as well as how to configure NPS and Web Server (IIS) in Windows Server.

#### Lessons

- Overview of RAS in Windows Server
- Implementing VPNs
- Implementing NPS
- Implementing Always On VPN
- Implementing Web Server in Windows Server

### Lab: Deploying network workloads

- Implementing Web Application Proxy
- Implementing VPN in Windows Server
- Deploying and Configuring Web Server

After completing this module, students will be able to:

- Describe VPN options in Windows Server.
- Describe Always On VPN functionality.
- Describe and configure NPS.
- Describe and configure Web Server (IIS).

# Module 11: Monitoring, performance, and troubleshooting

This module describes how to implement service and performance monitoring and apply troubleshooting in Windows Server. The module highlights monitoring tools and describes how to monitor performance, including event logging and how to perform event logging monitoring for troubleshooting purposes.

#### Lessons

- Overview of Windows Server monitoring tools
- Using Performance Monitor
- Monitoring event logs for troubleshooting

### Lab: Monitoring and troubleshooting Windows Server

- Establishing a performance baseline
- Identifying the source of a performance problem
- Viewing and configuring centralized event logs
- Identifying the source of a performance problem
- Describe monitoring tools in Windows Server.
- Describe performance monitoring and use it in Windows Server.
- Describe event logging and perform event logging monitoring for troubleshooting purposes.

# Module 12: Upgrade and migration in Windows Server

This module describes how to perform upgrades and migrations for AD DS, Storage, and Windows Server. The module covers tools to use for AD DS migration. The module also covers the Storage Migration Service, and finally, Windows Server migration tools and usage scenarios.

#### Lessons

- AD DS migration
- Storage Migration Service
- Windows Server migration tools

## Lab: Migrating Server workloads

- Selecting a process to migrate server workloads
- Planning how to migrate files by using Storage Migration Service

After completing this module, students will be able to:

- Describe tools to use for AD DS migration.
- Describe the Storage Migration Service.
- Describe Windows Server migration tools and their usage scenarios.