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Auditing Networks, Perimeters, and Systems

GSNA Practical Assignment

Version 3.1

Option 1

Auditing the Fortigate-100 Firewall Appliance

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Auditing the Fortigate-100 Firewall Appliance

Abstract

Today, instant sharing of information is possible between people and organizations using publicly connected global network. Corporations need to protect their information assets against malicious attacks that attempt to compromise their business infrastructure and comply with laws and regulations to demonstrate 'due diligence' to their stake holders and customers. Hacker attacks, worms and viruses can be remotely deployed against an organization to cripple their daily activities resulting in financial losses. Compromised internal systems can flood malicious data internally affecting productivity and corrupting the integrity of the company's information.

Technology can provide defenses to mitigate such attacks and a choice of multifarious protection is available at various cost levels. While the right technology choices are important to any business, this is especially true for Small and Medium Businesses. These companies typically operate closer to the bottom line, and must be careful to keep the cost of acquiring and managing technology as low as possible. Further, in the SMB world, where productivity is so closely linked to profits, technology must be reliable. The best way to lower total cost of ownership and heighten productivity is to buy reliable products and technologies, that work well on their own or together right from the beginning.

Lack of manpower renders small networks vulnerable to security problems. Besides administering the network, protecting the network against viruses and worms, applying latest security patches to systems adds to the work load of the network administrators. Recovering compromised systems and loading security software and patches to each machine consumes time and money.

To alleviate this and to mitigate various forms of network attacks, many vendors are providing integrated all-in-one Network Appliances to secure the internal Network. Theses are being deployed at many Small and Medium businesses. This audit examines one such appliance and investigates how they fit into a company's business objectives of protecting their information system that is connected to the public network.

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Part 1: Research in Audit, Measurement practice, and control systems

Rama Marketing Inc. stocks and sells copper fittings for plumbing, for the building and industrial markets. They sell Commercial Industrial Division (CID) products which primarily consist of pressure rated metal valves made of bronze, iron, carbon and stainless steel, as well as ABS fittings, plumbing & heating valves and other sundry items such as frost free wall hydrants. Rama Marketing Inc. stocks and sells the entire ABC® product line. ABC® metal valves serve a wide variety of commercial, industrial and fire protection markets.

The company has a Local Area Network consisting of windows 2000 Domain controller, a windows 2000 Citrix server and 25 desktop and 60 thin clients. The company connects to the internet through a border router, firewall model Fortigate-100 from Fortinet Inc (http://www.fortinet.com).

The domain controller hosts their ERP program and is accessed through the CITRIX Application server. The CITRIX Server hosts all Microsoft Office productivity programs which are customized and accessed by Citrix ICA clients.

The company also runs an EDI application that connects to remote sites for B2B applications. The EDI application is available only on a specific single computer, the access to which is logically controlled. Only selected users are authorized to use the application. The company uses internet communication primarily for:

- E-mail
- Web Browsing: specific vendor sites for prices, catalogues, checking on the inventories etc.
- EDI
- Payroll transmission
- Electronic banking
- Remote branch/user connectivity.

Rama Inc. is also planning to deploy Internet critical applications in the near future

Business Control Objectives

IT Governance Institute has developed Control Objectives for Information and related Technology (COBIT ®) QuickStart ®framework, which provides a selection from their complete COBIT ® framework as a baseline for small and medium enterprises. COBIT® helps meet the multiple needs of management by bridging the gaps between business risks, control needs and technical issues. COBIT Quickstart ® can be used as a baseline and a set of 'smart things to do' for many small and medium and other enterprises. It can also be a starting point for enterprises for their move towards an appropriate level of control and governance of IT (**Ref Cobit Quickstart® Executive Summary**).

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(For more information http://www.isaca.org/cobit)

Rama Inc has adopted the following control objectives from COBIT® (**Ref: COBIT® Control Objectives 3rd edition manual**)

Domain: Delivery and Support

Process: DS5 – Ensure System Security

High level objective:

Control over the IT process of Ensuring System Security with the business goal of safeguarding information against unauthorized use, disclosure or modification, damage or loss is enabled by logical access controls which ensures access to systems, data and programs is restricted to authorized users and takes into consideration:

- confidentiality and privacy requirements
- authorization, authentication and access control
- user identification and authorization profiles
- need-to-have and need-to-know
- cryptographic key management
- incident handling, reporting and follow-up
- **virus prevention and detection**
- **firewalls**
- centralized security administration
- user training
- **tools for monitoring compliance, intrusion testing and reporting**

While all of the above are equally important, this audit is concerned only with

- Virus prevention, detection and reporting
- Firewalls
- Intrusion detection, prevention and reporting

Detailed control objectives:

There are 21 detailed control objectives that support the above High-Level Control objective. This audit is based on the two following detailed control objectives for the Domain DS5 - Delivery and Support (**Ref: COBIT® Control Objectives 3rd edition**) for Rama Inc.

DS5.20: **Firewall Architecture and Connection with Public Networks**
Control Objective: If connection to the internet or other public networks exists, adequate firewalls should be operative to protect against denial of services and any unauthorized access to the internal resources; should control any application and infrastructure management flows in both directions; and should protect against denial of service attacks.

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DS 5.19: **Malicious software Prevention, Detection and correction**
Control Objective: Regarding malicious software, such as computer viruses and Trojan horses, management should establish a framework of adequate preventative, detective and corrective control measures, and occurrence response and reporting. Business and IT management should ensure procedures are established across the organization to protect information systems and technology from computer viruses. Procedures should incorporate virus protection, detection, occurrence response and reporting.
(**Ref: COBIT® Control Objectives 3rd edition manual**)

Audit Scope

I have chosen to audit the Fortigate-100 as it is the company's border router and Firewall. This appliance is expected to deliver the above two business control process objectives as a technical control for Rama Inc. This audit examines in detail how and how effectively, Fortigate-100 meets the above objectives.

Purpose:

1. Determine the threats and vulnerabilities related to the Fortigate-100 and their impact on business. (See: Risk Analysis)
2. Determine intended controls
    a. First, I will determine if this appliance has the necessary required controls to protect against denial of service attacks, unauthorized access to internal resources and provide secure flow of information in both directions. This will be accomplished by researching the product specifications and the manufacturer's brochures. (See following : Controls provided by Fortigate-100)
3. Provide a checklist for testing
    After determination of the intended controls,
    a. I will create a Test Plan
    b. Using the Test Plan, I will construct a test procedure through checklists for testing some of the chosen controls of this appliance. (See Part 2: Audit Check List).
4. Perform the test
    a. I will use the checklist to test if the intended controls are in fact present and functioning accordingly and record the findings (See Part 3: Audit of Fortigate-100 – Testing, evidence and findings).

Role of Fortigate-100

The Fortigate-100 functions as the Border Router, Firewall, Antivirus Filter, Intrusion Detection and prevention. Located at the edge of the company's internal network, it is the company's only Gateway to the internet.

Controls provided by Fortigate-100

Taken from Fortigate Series 50/100 Brochure:
"FortiGate™ Antivirus Firewalls are dedicated, hardware-based units that deliver complete, real-time network protection services at the network edge. Underlying FortiOS™ operating system is ICSA-certified for Antivirus, Firewall, IPSec VPN, and

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Intrusion Detection. The FortiGate-100 includes a DMZ port, traffic shaping, and increased throughput. The FortiGate-50 and FortiGate-100 are kept up to date automatically by Fortinet's FortiProtect Network, which provides continuous updates that ensure protection against the latest viruses, worms, Trojans, intrusions and other threats. (Ref: http://www.fortinet.com)

1. **Firewall (ICSA Certified) -** Industry standard stateful inspection firewall.

2. **Intrusion Detection (ICSA Certified) -** Customizable database of over 1300 attack signatures.

3. **Intrusion Prevention -** Active prevention of over 30 intrusions and attacks, including DoS and DDoS attacks, based on user-configurable thresholds.

4. **Network-based Antivirus (ICSA Certified) -** Detects and eliminates viruses and worms in real-time. Scans incoming and outgoing email attachments (SMTP, POP3, IMAP) and Web (HTTP) and FTP traffic — without degrading Web performance.

Note: VPN and Web Content Filtering controls and not included in this audit.

Administering the Fortigate-100

FG-100 can be configured / administered either via a Web interface or a Command Line interface. In certain functions they complement each other and this audit uses both of them wherever it is effective and applicable.

The Fortigate web-based manager Setup Wizard guides one through the initial configuration steps. It can be used to configure the administrator password, the interface addresses, and the default gateway address.

Requirements for the web interface:

- An ethernet connection between the FortiGate-100 and management computer.
- Internet Explorer version 4.0 or higher on the management computer.

Command Line Interface (CLI)

The CLI is a full-featured management tool. It is used to configure the administrator password, the interface addresses, and the default gateway address and to configure advanced settings (Ref: Fortgate-100 Documentation CD-ROM).

Requirements for using CLI:

- A serial connection between the FortiGate-100 and management computer.
- A terminal emulation application (HyperTerminal for Windows) on the management computer.

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Risks Analysis

Based on the business control objectives referred earlier under 'Detailed Control Objectives' (COBIT® ref: DS 5:19 and DS: 5.20). Rama Inc. analyzed the risks to their information system and the overall impact to their business. The company adopted Facilitated Risk Analysis Process (FRAP).

The risks and vulnerabilities to the Fortogate-100 Firewall / Router appliance was analyzed by a team of individuals that included business managers, who are familiar with business information needs, and technical staff who have a detailed understanding of potential system vulnerabilities and related controls. The team consists of:

- System User
- Company Business manager / Controller
- Network administrator
- HR manager

(**Ref: The Information Security Risk Analysis by Thomas R. Peltier ISBN:0849308801**)

During the session, the key business processes that depended on the availability of the Fortigate-100, the systems and applications that depended on the integrity of the Fortigate-100 were analyzed and listed (Tables 1 & 2). Using a Loss Impact Table (Table 3) the team proceeded to determine the Integrity, Confidentiality and Availability of the Fortigate-100 (Table 4) based on an established downtime (outage period). The identified risks to the system and business processes are presented in the 'Risk Statement Forms' (**Ref: Microsoft Solutions for security – Windows 200 Server Security Solutions; Chapter 3 – Page 58 'Risk Statement Form'**).

This risk analysis validates the significant importance of the Fortigate-100, as a technical control, in supporting the company's business objectives and its processes. The team's conclusions on the risks, their priority, and the required controls are documented in Tables 5 and 6. In Table 6 the checklist items are mapped to the controls, which in turn are mapped to the control objectives in an order of priority.

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Table 1: Key Business Processes that rely on the availability of the Fortigate-100

Business Process 1	Internet (Access to Vendor , Supplier Inventory and Prices)
Business Process 1	Payroll
Business Process 2	Human Resource System
Business Process 3	Electronic Banking
Business Process 4	Electronic Data Interchange (Purchase orders, Invoices)
Business Process 5	E-mail and documents
Business Process 6	Customer support, inventory, order booking, shipping and delivery
Business Process 7	Accounting

Ref: The Information Security Risk Analysis by Thomas R. Peltier ISBN:0849308801

Table 2: Key Systems and Applications that rely on the integrity of the Fortigate-100

Systems (Servers)	Windows Domain Controller, Citrix Server
Application 1	Customer Orders, Inventory , Price Lists (ERP)
Application 2	Microsoft Office
Application 3	Payroll and Accounting
Application 4	Human Resources Program
Application 5	E-mail and document exchange

(**Ref: The Information Security Risk Analysis by Thomas R. Peltier ISBN:0849308801**)

Risk Ratings

The following guidelines (**Ref: Microsoft Solutions for Security (Patterns and Practices) Windows 2000 server Security Solutions – Chapter 3: Understanding the Security Risk Management Discipline**) were used to determine the risk exposure.

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Probability Rating

Probability range	Probability value used for calculations	Natural language expression	Numeric score
1% through 33%	17%	Low	1
34% through 67%	50%	Medium	2
68% through 99%	84%	High	3

Impact Rating

Impact Factor: High = 3, Medium = 2, Low = 1

Risk Exposure = Impact x Probability

Probability impact	Low = 1	Medium = 2	High = 3
High = 3	3	6	9
Medium = 2	2	4	6
Low = 1	1	2	3

Low exposure = 1 or 2 Medium exposure = 3 or 4 High exposure = 6 or 9

Table 3: Loss Impact Valuation Table

Impact Value	Time Sensitivity	Intangible Loss (Dollar Loss Difficult to Estimate)		Tangible Loss
	Longest Tolerable Outage Period During Peak	Customer Satisfaction (Dissatisfied Customers)	Embarrassment *(Comes to Attention of)*	Financial
L	24 hours or less	0 – 10K	Few if anyone	Less than $50K
M	25–72 hours	10,001– 15K	Company organization	$50,001–$300K
H	73 hours–5 days	15,001 and higher	Company Organization, Vendors	$300,001and above

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Table 4: The Integrity, Confidentiality and Availability requirements

#	Key Business Processes or Business Functions Supported by Fortigate-100	Integrity (Impact Value)	Confidentiality (Impact Value)	Availability (Impact Value)
1	Internet (Access to Vendor, Supplier Inventory and Prices)	M	M	M
2	ERP System	H	H	H
2	Payroll	H	H	M
3	Human Resources	H	H	M
4	Electronic Banking	H	H	H
5	Electronic Data Interchange	H	H	H
6	E-mail, Documents	H	H	M

Identified Risks to the Systems and Business Processes

The identified risks are presented below in the form of risk statements (**Ref: Microsoft Solutions for security – Windows 200 Server Security Solutions; Chapter 3 – Page 58 'Risk Statement Form'**). Part 2: Audit Check List provides Risk of Non Compliance for each item. The risk items shown below are not in their order of priority.

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Risk Severity	High	Probability	H	Impact	H	Risk Item	1
Risk Condition	Unknown and dangerous services pass through the firewall freely. Important for Border Routers						
and as a Result…							
Risk Consequence	An intruder may set up a backdoor and by pass the Firewall Security. A hacker can traverse the entire company network and can damage one or several computers and data they contain. They can also leave programs that will help them connect remotely and record user accounts, password etc, which can exploited. Employee's private and company's data are at high risk.						
Countermeasure	Firewall Policy, Port Filtering. Enable Intrusion Detection and Prevention.						
References	SANS GSNA Courseware – Auditing the perimeter. JANET-CERT: Services that router should block. http://www.ja.net/CERT/JANET-CERT/prevention/cisco/local_services.html Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 3.2 Protecting the network with the Router).						

Risk Severity	High	Probability	H	Impact	H	Risk Item	2
Risk Condition	Login by hostile agents or unauthorized users						
and as a Result…							
Risk Consequence	An intruder may set up an account and modify Firewall settings remotely, or modify the firewall administrator's account and deny their access to the firewall.						
Countermeasure	Access Configuration and Change Management						
References	Guidelines on Firewalls and Firewall Policy (NIST Publication 800-41) - Chapter 5.0 Firewall Administration						

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Risk Severity	High	Probability	H	Impact	H	Risk Item	3
Risk Condition	Session hijacking						
and as a Result…							
Risk Consequence	Exposure of sensitive information to unauthorized listeners. Session hijacking can be used to obtain logon information that can be used to gain access to a system or confidential information.						
Countermeasure	Access Configuration and Change Management, Session encryption and stateful inspection at the firewall. Logs.						
References	Microsoft security guidance kit – Threats and countermeasures.						

Risk Severity	High	Probability	H	Impact	H	Risk Item	4
Risk Condition	IP Spoofing						
and as a Result…							
Risk Consequence	An intruder can change the source address of an IP packet to hide his / her true identity and send a malicious code or start a denial of service attack. The spoofed address may be external or from the trusted internal network.						
Countermeasure	Implement Access Control, RFC 2827 Filtering. Enable Intrusion Detection and Prevention.						
References	Microsoft Security Guidance Kit : Perimeter Firewall Design						

Risk Severity	High	Probability	H	Impact	H	Risk Item	5
Risk Condition	Flooding attacks or DDOS attacks using ICMP						
and as a Result…							
Risk Consequence	An intruder can gather internal network information using ICMP Protocol to perform denial of service attacks. ICMP can also be used for exploiting systems and as a covert channel for attacker's communications.						
Countermeasures	Disallow traceroute, ping, or any other ICMP messages. Enable Intrusion Detection and Prevention.						
References	http://www.ja.net/CERT/JANET-CERT/prevention/cisco/local_services.html; http://www.sans.org/rr/papers/60/477.pdf; http://techrepublic.com.com/5102-6264-5087087.html						

Risk Severity	High	Probability	H	Impact	H	Risk Item	6
Risk Condition	Denial of service attacks						
and as a Result…							
Risk Consequence	The network resources are consumed disrupting and denying services to the legitimate users. This may result in loss of revenue and loss in productivity.						
Countermeasures	Firewall Policy, Use of firewall Filters, Intrusion Detection and Prevention, Patching and updating of software Firewall Logs.						
References	http://www.cert.org/tech_tips/denial_of_service.html ; http://www.cert.org/archive/pdf/DoS_trends.pdf ; Microsoft Security Guidance Kit:- Threats and Countermeasures						

Risk Severity	High	Probability	H	Impact	H	Risk Item	7
Risk Condition	Misconfigured router						
and as a Result…							
Risk Consequence	May result in unauthorized access or modification of organization's information resources. Denial-of-service attacks that target and use misconfigured network routing equipment pose an "imminent and real threat" to Internet security, according to a recent report by Carnegie Mellon University's federally funded CERT Coordination Center.						
Countermeasure	Regular Firewall Audit, Change Control						
References	http://www.computerworld.com/networkingtopics/networking/story/0,10801,65366,00.html						

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Risk Severity	High	Probability	H	Impact	H	Risk Item	8
Risk Condition	Exposure to Viruses, Trojans etc.						
and as a Result…							
Risk Consequence	Critical data loss or system availability. An intruder may set up a backdoor and by pass the Firewall Security. A hacker can traverse the entire company network and can damage one or several computers and data they contain. They can also leave programs that will help them connect remotely, and record user accounts, password etc, which can exploited. Employee's private and company's data at high risk. Increased cost of recovery. 'An explosion in virus attacks affected two-thirds of companies in the past year, leading to significant dents in productivity.'*						
Countermeasure	AV Program, Acceptable use policy (Security Policies).						
References	* Pricewaterhousecoopers (PwC) puts cost of virus attacks at $1tr http://software.silicon.com/security/0,39024655,11027559,00.htm						

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Table 5: Identified Risks

#	Vulnerability / Exposure	Risk	Assets Impacted	Type	Risk Exposure	Controls
1	Default Firewall settings. Misconfigured Firewalls Unauthorized Router Access.	• Unknown and dangerous services pass through freely. • May be serving as unwitting participants in Denial of Service. • Login by hostile agents or unauthorized users, inability to attribute accountability. • Exposure of sensitive information to unauthorized listeners, session hijacking. • Address-spoofed DDoS traffic exiting the network, forwarding bad traffic to peers. • Flooding attacks or DDoS attacks using ICMP. • Malicious third parties may gain access to critical applications or sensitive data. • Denial of service where remote users may not be able to gain access to data. • Misconfigured router, which may result in unauthorized access or modification of organization's information resources.	• Servers • Personnel Data • Customer Orders • Inventory • Pricelists • Documents • E-mail • Productivity • EDI	INT CON AVA	3x3=9 HIGH	1,2,3,4
2	Malware, Spyware, Viruses and Trojans.	• Increased cost of recovery (correcting information and reestablishing services). • Loss of information (critical data, proprietary information, contracts). • Loss of trade secrets. • Increased cost of retrospectively securing the system.		INT CON AVA	3x3=9 HIGH	5

Risk = Actual Risk **Type** = Integrity, Confidentiality, Availability **Control** = Controls identified to help mitigate the risk

REFERENCE: Information Security Risk Analysis by Thomas R. Peltier.

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Table 6: List of Controls

Control Objective	Controls	Checklist Item #	Control Description
If connection to the internet or other public networks exists, adequate firewalls should be operative to protect against denial of services and any unauthorized access to the internal resources; should control any application and infrastructure management flows in both directions; and should protect against denial of service attacks.	**1. Access and Configuration / change Management**		
	• Security Policies • FW Access Control • FW Configuration • FW RULEBASE Order	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	Preventive
	2. Port Filtering		
	• Permit only Required Protocols and Services • Reject Risky Protocols and services	13, 14, 15,16,17, 18, 19,20	Preventive
	3. Address Filtering		
	• Reject all Traffic from the Internal Networks that bear a source IP address which does not belong to the internal network • Reject all Traffic from external networks that bears a source address belonging to the internal network • Reject all Traffic with a source or destination address belonging to any reserved, unroutable, or illegal address range.	21, 22, 23, 24, 25	Preventive: Defeating Denial of Service Attacks. IP Source Address Spoofing. SYN Flooding and IP Spoofing Attacks, Smurf IP Denial-of-Service Attacks.
	4. Intrusion Detection and prevention		Detective and Corrective
	• Intrusion Detection • Intrusion Prevention • Audit and Logging	26, 27, 28, 29, 30, 31	
Regarding malicious software, such as computer viruses and Trojan horses, management should establish a framework of adequate preventative, detective and corrective control measures, and occurrence response and reporting. Business and IT management should ensure procedures are established across the organization to protect information systems and technology from computer viruses. Procedures should incorporate virus protection, detection, occurrence response and reporting.	**5. Anti Virus Protection**		Preventive and corrective
	• Acceptable use policy • File Blocking	32, 33, 34, 35,	

Reference: COBIT QuickStart, COBIT, CISA Review Manual 2003, Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1

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The Current State of Practice

Control Objectives:
Information technology is no longer a self contained department. It involves users, managers and technologists and is pervasive throughout an organization and supports the organizations' business goals. Therefore, a framework is needed to ensure that computer-based technologies are applied in a cost-effective secure and appropriate manner.
COBIT ® *Framework*, developed and promoted by the IT Governance Institute is a control model that focuses on the process rather than functions or applications. This allows self-assessment in order to make choices for control implementations and improvements over IT. COBIT ® is the result of agreed upon standards by experts in the field of Information Technology and provides a good tool for IT governance. In summary: **'**COBIT ® helps organizations to adopt practices for planning and organizing, acquiring and implementing, delivering and monitoring IT and related technologies to ensure that they support the organizations' business objectives. It provides a basic understanding for every organization on the status of their IT systems and helps them to decide the required security and controls. The organizations can map their progress through establishing and monitoring key performance indicators and critical success factors. COBIT Quickstart ® provides a selection from the complete COBIT framework and can be used as a baseline for many small and medium organizations. It is useful for auditors, IT managers, and implementers for light and easy-to-use approach to get started**'** (**Ref: COBIT ® Framework – 3rd edition**). More detailed information can be obtained from http://www.isaca.org/cobit.
As we have done in this audit, an organization can pick and choose the control objectives that closely relate to their business objectives and gradually grow into other Control Domains of COBIT ®. This facilitates an organization to baseline their IT governance and later on 'Benchmark' with their peer organizations.

Perimeter Security:
Security threats are growing in frequency and complexity and their ability to spread in a matter of minutes has also increased to cause severe damages. With the increased use of networks and the Internet in daily business computing, the risk of unauthorized users attempting to gain access to business critical resources is rising.

Perimeter security is an important component of a defense-in-depth strategy that includes security measures at multiple points within the organization. Identifying the features necessary in a perimeter firewall is an important step and I have gained most valuable information from Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 and Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations. These two resources were consulted in detail during this audit. In addition to some of the checklist items, the checklist format was modeled after the Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations. I tailored this audit based on the above, the GSNA Course book, Information found on SANS Portal, Microsoft Security Guidance Kit and other referred

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material in the checklist, to develop a reproducible testing plan relevant to the specific Fortigate-100 Firewall / Router.

Risk Analysis:
There is a plethora of information available on risk assessment methodologies. The Information Security Risk Analysis by Thomas R. Peltier, provides guidance to perform the necessary risk evaluation and a workbook for understanding risk analysis to safeguard information assets within organizations. Another Source of information that I used is 'The Operationally Critical Threat, Asset, and Vulnerability Evaluation℠ (OCTAVE®) developed at the Software Engineering Institute (SEI℠) of the Carnegie Mellon University. The OCTAVE® self assessment approach for evaluating risks is driven by operational risk and security practices of the organization being assessed. The process based risk assessment methodology is described in a10 Volume guide and provides all the necessary worksheets. OCTAVE®-S is a variation of the OCTAVE® and is tailored to meet the specific needs of small organizations. **Ref: OCTAVE®-S – Operationally Critical Threat, Asset, and Vulnerability Evaluation, Version 0.9: http://www.cert.org/octave**
Additional source of information on Risks is from Microsoft Corporation's Microsoft Solutions Guide for Securing Microsoft Windows 2000 Server (**Ref: http://support.microsoft.com/default.aspx?scid=kb;en-us;829031**). Chapter 3 'Security Risk Management Discipline' of this guide discusses in detail the approaches one could take in identifying, classifying and risk mitigating plans. It provides Risk Statement forms for analysis and prioritizing risks.

Often times, the risk assessment process and the methodology seem simple in theory based on a 'common sense' approach. But in real life situations, they can be challenging. Using the above referred guides, I was successful in developing questionnaires to identify the critical assets, the Process or Business Functions that depended on them, correlate risks to the assets and the controls that are required to mitigate the impacts. To assist non technical personnel on the impact, I have provided additional information (Risk of Non Compliance) on each checklist item, hopefully in simpler terms.

Test Plan:

1. Test firewall configuration for secure administration and Rulebase (**See: Part 2:Audit Checklist - Section 2.1.0**)

2. Test firewall configuration for allowed "outside-in' and "inside-out' services (**See: Part 2:Audit Checklist - Section 2.2.0**)

3. Test ingress and egress Address Access Control (**See: Part 2:Audit Checklist - Section 2.3.0**)

4. Test IDS for detection / prevention and Alert (**See: Part 2:Audit Checklist - Section 2.4.0**)

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5. Test AV controls settings and File blocking protection (**See: Part 2:Audit Checklist - Section 2.5.0**)

(Ref: GSNA Courseware Section 7.2 – Auditing the Perimeter)

Part 2: Audit Checklist

Although there are verbal and general understanding of what services are required and the safe usage of computing systems in general, Rama Inc. do not have specific written security policies of any kind. Because of this, the firewall was audited against standards and best practices referred in the reference section of each item.

2.1.0 Access and Configuration /Change Management

N/A	Pass	Fail	#	Check List Item	RISK
			1	a) Only FW administrator and other authorized personnel will be granted access to the FW for administration. b) Firewall should be administered from a trusted host.	H

Risk of Non Compliance	Unauthorized user access and unsecured hosts leave the firewall susceptible for intruders to modify the firewall rules, corrupt its integrity and deny its availability to legitimate users.
Procedure	Connect to internal interface of the firewall using SSH Client Putty. At the Command Line Interface (CLI) Login as Administrator and execute the following commands : a) Fortigate-100 # get system admin. Note the results b) Fortigate-100 # get config. Note the results.
Verify	The results will show the admin users name and the specific trusted ip address from which they can connect to the FW and their read/write permissions.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.4 Router Accounts) Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 3.3 – Managing the Router and 4.1.5. – Logins, Privileges, Passwords and Accounts). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			2	*The administrator and other authorized users account password will be encrypted and should be at least 6 characters long.*	H

Risk of Non Compliance	Clear text passwords give easy access (password cracking) for intruders to misconfigure the firewall
Procedure	At the CLI Login as Administrator and execute the following command: a) Fortigate-100 # get config. Note the results. b) Create a new user with a password less than 6 characters. A Warning should appear.
Verify	The password is encrypted. For Passwords less than 6 characters a warning appears.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Security Operations (Section 3.5.5 Router Passwords). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 4.1.5. – Logins, Privileges, Passwords and Accounts). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			3	*The time out period for unattended console is set for no longer than 15 minutes. Activating this timeout period provides additional security*	H

Risk of Non Compliance	Abuse from casual or malicious use through the open session (for longer timeout periods) by unauthorized users, if they get physical access to the session.
Procedure	At the Command Line Interface (CLI) Login as Administrator and execute the following command: a) Fortigate-100 # get system option b) Login and wait for the expiration timeout period. The system must force you to re login
Verify	**The values for 'Admin timeout' is 15 minutes.**
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.4 Router Accounts). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			4	*The FW administrator will ensure modems will not be used for remote administration*	H

Risk of Non Compliance	War-dialing. Enables a backdoor for malicious purposes.
Procedure	Check if an auxiliary console for Modem connection is available, if available check if it is disabled.
Verify	Physically.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.6 – Out-of-band Management). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 4.1.6 Remote Access) Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			5	*The FW administrator will disable FW interfaces that are not in use*	H

Risk of Non Compliance	Scanning and spoofing attacks, unauthorized access attempts to the firewall through un-trusted network. If successful, enables a backdoor for the intruder to the firewall and to the internal network.
Procedure	At the CLI Execute the following command: Fortigate-100 # get system interface
Verify	The lists of interfaces that are up are shown. Ensure that the DMZ interface is disabled.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.6 – Out-of-band Management) Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version1.1. Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			6	*Ensure that only ports on the internal interface will be used for administrative access to the FW and they are restricted to SSH or SSL encryptions.*	H

Risk of Non Compliance	Man-in-the-middle attack, Session hijacking.
Procedure	At the CLI Execute the following command: a) Fortigate-100 # get system interface. Note the results. b) Try login to the external interface through web interface or using putty.
Verify	Check if the line "access:" reads 'ssh, https' only for the internal interface. You should not be able to login to the external interface of the firewall.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.7 – In-band Router Management) Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 5.3 – Using SSH for Remote Administration security). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			7	*The FW administrator will ensure all administrative access and modification to the FW configuration are logged.*	H

Risk of Non Compliance	Undetected firewall access violations and configuration changes to the firewall settings.
Procedure	Log in as admin using the web interface: https://192.168.22.1 a) Select Log&Report>Log setting>Config Policy. b) Select HA activity event and select ok. Deselect HA activity event and select ok.
Verify	a) Verify that under Log & Report > Log Setting > config Policy > Event log: 'admin login/logout event' and 'when configuration has changed' are selected. b) Check the logs to verify the log policy changes are recorded.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.7 – In-band Router Management. Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1) (Section 3.3.3 Logging and 4.5.2 – Configuring Logging and Time Services). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			8	*The current and previous router configuration are backed up and saved in a secure location.*	MH

Risk of Non Compliance	Unauthorized configuration changes and corruption of the stored files. No backup protection affects Real-time Recovery Objective (RT0).
Procedure	a) Ask admin to show the back up configuration file location. b) Create a new back up and store it in the same directory (for next item 9)
Verify	Check the creation dates of the configuration back up files. They must be different. Check if the files are stored in a secure system.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.6.3 –Logistics for Configuration Loading and Maintenance). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 3.3.2 Updating the Router and 4.1.8 – Logistics for configuration Loading and Maintenance). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			9	*On the system where the configuration files are stored, the local operating system's security mechanisms will be used for restricting access to the files*	MH

Risk of Non Compliance	Unauthorized configuration changes and corruption of the stored files. No backup protection affects Real-time Recovery Objective (RT0).
Procedure	Ask admin to show the location of the backup configuration files. Compare the security permissions of the old and newly backed up configuration files (previous item 8).
Verify	Check if the folder is located in a NTFS formatted volume. Check the security properties of the folder. Verify that only the administrator (S) of the firewall has full permission to the folder.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.6.3 –Logistics for Configuration Loading and Maintenance). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 4.1.8 – Logistics for configuration Loading and Maintenance) Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			10	*Ensure that the latest patches and updates are applied to the firewall components. If patches and updates are automatically downloaded from the vendors' websites, ensure that the update is received from a trusted site.*	H

Risk of Non Compliance	Exploitation of known vulnerabilities.
Procedure	a) Use web interface and login as the administrator. Note the Firmware, Anti Virus and attack definition Versions. b) Ask the Administrator to login at the Fortinet support site and show the latest versions of these items. c) Check Automatic update function if they are enabled.
Verify	Compare the version numbers. The versions in Fortigate-100 must be the latest.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations. Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 4.5.5 Performing Cisco Software Updates). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			11	*Review the ruleset EXT > INT to ensure that they follow the order as follows:* • *firewall Lockdown* • *anti-spoofing filters (blocked private addresses, internal addresses appearing from the outside)* • *Deny unwanted inbound services* • *User permit rules (allow CITRIX ICA and HTTPS)* • *Noise drops (e.g. discard multicasts, OSPF and HSRP chatter)* • *Deny and Alert (alert systems administrator about traffic that is suspicious)* • *Deny and log (log remaining traffic for analysis)* *Firewalls operate on a first match basis, thus the above structure is important to ensure that suspicious traffic is kept out instead of inadvertently allowing them in by not following the proper order.*	H

Risk of Non Compliance	Misconfiguration. Ineffective rulesets.
Procedure	Login as admin using the web interface. a) Select Firewall>Addresses>External - Note the results b) Select Firewall > Policy > 'EXT>INT' – Note the results
Verify	Check the Rule order, as above. Make sure that logging is enabled for all the denied rules.
Conclusion	

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Reference	Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php Building Your Firewall Rulebase by Lance Spitzner http://www.spitzner.net/rules.html						
Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			12	*Review the ruleset INT > EXT to ensure that they follow the order as follows:* • *allow ipsec tunnel* • *anti-spoofing filters (blocked private addresses, internal addresses appearing from the outside)* • *blocked unwanted outbound services* • *User permit rules (e.g. allow HTTP to public web server)* • *Deny and log (log remaining traffic for analysis)* *Firewalls operate on a first match basis, thus the above structure is important to ensure that suspicious traffic is kept out instead of inadvertently allowing them in by not following the proper order.*	H

Risk of Non Compliance	Misconfiguration. Ineffective rulesets.						
Procedure	Login as admin using the web interface. Select Firewall>Addresses>Internal - Note the results Select Firewall > Policy > 'INT>EXT' – Note the results						
Verify	Check the Rule order, as above. Make sure that logging is enabled for all the denied rules.						
Conclusion							
Reference	Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php Building Your Firewall Rulebase by Lance Spitzner http://www.spitzner.net/rules.html						
Subjective		Objective	X	Evidence		Findings	

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2.2.0 Port Filtering

N/A	Pass	Fail	#	Check List Item	RISK
			13	*Reject the following non-required, risky protocols and services in either direction.*	H

Port (Transport)		*Service*	
1	(TCP & UDP)	tcpmux	
7	(TCP & UDP)	echo	
9	(TCP & UDP)	discard	
11	(TCP)	systat	
13	(TCP & UDP)	daytime	
15	(TCP)	netstat	
19	(TCP & UDP)	chargen	
67	(UDP)	bootp	
69	(UDP)	tftp	
135	(TCP & UDP)	loc-srv	
137	(TCP & UDP)	netbios-ns	
138	(TCP & UDP)	netbios-dgm	
139	(TCP & UDP)	netbios-ssn	
177	(UDP)	xdmcp	
445	(TCP)	netbios (ds)	
512	(TCP)	rexec	
515	(TCP)	lpr	
517	(UDP)	talk	
518	(UDP)	ntalk	
540	(TCP)	uucp	
1900, 5000	(TCP & UDP)	Microsoft UPnP SSDP	
12345	(TCP)	NetBus	
12346	(TCP)	NetBus	
31337	(TCP & UDP)	Back Orifice	

Risk of Non Compliance	These ports can be used for denial of service and or sending malicious codes
Procedure	Login as admin to the web interface. Select Firewall > Service > Custom The custom services are additional ports/services that are not in the predefined list. A group Disallowed_ services contains all the ports that are unnecessary and denied entry to the network. Check that this group of services are denied and logging enabled both at the EXT>INT and INT > EXT Policies.
Verify	Verify that the list reflect the ports mentioned in this checklist.
Conclusion	

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Reference	Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 3.2 Protecting the network with the Router). JANET-CERT: Services that router should block. http://www.ja.net/CERT/JANET-CERT/prevention/cisco/local_services.html Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			14	*Permit only required inbound Protocols and Services*	H

Risk of Non Compliance	Intruders may exploit unknown and not required services.
Procedure	Perform Port scanning of the external Interface IP from PC FSAUDIT xxx.xxx.xxx.x29 Use following commands inbound from the internet for TCP and UDP Ports: • Nmap –n –P0 -sT –p 1-65535 –oN inbound-syn-scan.txt xxx.xxx.xxx.x27 • Nmap –n –P0 –sU –p 1-65535 –oN inbound-udp-scan.txt xxx.xxx.xxx.x27 Set up tcpdump Packet capture on the internal network side. Use following command to capture inbound packets: tcpdump -nn -vvv –w inboundtcp-scan.cap host 192.168.22.1 tcpdump -nn -vvv –w inboundudp-scan.cap host 192.168.22.1
Verify	Should only detect ports 443/tcp and 1494/tcp. Verify the logged data for the scanning activity. Check tcpdump for records of the port scan traffic.
Conclusion	
Reference	SANS – GSNA Courseware. Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3 Functional Tests). SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			15	*Permit only required inbound Protocols and Services (Fin Scan)*	H

Risk of Non Compliance	Intruders may exploit unknown and not required services. Helps to determine open and closed ports.
Procedure	Perform Port scanning of the external Interface IP from PC FSAUDIT xxx.xxx.xxx.x29 with FIN packets to see if they are handled differently. Use following commands. • Nmap –n –P0 –sF –p 1-65535 –oN inbound-fin-scan.txt xxx.xxx.xxx.x27 Set up tcpdump Packet capture on the internal network side. Use following command to capture inbound packets: • tcpdump -nn -vvv –w inbound-fin-scan.cap host 192.168.22.1
Verify	Should not detect any open ports. Verify the logged data for the scanning activity Check tcpdump for records of the port scan traffic.
Conclusion	
Reference	SANS – GSNA Courseware. SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			16	*Permit only required inbound Protocols and Services (ACK Scans).*	H

Risk of Non Compliance	Intruders may exploit unknown and not required services. Helps to determine ports that allow established connections.
Procedure	Perform Port scanning of the external Interface IP from PC FSAUDIT xxx.xxx.xxx.x29 with ACK packets to see if they are handled differently. Use following commands: • Nmap –n –P0 -sA –p 1-65535 –oN inbound-ack-scan.txt xxx.xxx.xxx.x27 Set up tcpdump Packet capture on the internal network side. Use following command to capture inbound packets: • tcpdump -nn -vvv -w inbound-ACK-scan.cap host 192.168.22.1
Verify	Should not detect any open ports. Verify the logged data for the scanning activity. Check tcpdump for records of the port scan traffic.
Conclusion	
Reference	SANS – GSNA Courseware SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton. Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			17	*Permit only required Outbound Protocols and Services.*	H

Risk of Non Compliance	Malicious programs, proxy connections may provide back door connections to an intruder affecting confidentiality and integrity of data. Become an unwitting participant in DDos attacks.
Procedure	Perform Port scanning of the internal Interface IP from PC FBSD 192.168.22.210. Use following commands: • Nmap –n –P0 -sT –-p 1-65535 –oN outbound-syn-scan.txt 192.168.22.1 • Nmap –n –P0 –sU –p 1-65535 –oN outbound-udp-scan.txt 192.168.22.1 Set up tcpdump Packet capture on the external network side. Use following command to capture inbound packets: • tcpdump -nn -vvv -w servicesouttcp-scan.cap host xxx.xxx.xxx.x27 (for TCP) • tcpdump -nn -vvv -w servicesoutudp-scan.cap host xxx.xxx.xxx.x27 (for UDP)
Verify	Should only detect ports 22/tcp and 443/tcp. Verify the logged data of the scanning activity. Check tcpdump for records of the port scan traffic.
Conclusion	
Reference	SANS – GSNA Courseware – Auditing the Perimeter. SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton. Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			18	*Permit only required Outbound Protocols and Services (FIN Scan Test).*	H

Risk of Non Compliance	Malicious programs, proxy connections may provide back door connections to an intruder affecting confidentiality and integrity of data. Become an unwitting participant in DDos attacks
Procedure	Perform Port scanning of the internal Interface IP from PC FBSD 192.168.22.210 with FIN packets to see if they are handled differently. Use following commands: • Nmap –n –P0 -sF –p 1-65535 –oN outbound-fin-scan.txt 192.168.22.1 Set up tcpdump Packet capture on the external network side. Use following command to capture inbound packets: • tcpdump -nn -vvv -w outbound-fin-scan. cap host xxx.xxx.xxx.x27
Verify	Should not detect any open ports. Verify the logged data of the scanning activity. Check tcpdump for records of the port scan traffic.
Conclusion	
Reference	SANS – GSNA Courseware SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton. Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

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Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			19	*Permit only required Outbound Protocols and Services (ACK Scan test).*	H

Risk of Non Compliance	Malicious programs, proxy connections may provide back door connections to an intruder affecting confidentiality and integrity of data. Become an unwitting participant in DDos attacks
Procedure	Perform Port scanning of the internal Interface IP from PC FBSD 192.168.22.210 with ACK packets to see if they are handled differently. Use following commands: • Nmap –n –P0 -sA –p 1-65535 –oN outbound-ack-scan.txt 192.168.22.1 (ACK Scan to look for open ports) Set up tcpdump Packet capture on the external network side. Use following command to capture inbound packets: tcpdump -nn -vvv -w outbound-ack-scan. cap host xxx.xxx.xxx.x27
Verify	Should not detect any open ports. Verify the logged data if the scanning activity is detected. Check tcpdump for records of the port scan traffic.
Conclusion	
Reference	SANS – GSNA Courseware SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton. Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			20	*Reject Inbound traffic containing ICMP (Internet Control Message Protocol) traffic. Log Event.*	M

Risk of Non Compliance	Intruders may gather information for Denial of Service attacks.
Procedure	Verify that ICMP protocol 8, 11, and 3 are blocked at the external interface. Login as admin to the web interface. Select Firewall > Policy > 'EXT>INT'. Check if this specific service is included in the disallowed_services group or by itself appears in the ruleset and set to deny access.
Verify	Check predefined Service ICMP_Any is in the disallowed services list.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.6.2.2 - Exploit Protection) SANS – GSNA Courseware Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective	X	Objective	X	Evidence		Findings	

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2.3.0 Address Filtering

N/A	Pass	Fail	#	Check List Item	RISK
			21	*Reject all Traffic from the External Networks that bear following source IP address:* *0.0.0.0/8 Historical broadcast* *10.0.0.0/8 RFC 1918 private network* *169.254.0.0/16 Link local networks* *172.16.0.0/12 RFC 1918 private network* *192.168.0.0/16 RFC 1918 private network* *224.0.0.0/4 Class D multicast* *240.0.0.0/5 Class E reserved* *248.0.0.0/5 Unallocated* *255.255.255.255/32 Broadcast*	H

Risk of Non Compliance	IP Spoofing to start denial of service attempts or send malicious codes.
Procedure	Login to Firewall as admin using the web interface. Select> firewall>Policy>'EXT>INT'
Verify	Verify that the above addresses are included in the policy and set to deny access and logging is enabled.
Conclusion	
Reference	MSDN – Chapter 15 – Securing your Network - http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnnetsec/html/thcmch15.asp SANS – GSNA Courseware. Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			22	*Reject all Traffic from the Internal Networks that bear a source IP address which does not belong to the internal network (outbound)*	H

Risk of Non Compliance	IP Spoofing to start denial of service attempts or send malicious codes.
Procedure	Check the firewall Int to Ext ruleset for the specific policy. From internal PC FBSD 192.168.22.210 execute command as below: a) hping –S xxx.xxx.xxx.x43 –a 192.168.0.20 –p 21 b) hping –S xxx.xxx.xxx.x43 –a 192.168.20.20 –p 21
Verify	The addressees 192.168.22.0 /8 only should be allowed outbound access. Other 192.168.XXX.XXX should be denied access (policyid 21).
Conclusion	
Reference	Guidelines on Firewalls and Firewall Policy NIST Publication 900-41 (Section 4.2 Implementing Firewall Ruleset). Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3.2. – Attack Tests). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			23	*Reject outbound traffic from a system using a source address that falls within the address ranges :10.0.0.0 /8, 172.16.0.0 /16, 165.255.0.0 /16*	H

Risk of Non Compliance	IP Spoofing to start denial of service attempts or send malicious codes.
Procedure	Check the Firewall INT>EXT ruleset for the specific policy. From internal PC FBSD 192.168.22.210 execute command as below: hping –S 10.10.20.20 –a 172.16.20.20 –p ++21 hping –S xxx.xxx.xxx.x43 –a 10.10.20.20 hping –S xxx.xxx.xxx.x43–a 169.254.20.20
Verify	Verify the above addresses are denied access. Verify the logs for the record of the denied activities.
Conclusion	
Reference	Guidelines on Firewalls and Firewall Policy NIST Publication 900-41 (Section 4.2 Implementing Firewall Ruleset). Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3.2. – Attack Tests). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			24	*Reject inbound traffic from a system using a source address that falls within the address ranges : 10.0.0.0 /8, 172.16.0.0 /16, 165.255.0.0 /16*	H
Risk of Non Compliance	IP Spoofing to start denial of service attempts or send malicious codes.				
Procedure	Check the Firewall EXT>INT ruleset for the specific policy. From external PC FSAUDIT xxx.xxx.xxx.x29 execute command as below: a) hping –S xxx.xxx.xxx.x27 –a 10.10.21.21 –p 80 b) hping –S xxx.xxx.xxx.x27 –a 172.168.20.20 -p 23				
Verify	Verify the above addresses are denied access. Verify the logs for the record of the denied activities.				
Conclusion					
Reference	Guidelines on Firewalls and Firewall Policy NIST Publication 900-41 (Section 4.2 Implementing Firewall Ruleset). Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3.2. – Attack Tests). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php				

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			25	*Reject Outbound traffic containing broadcast addresses and Log event*	H
Risk of Non Compliance	Unwitting participant in Denial of Service Attacks.				
Procedure	Check the Firewall INT>EXT ruleset for the specific policy. From internal PC FBSD 192.168.22.210 execute command as below: nmap –sS –O -P0 -e dc0 -S 255.255.255.255 192.168.22.1				
Verify	Check firewall logs to see if the broadcasts are recorded and dropped.				
Conclusion					
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.6.2.2 – Exploits Protection) Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3.2. – Attack Tests). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php				

Subjective		Objective	X	Evidence		Findings	

Intrusion Detection and prevention:

Some reasons for adding IDS to you firewall are:

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- Double-checks misconfigured firewalls.
- Catches attacks that firewalls legitimate allow through (such as attacks against web servers).
- Catches attempts that fail.
- Catches insider hacking.

(**Ref: Technical Incursion Countermeasures: FAQ – Network Intrusion Detection Systems** **http://www.ticm.com/kb/faq/idsfaq.html**)

Overview:
The Fortigate-100 has a real-time Network Intrusion Detection System (NIDS). The NIDS consists of three modules designed to detect, prevent and respond to attacks. The detection module detects a wide variety of suspicious network traffic and network-based attacks. The NIDS detects and prevents the following types of attacks:

- Denial of service attacks
- Reconnaissance
- Exploits
- NIDS evasion

For the purpose of this paper the checklist is designed to verify the configuration of IDS and ID prevention and perform a ip spoofing test to verify the preventive function of the IDS. The, IDS detection module consists of individual attack signatures contained in a group. For example:
Denial of Service attack signature group consists of:

ID	Rule Name	Revision
917505	Jolt attack	10
101580802	Land attack	10
286130179	Teardrop attack	10
286130180	UDP echo+chargen bomb	10
917509	IGMP dos attack	10
917510	IGMP dos attack	10
101580808	NAPTHA	10
101580815	Winnuke attack	10
917520	Cisco IPv4 SWIPE	10
917521	Cisco IPv4 Mobility	10
917522	Cisco IPv4 Sun ND	10
917523	Cisco IPv4 PIM	10

(**Ref: Fortinet - Fortigate- NIDS Guide**)

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2.4.0 Intrusion Detection and Prevention

N/A	Pass	Fail	#	Check List Item	RISK
			26	Interfaces both internal and external must be monitored for network-based attacks.	H

Risk of Non Compliance	• Inability to detect misconfigured firewalls. • Inability to detect attacks that firewalls legitimately allow through (such as attacks against web servers). • Inability to detect insider hacking.
Procedure	Login to the firewall internal interface 192.168.22.1 using "putty". In the CLI dialogue execute the following commands: Fortigate-100 # get nids detection interfaces
Verify	Both the internal and external is set to ON. Verify the DMZ interface is set to OFF.
Conclusion	
Reference	Fortinet – Fortigate NIDS Guide. Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 5.5 CISCO IOS Intrusion Detection). Technical Incursion Countermeasures: FAQ – Network Intrusion Detection Systems http://www.ticm.com/kb/faq/idsfaq.html

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			27	Checksum verification must be turned ON. This feature tests files passing through the Fortigate-100 to make sure that they have not been changed in transit.	H

Risk of Non Compliance	Inability to detect malicious changes in data during transit.
Procedure	Login to the firewall internal interface 192.168.22.1 using "putty". In the CLI dialogue execute the following commands: Fortigate-100 # get nids detection checksum
Verify	Verify the Conclusions: it must be IP: ON, TCP: ON, UDP: ON and ICMP:ON
Conclusion	
Reference	Fortinet – Fortigate NIDS Guide.

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			28	All attack detection Signatures must be enabled. The NIDS detection module uses over 1000 signatures arranged into groups. By default all groups are enabled.	H

Risk of Non Compliance	Inability to match and detect patterns of security violations of most common network attacks.
Procedure	Open the web interface: https://192.168.22.1. Login as admin. Go to NIDS > Detection > Signature List
Verify	All signatures must be enabled.
Conclusion	
Reference	Fortinet – Fortigate NIDS Guide. Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 5.5 CISCO IOS Intrusion Detection).

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			29	NIDS attack prevention must be enabled. This module is disabled by default!	MH

Risk of Non Compliance	Inability to prevent the damage either by dropping the packets or by blocking network access.
Procedure	Login to the firewall internal interface 192.168.22.1 using "putty". In the CLI dialogue execute the following commands: Fortigate-100 # get nids prevention status.
Verify	Verify IDP is enabled.
Conclusion	
Reference	Fortinet – Fortigate NIDS Guide.

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			30	All attack prevention signatures must be enabled.	H

Risk of Non Compliance	Inability to prevent the damage either by dropping the packets or by blocking network access.
Procedure	Open the web interface: https://192.168.22.1. Login as admin. Go to NIDS > Prevention
Verify	'Enable prevention' is checked. Verify that all individual prevention signature groups are enabled.
Conclusion	
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 – DISA Field Security Operations. Fortinet – Fortigate NIDS Guide.

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			31	Test ID Prevention is functioning.	H

Risk of Non Compliance	Undetected internal or external attacks resulting in Denial of Service and or damage to systems and data.
Procedure	From the internal Test PC FSBD 192.168.22.210 execute the following command hping -S 192.168.22.1 –a 255.255.255.255
Verify	Check the IDS prevention detects and prevents and logs the attack.
Conclusion	
Reference	Fortinet – Fortigate NIDS Guide.

Subjective		Objective	X	Evidence		Findings	

2.5.0 AV / File Blocking Protection

In Fortigate-100 Antivirus protection is enabled in firewall policies. When it is enabled a content profile is selected that controls how the antivirus protection behaves. Content profiles control the type of traffic protected (HTTP, FTP, IMAP, POP3, SMTP), the type of antivirus protection (scan, block, quarantine) and the treatment of fragmented e-mail and oversized files or email. Note: Quarantine feature not available in Fortigate-100 series.

N/A	Pass	Fail	#	Check List Item	RISK
			32	Content filtering must be enabled in the firewall policy.	MH

Risk of Non Compliance	Malicious codes and viruses infecting internal network. Some may create backdoor connections for intruders.
Procedure	Login to the web interface. Select Firewall>Policy>'INT>EXT'> Open (Edit) Policyid 2.
Verify	Antivirus and Web filter must be enabled and the 'Strict' content profile must be in use.
Conclusion	
Reference	Fortinet – Content Protection Guide

Subjective		Objective	X	Evidence		Findings	

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N/A	Pass	Fail	#	Check List Item	RISK
			33	Verify contents of 'Strict Content profile'. This controls how the antivirus protection behaves.	H

Risk of Non Compliance	Downloading of infected files or programs containing malicious codes or viruses.
Procedure	Login as admin at the web Interface. Select firewall> Content Profile>Strict.
Verify	All options must be selected for protection, except 'pass fragmented e-mails'.
Conclusion	
Reference	Fortinet – Content Protection Guide

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			34	File blocking must be enabled to remove all files that pose a potential threat and to provide the best protection from active computer virus attacks.	H

Risk of Non Compliance	Downloading of files or programs containing malicious codes or viruses.
Procedure	Login to the web interface as admin. Select: Antivirus>File Block.
Verify	Only files with .doc, .ppt, .xl extensions must be unblocked for HTTP, FTP, IMAP, POP3, SMTP protocols. All other file extensions must be blocked for all protocols.
Conclusion	
Reference	Fortinet – Content Protection Guide

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
			35	Test File blocking functionality.	H

Risk of Non Compliance	Downloading of files or programs containing malicious codes or viruses.
Procedure	From any internal PC browse to http://www.winzip.com and attempt to download a trial version of winzip.exe
Verify	The down load must be blocked with a security alert message.
Conclusion	
Reference	Fortinet – Content Protection Guide

Subjective		Objective	X	Evidence		Findings	

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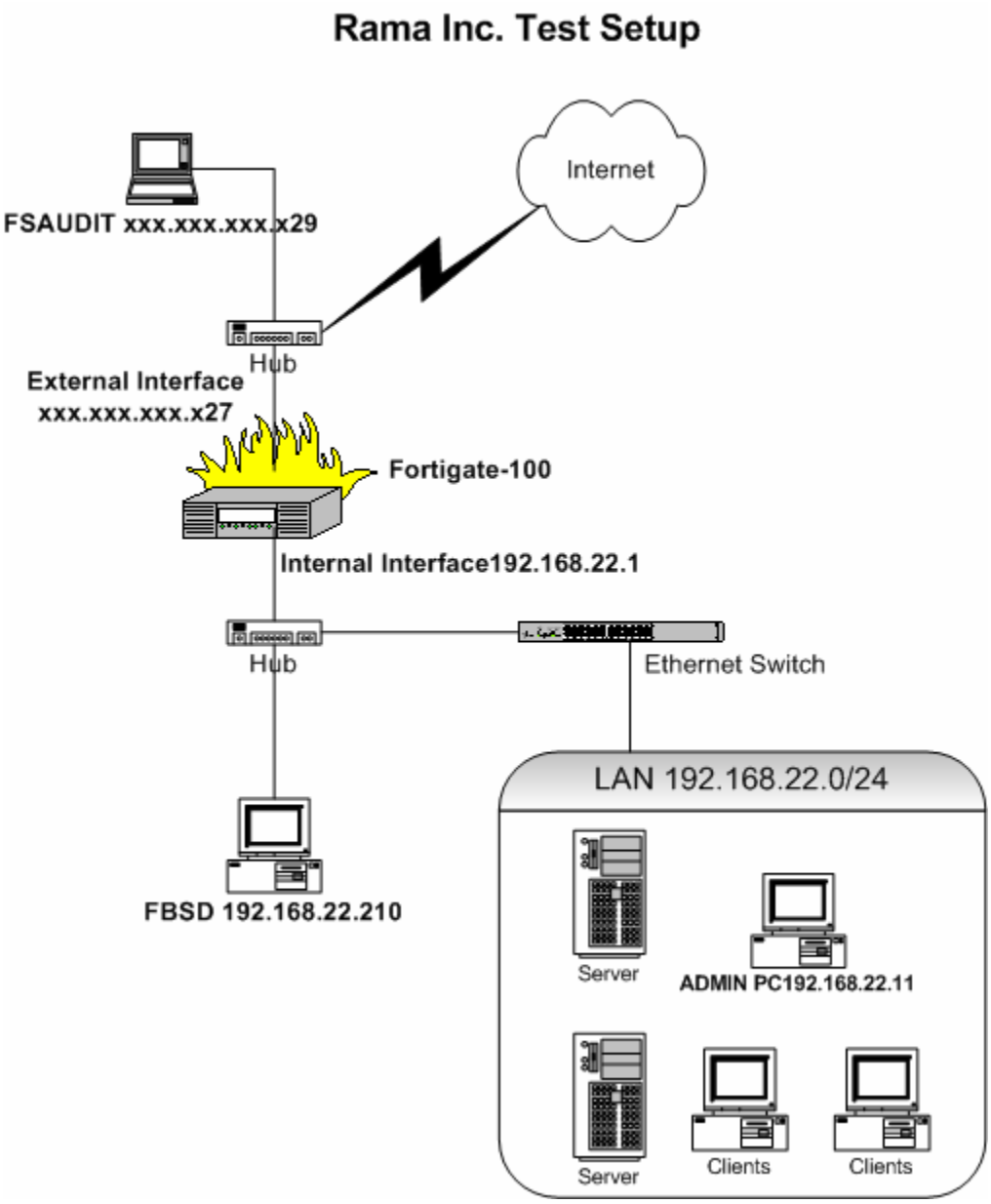
Part 3: Audit of Fortigate-100 – Testing, Evidence and Findings

Firewall Internal Interface Address: 192.168.22.1/24
Firewall External Address: xxx.xxx.xxx.x27
Other Internet address used for testing: xxx.xxx.xxx.x43



Tools Used:
PC with FREEBSD Operating System (Ref:http://www.freebsd.org/) for Testing: INT > EXT (FBSD: 192.168.22.210)
PC with Redhat Linux Operating System (Ref:http://fedora.redhat.com/) for Testing: EXT > INT (Customer Provided Internet Address FSAUDIT: xxx.xxx.xxx.x29

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PC with Windows 2000 Professional for Firewall Administration and data collection (IP Address 192.168.22.11)

Software tools:
Nmap: Nmap ("Network Mapper") is a free open source utility for network exploration or security auditing. It was designed to rapidly scan large networks, although it works fine against single hosts. Nmap uses raw IP packets in novel ways to determine what hosts are available on the network, what services (application name and version) those hosts are offering, what operating systems (and OS versions) they are running, what type of packet filters/firewalls are in use, and dozens of other characteristics. Nmap runs on most types of computers and both console and graphical versions are available. Nmap is free software, available with full source code under the terms of the GNU GPL. (Ref: http://www.insecure.org/nmap/)

NmapNT: nmapNT V. 2.53 SP1 by ryan@eEye.com eEye Digital Security. nmapNT is a windows port of the most popular network scanning tool to date, nmap. Nmap, which to date only ran under Unix, has a superior ability to map out and scan remote networks. Now this same power can be taken advantage of from NT platforms (Ref:http://www.eeye.com/html/resources/downloads/other/index.html). NmapNT is based on nmap by fyodor@insecure.org (http://www.insecure.org/nmap/).

Hping: hping is a command-line oriented TCP/IP packet assembler/analyzer. The interface is inspired to the ping(8) unix command, but hping isn't only able to send ICMP echo requests. It supports TCP, UDP, ICMP and RAW-IP protocols, has a traceroute mode, the ability to send files between a covered channel, and many other features. (Ref: http://www.hping.org/)

Ethereal: Ethereal is used by network professionals around the world for troubleshooting, analysis, software and protocol development, and education. It has all of the standard features you would expect in a protocol analyzer, and several features not seen in any other product. Its open source license allows talented experts in the networking community to add enhancements. It runs on all popular computing platforms, including Unix, Linux, and Windows. (Ref: http://www.ethereal.com/)

Tcpdump: It allows capturing, troubleshooting and analyzing network packets. More information can be obtained fromhttp://www.tcpdump.org/

Putty: PuTTY is a free SSH, Telnet and Rlogin client for 32-bit Windows systems. SSH, Telnet and Rlogin are three ways of doing the same thing: logging in to a multi-user computer from another computer, over a network. It is written and maintained primarily by Simon Tatham. Ref: http://putty.bhni.net/

Kiwi Syslog Daemon: Kiwi Syslog Daemon is a freeware Syslog Daemon for Windows. It receives, filters, logs, displays and forwards Syslog messages and SNMP traps from

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hosts such as routers, switches, Unix hosts and any other syslog enabled device (Ref: http://www.kiwisyslog.com/)

Instructions:
Perform all testing and verifications as per procedure in each of the items in the checklist. Connect to the internal interface ip 192.168.22.1 of the firewall using secure shell program "putty" for Command Line Interface. Web interface must only be used with SSL: https://192.168.22.1. Use Command Line Interface (CLI) or Web Interface wherever applicable.
The Proof / Evidence of the tests are shown below each checklist item.
The Findings are noted in 'Conclusion'.

3.1.0 Access and Configuration /Change Management

N/A	Pass	Fail	#	Check List Item	RISK
	1.a X	1.b X	1	a) Only FW administrator and other authorized personnel will be granted access to the FW for administration. b) Firewall should be administered from a trusted host.	H

Risk of Non Compliance	Unauthorized user access and unsecured hosts leave the firewall susceptible for intruders to modify the firewall rules, corrupt its integrity and deny its availability to legitimate users.
Procedure:	Connect to internal interface of the firewall using SSH Client Putty. At the Command Line Interface (CLI) Login as Administrator and execute the following commands : a) Fortigate-100 # get system admin. Note the results b) Fortigate-100 # get config. Note the results.
Verify	The results will show the admin users name and the specific trusted ip address from which they can connect to the FW and their read/write permissions.
Conclusion	Although the results are for test 1.a is incompliance, it is recommended that an additional, separate, user with read write permissions is created for administering the Firewall. See Part 4: Identified Vulnerabilities – Details. Test 1.b Failed. It is presently set to be administered from any internal PC!
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.4 Router Accounts) Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 3.3 –Managing the Router and 4.1.5. – Logins, Privileges, Passwords and Accounts) Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

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```
192.168.22.1 - PuTTY
login as: admin
admin@192.168.22.1's password:
Type ? for a list of commands.


Fortigate-100 # get system admin
name            ip              netmask         read per     write per
admin           0.0.0.0         0.0.0.0         allowed      allowed

Fortigate-100 #
```

```
Fortigate-100 # get config
set system opmode nat
set system tcp_option enable
set system admin username admin password 'Enc $1$$p.kEiPgwLfYBnGpjR8ASi.' trusth
ost 0.0.0.0 0.0.0.0
```

N/A	Pass	Fail	#	Check List Item	RISK
	X		2	*The administrator and other authorized users account password will be encrypted and should be at least 6 characters long.*	H

Risk of Non Compliance	Clear text passwords give easy access (password cracking) for intruders to misconfigure the firewall.
Procedure	At the CLI Login as Administrator and execute the following command: a) Fortigate-100 # get config. Note the results. b) Create a new user with a password less than 6 characters. A Warning should appear.
Verify	The password is encrypted. For Passwords less than 6 characters a warning appears.
Conclusion	**Password is encrypted and the warning appears**
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Security Operations (Section 3.5.5 Router Passwords). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 4.1.5. – Logins, Privileges, Passwords and Accounts). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

```
Fortigate-100 # get config
set system opmode nat
set system tcp_option enable
set system admin username admin password 'Enc $1$$p.kEiPgwLfYBnGpjR8ASi.' trusth
ost 0.0.0.0 0.0.0.0
```


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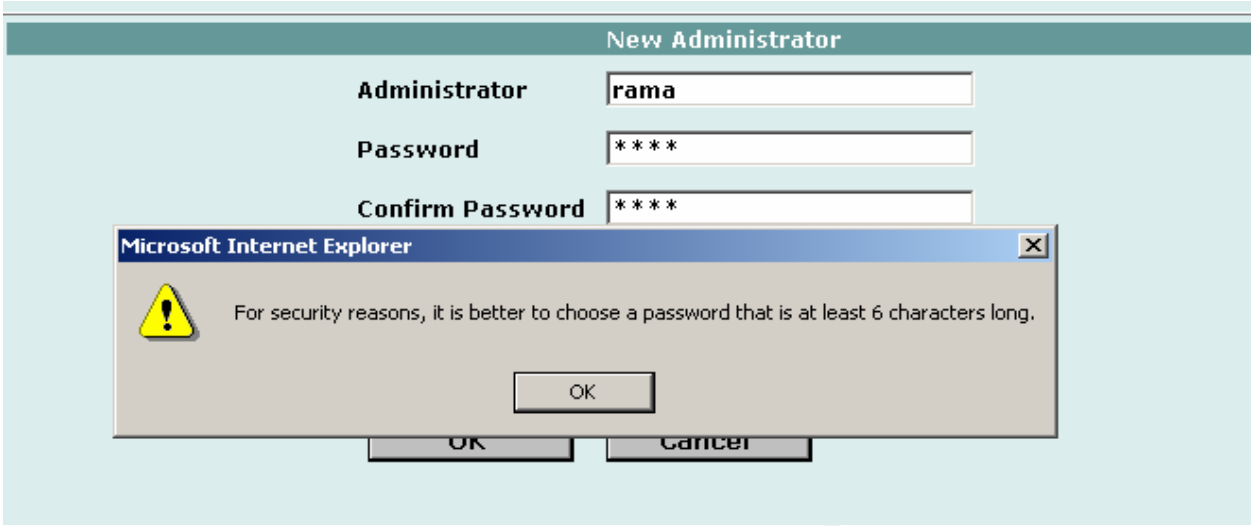

N/A	Pass	Fail	#	Check List Item	RISK
	X		3	*The time out period for unattended console is set for no longer than 15 minutes. Activating this timeout period provides additional security*	H

Risk of Non Compliance	Abuse from casual or malicious use through the open session (for longer timeout periods) by unauthorized users, if they get physical access to the session.
Procedure	At the Command Line Interface (CLI) Login as Administrator and execute the following command: a) Fortigate-100 # get system option. Note the results. b) Login and wait for the expiration timeout period. The system must force you to re login
Verify	**The values for 'Admin timeout' is 15 minutes.**
Conclusion	The admin time out is in compliance and the timeout period is effective.
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.4 Router Accounts). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

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```
Fortigate-100 # get system option
Admin timeout: 15 minutes
Auth timeout: 15 minutes
interval: 5 seconds
fail_time: 5 times
Language: english
GUI refresh interval: 30 seconds
Configuration update:
        FortiManager    : 0.0.0.0
        SNMP community  :
        update on boot  : no
radius port: 1812

Fortigate-100 #
```

N/A	Pass	Fail	#	Check List Item	RISK
	X		4	*The FW administrator will ensure modems will not be used for remote administration*	H

Risk of Non Compliance	War-dialing. Enables a backdoor for malicious purposes.
Procedure	Check if an auxiliary console for Modem Connection is available, if available check if it is disabled
Verify	Physically.
Conclusion	**No Modem Connection Available for Fortigate-100 series.**
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.6 – Out-of-band Management). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 4.1.6 Remote Access) Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence		Findings	

N/A	Pass	Fail	#	Check List Item	RISK
		X	5	*The FW administrator will disable FW interfaces that are not in use*	H

Risk of Non Compliance	Scanning and spoofing attacks, unauthorized access attempts to the firewall through un-trusted network. If successful, enables a backdoor for the intruder to the firewall and to the internal network.
Procedure	At the CLI Execute the following command: Fortigate-100 # get system interface
Verify	The lists of interfaces that are up are shown. Ensure that the DMZ interface is disabled.
Conclusion	**The DMZ Interface is not Disabled. It is Administratively up and running**
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.6 – Out-of-band Management). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

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```
Fortigate-100 # get system interface
Interface internal
        primary IP address:192.168.22.1 255.255.255.0
        Detect Serv:    disable
        secondary IP address:0.0.0.0    0.0.0.0
        Detect Serv:    disable
        mac address: 00:09:0F:02:00:FC
        (NIC mac address): (00:09:0f:02:00:fc)
        mtu: OFF  1500bytes
        speed: auto
        zone:
        Log to this: enable
        access: ping,https,ssh
        second access:
        Status:administrative UP        RUNNING
Interface external
        primary IP address:                     255.255.255.0
        Detect Serv:    disable
        secondary IP address:0.0.0.0    0.0.0.0
        Detect Serv:    disable
        mac address: 00:09:0F:02:00:FD
        (NIC mac address): (00:09:0f:02:00:fd)
        mtu: OFF  1500bytes
        speed: auto
        zone:
        Log to this: enable
        access: ping
        second access:
        Status:administrative UP        RUNNING
Interface dmz
        primary IP address:10.10.10.1   255.255.255.0
        Detect Serv:    disable
        secondary IP address:0.0.0.0    0.0.0.0
        Detect Serv:    disable
        mac address: 00:09:0F:02:00:FE
        (NIC mac address): (00:09:0f:02:00:fe)
        mtu: OFF  1500bytes
        speed: auto
        zone:
        Log to this: enable
        access: ping,https
        second access:
        Status:administrative UP        RUNNING
```


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N/A	Pass	Fail	#	Check List Item	RISK
		X	6	*Ensure that only ports on the internal interface will be used for administrative access to the FW and they are restricted to SSH or SSL encryptions.*	H

Risk of Non Compliance	Man-in-the-middle attack, Session hijacking.
Procedure	At the CLI Execute the following command: a) Fortigate-100 # get system interface. Note the results. b) Try login to the external interface through web interface or using putty.
Verify	Check if the line "access:" reads 'ssh, https' only for the internal interface. You should not be able to login to the external interface of the firewall.
Conclusion	**Although the tests results were positive. The DMZ is also set to be connected for connection through HTTPS!**
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.7 – In-band Router Management) Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 5.3 – Using SSH for Remote Administration security). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

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```
Fortigate-100 # get system interface
Interface internal
        primary IP address:192.168.22.1 255.255.255.0
        Detect Serv:    disable
        secondary IP address:0.0.0.0    0.0.0.0
        Detect Serv:    disable
        mac address: 00:09:0F:02:00:FC
        (NIC mac address): (00:09:0f:02:00:fc)
        mtu: OFF  1500bytes
        speed: auto
        zone:
        Log to this: enable
        access: ping,https,ssh
        second access:
        Status:administrative UP        RUNNING
Interface external
        primary IP address:                     255.255.255.0
        Detect Serv:    disable
        secondary IP address:0.0.0.0    0.0.0.0
        Detect Serv:    disable
        mac address: 00:09:0F:02:00:FD
        (NIC mac address): (00:09:0f:02:00:fd)
        mtu: OFF  1500bytes
        speed: auto
        zone:
        Log to this: enable
        access: ping
        second access:
        Status:administrative UP        RUNNING
Interface dmz
        primary IP address:10.10.10.1   255.255.255.0
        Detect Serv:    disable
        secondary IP address:0.0.0.0    0.0.0.0
        Detect Serv:    disable
        mac address: 00:09:0F:02:00:FE
        (NIC mac address): (00:09:0f:02:00:fe)
        mtu: OFF  1500bytes
        speed: auto
        zone:
        Log to this: enable
        access: ping,https
        second access:
        Status:administrative UP        RUNNING
```


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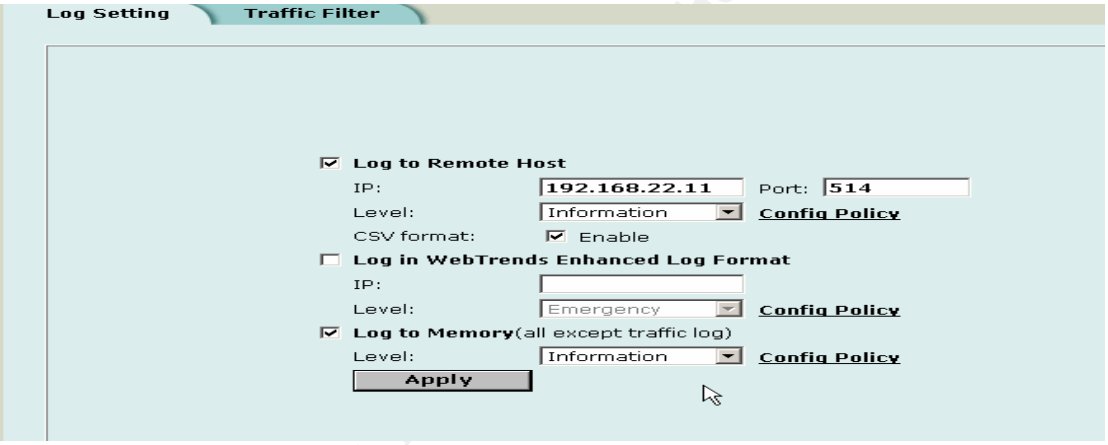
N/A	Pass	Fail	#	Check List Item	RISK
	X		7	*The FW administrator will ensure all administrative access and modification to the FW configuration are logged.*	H

Risk of Non Compliance	Undetected firewall access violations and configuration changes to the firewall settings.
Procedure	Log in as admin using the web interface: https://192.168.22.1 a) Select Log&Report>Log setting>Config Policy. b) Select HA activity event and select ok. Deselect HA activity event and select ok.
Verify	a) Verify that under Log & Report > Log Setting > config Policy > Event log: 'admin login/logout event' and 'when configuration has changed' are selected. b) Check the logs to verify the log policy changes are recorded.
Conclusion	In Compliance
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.5.7 – In-band Router Management Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1) (Section 3.3.3 Logging and 4.5.2 – Configuring Logging and Time Services). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X



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```
(192.168.22.11)"
Local7.Info 192.168.22.1 date=2004-06-03 time=08:36:22 device_id=FGT1002801021129 log_id=0100090112 type=event
subtype=config pri=information user=admin ui=GUI(192.168.22.11) module=log submodule=logsetting msg="Log
Policy has been modified by user admin via GUI(192.168.22.11)"
```

N/A	Pass	Fail	#	Check List Item	RISK
	X		8	*The current and previous router configuration are backed up and saved in a secure location.*	MH

Risk of Non Compliance	Unauthorized configuration changes and corruption of the stored files. No backup protection affects Real-time Recovery Objective (RTO).
Procedure	a) Ask admin to show the back up configuration file location. b) Create a new back up and store it in the same directory (for next item 9).
Verify	Check the creation dates of the configuration back up files. They must be different. Check if the files are stored in a secure system.
Conclusion	In compliance. The files are stored in a PC with Windows 2000 Professional Operating System, with admin access only. Note: The administrator consolidated the backup on the same date 5/31/2004. The old back up and the new backup are of different dates and the permissions set are identical.
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.6.3 –Logistics for Configuration Loading and Maintenance). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 3.3.2 Updating the Router and 4.1.8 – Logistics for configuration Loading and Maintenance). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

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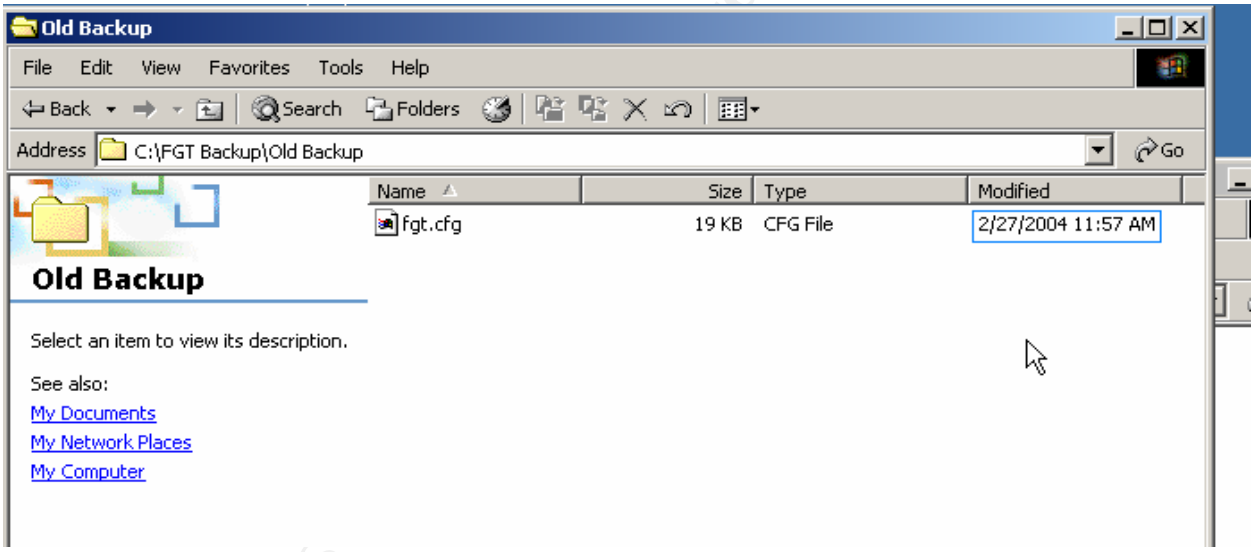

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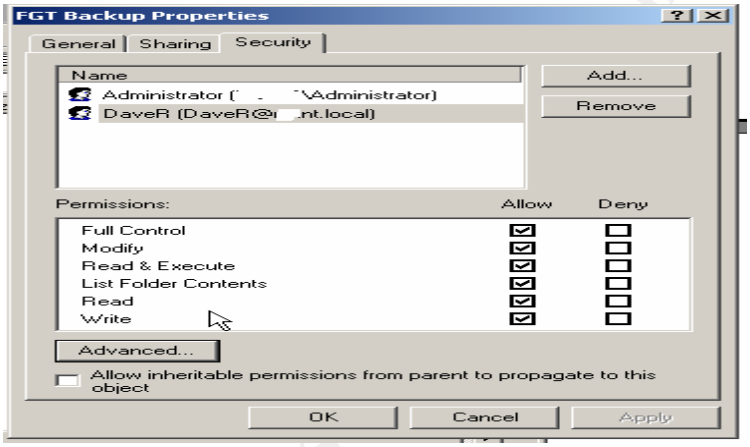
N/A	Pass	Fail	#	Check List Item	RISK
	X		9	*On the system where the configuration files are stored, the local operating system's security mechanisms will be used for restricting access to the files*	MH

Risk of Non Compliance	Unauthorized configuration changes and corruption of the stored files. No backup protection affects Real-time Recovery Objective (RTO).
Procedure	Ask admin to show the location of the backup configuration files. Compare the security permissions of the old and newly backed up configuration files (previous item 8).
Verify	Check if the folder is located in a NTFS formatted volume. Check the security properties pf the folder. Verify that only the administrator (S) of the firewall has full permission to the folder.
Conclusion	**The files are stored in a PC with Windows 2000 Professional Operating System, with admin access only**
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.6.3 –Logistics for Configuration Loading and Maintenance). Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 4.1.8 – Logistics for configuration Loading and Maintenance). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X



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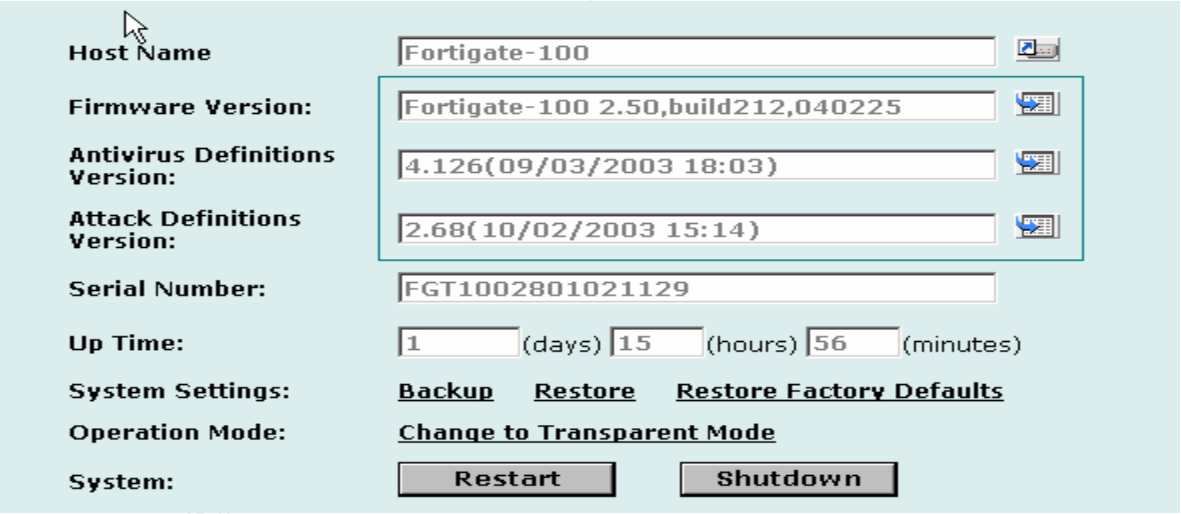
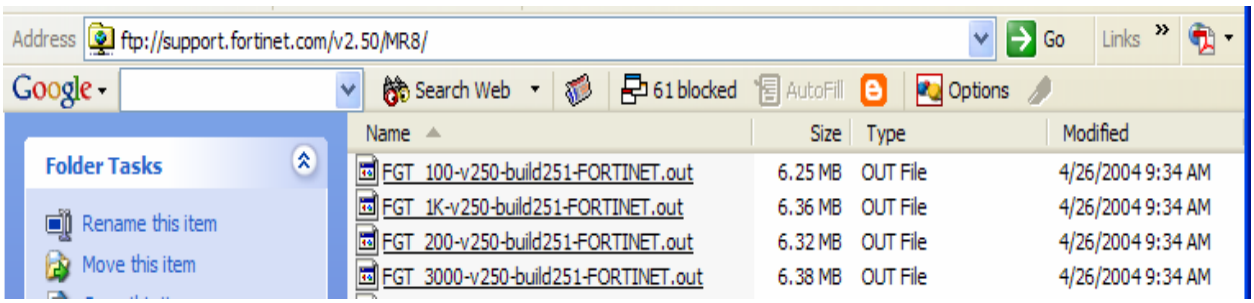
N/A	Pass	Fail	#	Check List Item	RISK
		X	10	*Ensure that the latest patches and updates are applied to the firewall components. If patches and updates are automatically downloaded from the vendors' websites, ensure that the update is received from a trusted site.*	H

Risk of Non Compliance	Exploitation of known vulnerabilities.
Procedure	a) Use web interface and login as the administrator. Note the Firmware, Anti Virus and attack definition Versions. b) Ask the Administrator to login at the Fortinet support site and show the latest versions of these items. c) Check Automatic update function if they are enabled.
Verify	Compare the version numbers. The versions in Fortigate-100 must be the latest.
Conclusion	**Not in compliance. The firmware version is older (build212) version Build 251. Attack signatures and AV definitions are not the latest.** Automatic update is not enabled. Manual update is in effect.
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations. Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 4.5.5 Performing Cisco Software Updates). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X





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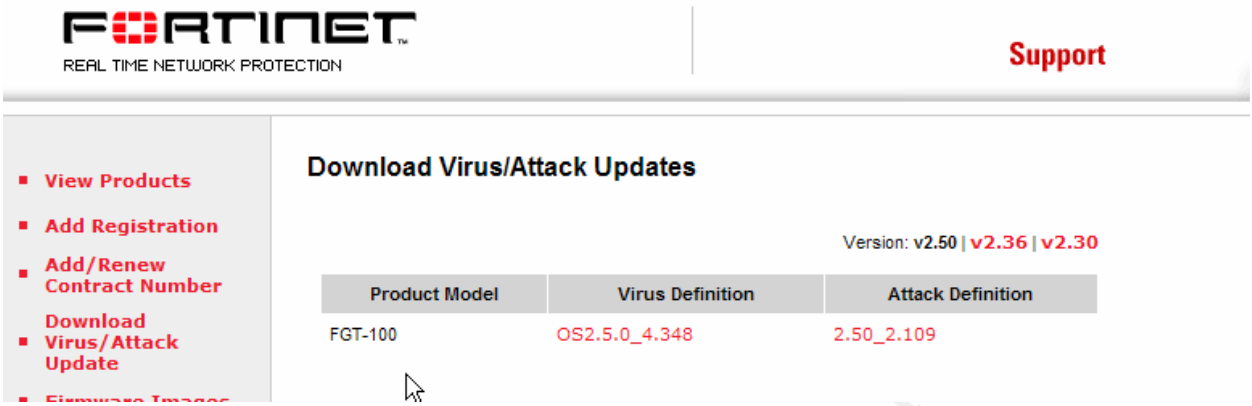

N/A	Pass	Fail	#	Check List Item	RISK
	X		11	*Review the ruleset EXT > INT to ensure that they follow the order as follows:* • *firewall Lockdown* • *anti-spoofing filters (blocked private addresses, internal addresses appearing from the outside)* • *Deny unwanted inbound services* • *User permit rules (allow CITRIX ICA and HTTPS)* • *Noise drops (e.g. discard multicasts, OSPF and HSRP chatter)* • *Deny and Alert (alert systems administrator about traffic that is* • *suspicious)* • *Deny and log (log remaining traffic for analysis)* *Firewalls operate on a first match basis, thus the above structure is important to ensure that suspicious traffic is kept out instead of inadvertently allowing them in by not following the proper order.*	H

Risk of Non Compliance	Misconfiguration. Ineffective rulesets.
Procedure	Login as admin using the web interface. a) Select Firewall>Addresses>External - Note the results b) Select Firewall > Policy > 'EXT>INT' – Note the results
Verify	Check the Rule order, as above. Make sure that logging is enabled for all the denied rules.
Conclusion	**The result gives the list of external addresses configured.** **The result gives the order of the firewall EXT>INT Policy.** **The firewall rule is in compliance and logging is enabled for all the denied rules.**
Reference	Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php Building Your Firewall Rulebase by Lance Spitzner http://www.spitzner.net/rules.html

Subjective		Objective	X	Evidence	X	Findings	X

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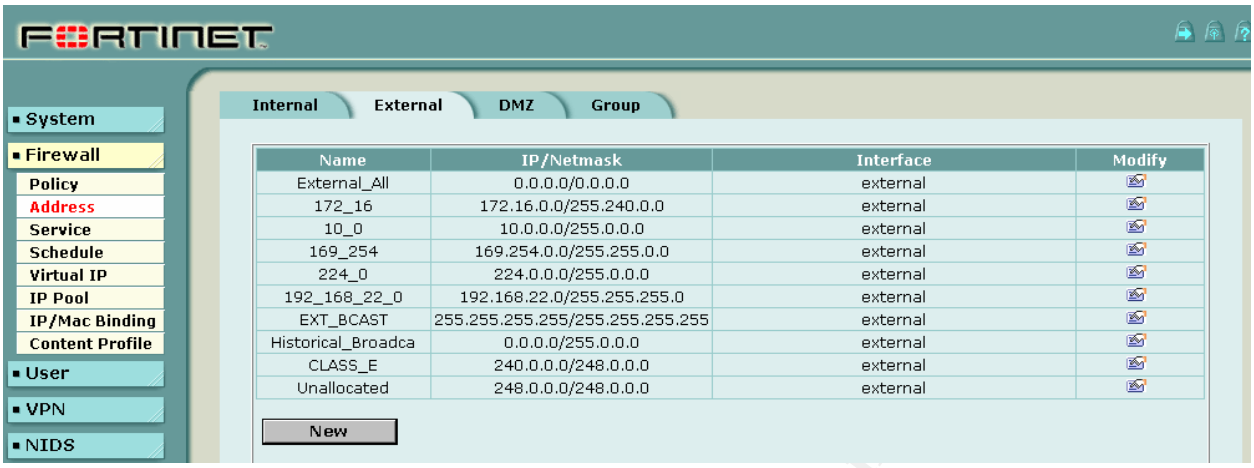
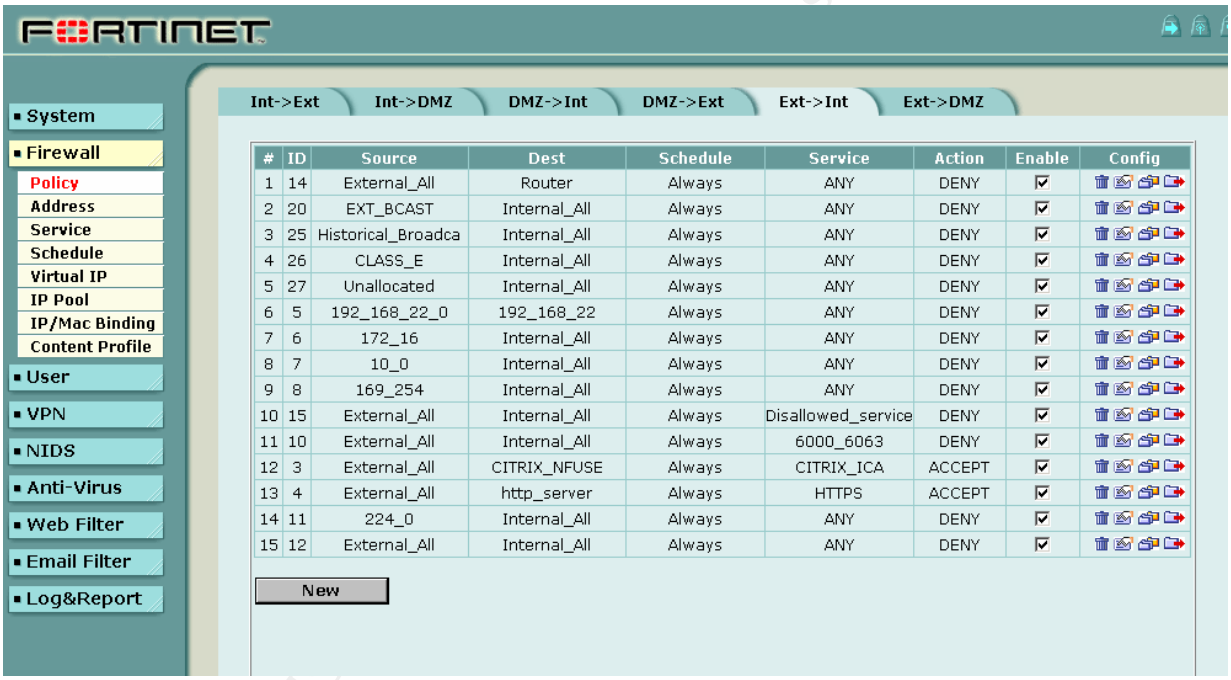


Name	IP/Netmask	Interface	Modify
External_All	0.0.0.0/0.0.0.0	external	
172_16	172.16.0.0/255.240.0.0	external	
10_0	10.0.0.0/255.0.0.0	external	
169_254	169.254.0.0/255.255.0.0	external	
224_0	224.0.0.0/255.0.0.0	external	
192_168_22_0	192.168.22.0/255.255.255.0	external	
EXT_BCAST	255.255.255.255/255.255.255.255	external	
Historical_Broadca	0.0.0.0/255.0.0.0	external	
CLASS_E	240.0.0.0/248.0.0.0	external	
Unallocated	248.0.0.0/248.0.0.0	external	



#	ID	Source	Dest	Schedule	Service	Action	Enable	Config
1	14	External_All	Router	Always	ANY	DENY	☑	
2	20	EXT_BCAST	Internal_All	Always	ANY	DENY	☑	
3	25	Historical_Broadca	Internal_All	Always	ANY	DENY	☑	
4	26	CLASS_E	Internal_All	Always	ANY	DENY	☑	
5	27	Unallocated	Internal_All	Always	ANY	DENY	☑	
6	5	192_168_22_0	192_168_22	Always	ANY	DENY	☑	
7	6	172_16	Internal_All	Always	ANY	DENY	☑	
8	7	10_0	Internal_All	Always	ANY	DENY	☑	
9	8	169_254	Internal_All	Always	ANY	DENY	☑	
10	15	External_All	Internal_All	Always	Disallowed_service	DENY	☑	
11	10	External_All	Internal_All	Always	6000_6063	DENY	☑	
12	3	External_All	CITRIX_NFUSE	Always	CITRIX_ICA	ACCEPT	☑	
13	4	External_All	http_server	Always	HTTPS	ACCEPT	☑	
14	11	224_0	Internal_All	Always	ANY	DENY	☑	
15	12	External_All	Internal_All	Always	ANY	DENY	☑	

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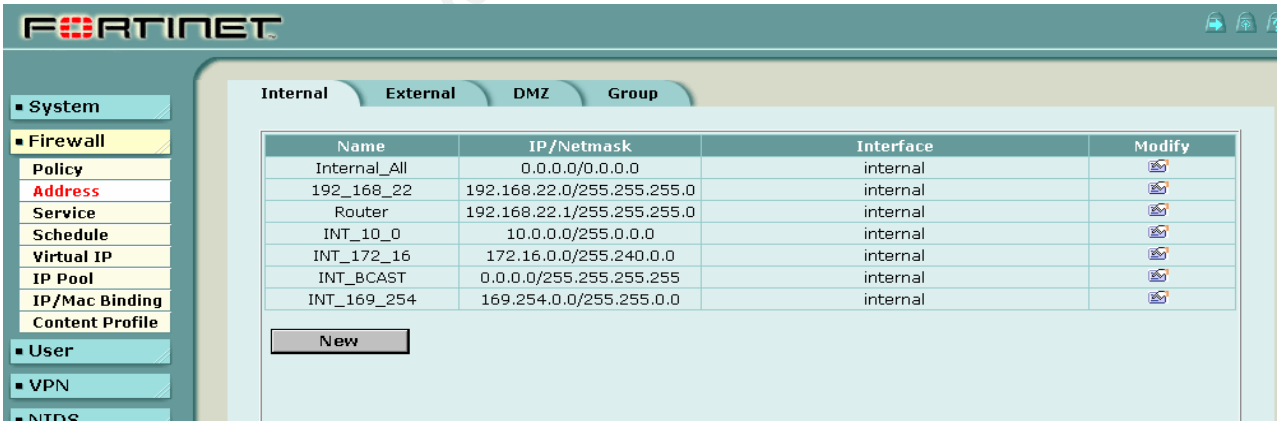
N/A	Pass	Fail	#	Check List Item	RISK
	X		12	*Review the ruleset INT > EXT to ensure that they follow the order as follows:* • *allow ipsec tunnel* • *anti-spoofing filters (blocked private addresses, internal addresses appearing from the outside)* • *blocked unwanted outbound services* • *User permit rules (e.g. allow HTTP to public web server)* • *Deny and log (log remaining traffic for analysis)* *Firewalls operate on a first match basis, thus the above structure is important to ensure that suspicious traffic is kept out instead of inadvertently allowing them in by not following the proper order.*	H

Risk of Non Compliance	Misconfiguration. Ineffective rulesets.
Procedure	Login as admin using the web interface. a) Select Firewall<Addresses>Internal - Note the results b) Select Firewall > Policy > 'INT>EXT' – Note the results
Verify	Check the Rule order, as above. Make sure that logging is enabled for all the denied rules.
Conclusion	**The result gives the list of internal addresses configured.** **The result gives the order of the firewall INT>EXT Policy.** **The order is in compliance and logging is enabled for denied accesses.**
Reference	Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php Building Your Firewall Rulebase by Lance Spitzner http://www.spitzner.net/rules.html

Subjective		Objective	X	Evidence	X	Findings	X



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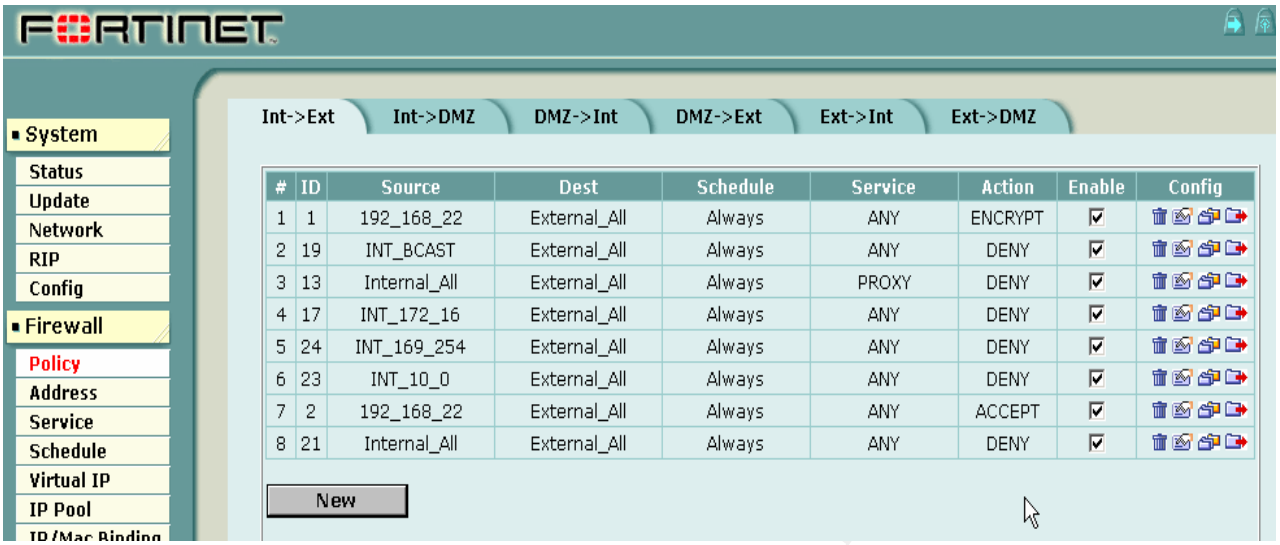

#	ID	Source	Dest	Schedule	Service	Action	Enable	Config
1	1	192_168_22	External_All	Always	ANY	ENCRYPT	☑	
2	19	INT_BCAST	External_All	Always	ANY	DENY	☑	
3	13	Internal_All	External_All	Always	PROXY	DENY	☑	
4	17	INT_172_16	External_All	Always	ANY	DENY	☑	
5	24	INT_169_254	External_All	Always	ANY	DENY	☑	
6	23	INT_10_0	External_All	Always	ANY	DENY	☑	
7	2	192_168_22	External_All	Always	ANY	ACCEPT	☑	
8	21	Internal_All	External_All	Always	ANY	DENY	☑	

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3.2.0 Port Filtering

N/A	Pass	Fail	#	Check List Item			RISK
			13	*Reject the following non-required, risky protocols and services in either direction.*			
				Port (Transport)		*Service*	
				1	(TCP & UDP)	tcpmux	
				7	(TCP & UDP)	echo	
				9	(TCP & UDP)	discard	
				11	(TCP)	systat	
				13	(TCP & UDP)	daytime	
				15	(TCP)	netstat	
				19	(TCP & UDP)	chargen	
				67	(UDP)	bootp	
				69	(UDP)	tftp	
				135	(TCP & UDP)	loc-srv	
		X		137	(TCP & UDP)	netbios-ns	H
				138	(TCP & UDP)	netbios-dgm	
				139	(TCP & UDP)	netbios-ssn	
				177	(UDP)	xdmcp	
				445	(TCP)	netbios (ds)	
				512	(TCP)	rexec	
				515	(TCP)	lpr	
				517	(UDP)	talk	
				518	(UDP)	ntalk	
				540	(TCP)	uucp	
				1900, 5000	(TCP & UDP)	Microsoft UPnP SSDP	
				12345	(TCP)	NetBus	
				12346	(TCP)	NetBus	
				31337	(TCP & UDP)	Back Orifice	

Risk of Non Compliance	These Ports can be used for Denial of Service and or sending malicious codes.
Procedure	Login as admin to the web interface. Select Firewall > Service > Custom The custom services are additional ports/services that are not in the predefined list. A group Disallowed_ services contains all the ports that are unnecessary and denied entry to the network. Check that this group of services are denied and logging enabled both at the EXT>INT and INT > EXT Policies.
Verify	Verify that the list reflect the ports mentioned in this checklist.
Conclusion	The list is in compliance for EXT>INT. The FW is a stateful inspection. No specific services are blocked outbound. Found a custom service defined as proxy not included in the denied outbound list.

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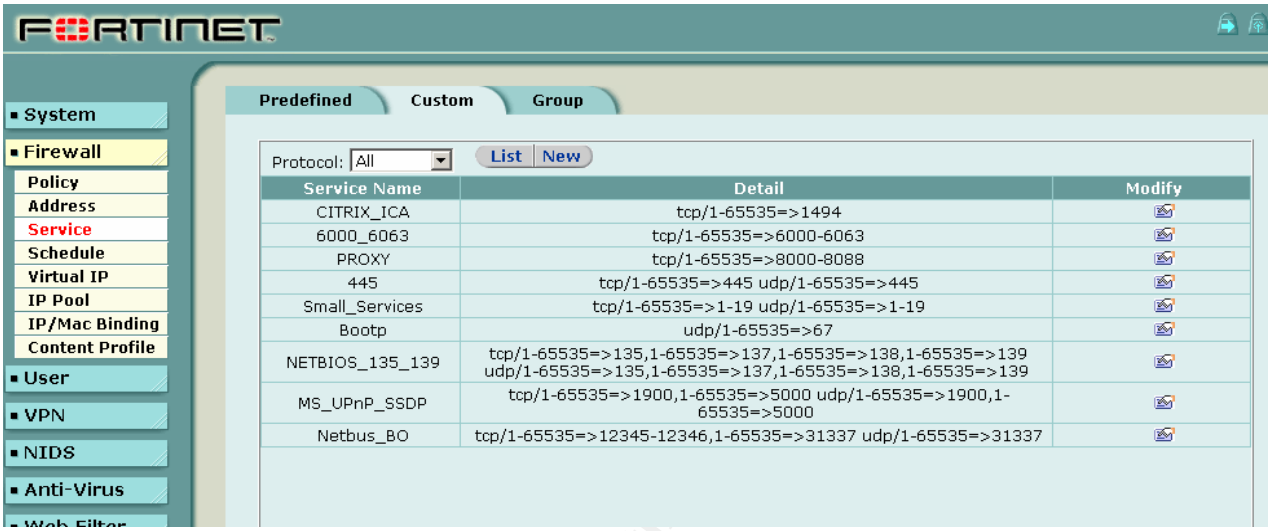
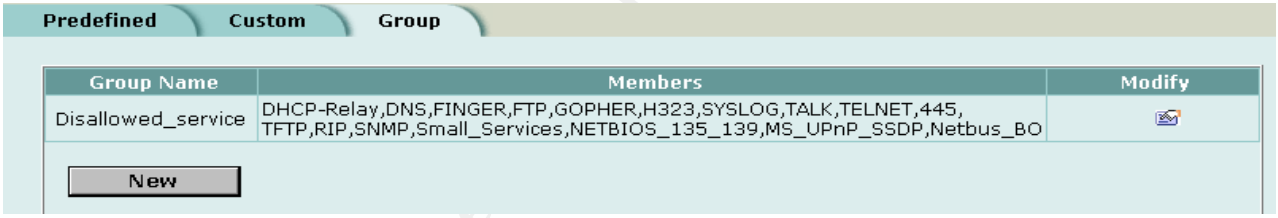
Reference	Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 3.2 Protecting the network with the Router). JANET-CERT: Services that router should block. http://www.ja.net/CERT/JANET-CERT/prevention/cisco/local_services.html Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X





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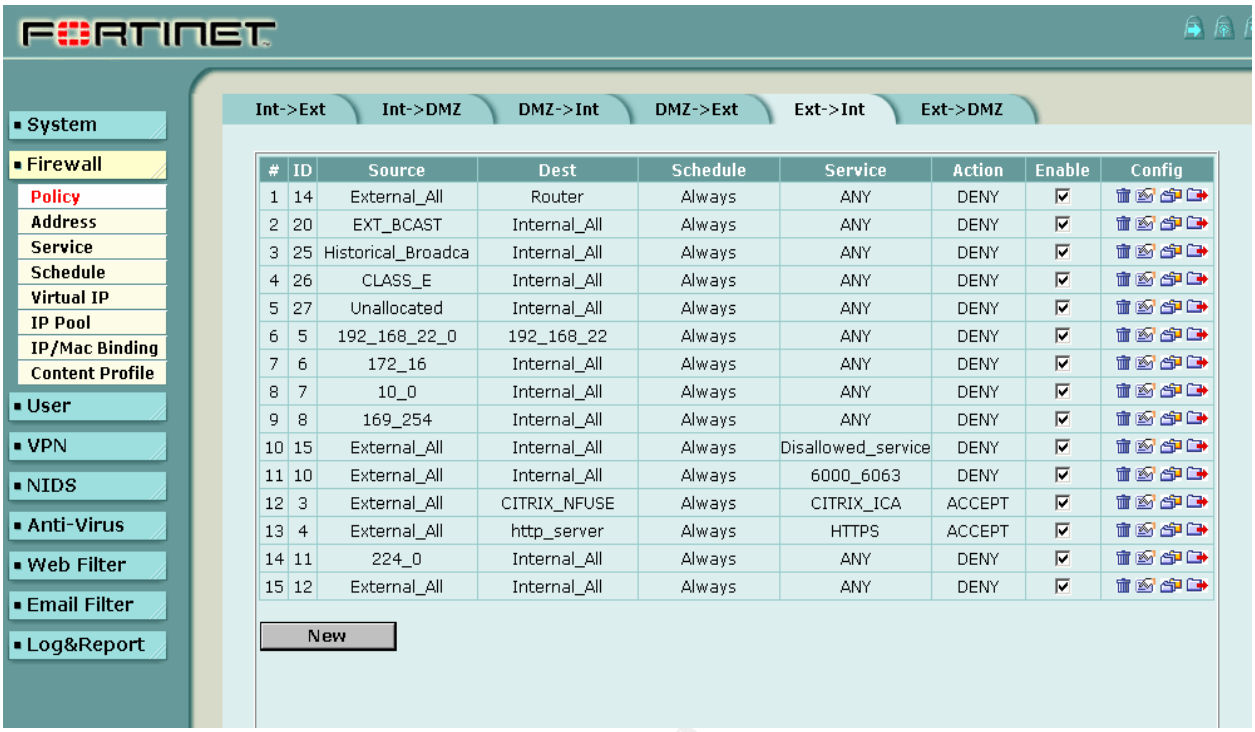

#	ID	Source	Dest	Schedule	Service	Action	Enable	Config
1	14	External_All	Router	Always	ANY	DENY	☑	
2	20	EXT_BCAST	Internal_All	Always	ANY	DENY	☑	
3	25	Historical_Broadca	Internal_All	Always	ANY	DENY	☑	
4	26	CLASS_E	Internal_All	Always	ANY	DENY	☑	
5	27	Unallocated	Internal_All	Always	ANY	DENY	☑	
6	5	192_168_22_0	192_168_22	Always	ANY	DENY	☑	
7	6	172_16	Internal_All	Always	ANY	DENY	☑	
8	7	10_0	Internal_All	Always	ANY	DENY	☑	
9	8	169_254	Internal_All	Always	ANY	DENY	☑	
10	15	External_All	Internal_All	Always	Disallowed_service	DENY	☑	
11	10	External_All	Internal_All	Always	6000_6063	DENY	☑	
12	3	External_All	CITRIX_NFUSE	Always	CITRIX_ICA	ACCEPT	☑	
13	4	External_All	http_server	Always	HTTPS	ACCEPT	☑	
14	11	224_0	Internal_All	Always	ANY	DENY	☑	
15	12	External_All	Internal_All	Always	ANY	DENY	☑	

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N/A	Pass	Fail	#	Check List Item	RISK
	X		14	*Permit only required inbound Protocols and Services*	H

Risk of Non Compliance	Intruders may exploit unknown and not required services.
Procedure	Perform Port scanning of the external Interface IP from PC FSAUDIT xxx.xxx.xxx.x29. Use following commands inbound from the internet for TCP and UDP Ports: • Nmap –n –P0 -sT –p 1-65535 –oN inbound-syn-scan.txt xxx.xxx.xxx.x27 • Nmap –n –P0 -sU –p 1-65535 –oN inbound-udp-scan.txt xxx.xxx.xxx.x27 Set up tcpdump Packet capture on the internal network side. Use following command to capture inbound packets: tcpdump -nn -vvv -w inboundtcp-scan.cap host 192.168.22.1 tcpdump -nn -vvv -w inboundudp-scan.cap host 192.168.22.1
Verify	Should only detect ports 443/tcp and 1494/tcp. Verify the logged data for the scanning activity Check tcpdump for records of the port scan traffic.
Conclusion	**In compliance. Tcpdump did not register any traffic originating from scanning host. The scanning activity was detected.**
Reference	SANS – GSNA Courseware. Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3 Functional Tests). SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence	X	Findings	X

```
# nmap 3.50 scan initiated Fri Jul  9 07:12:10 2004 as: nmap -n -P0 -sT -p 1-65535 -oN
inbound-syn-scan.txt xxx.xxx.xxx.x27 Interesting ports on xxx.xxx.xxx.x27:(The 65533 ports scanned
but not shown below are in state: filtered)
PORT     STATE SERVICE
443/tcp  open  https
1494/tcp open  citrix-ica
# Nmap run completed at Fri Jul  9 19:44:40 2004 -- 1 IP address (1 host up) scanned in 45150.948
seconds
```

```
# nmap 3.50 scan initiated Mon Jul 12 09:35:46 2004 as: nmap -n -P0 -sU -p 1-65535 -oN
inbound-udp-scan.txt xxx.xxx.xxx.x27
All 65535 scanned ports on xxx.xxx.xxx.x27 are: filtered
# Nmap run completed at Tue Jul 13 07:29:07 2004 -- 1 IP address (1 host up) scanned in 78801.685
seconds
```


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date=2004-07-09,time=07:16:14,device_id=FGT1002801021129,log_id=0401110252,type=ids,subtype=prevention,pri=alert,attack_id=100663398,,src=xxx.xxx.xxx.x29,dst=xxx.xxx.xxx.x27,src_port=1140,dst_port=13028,interface=external,status=dropped,proto=6,service=13028/tcp,msg="TCP port scan [Reference: http://www.fortinet.com/ids/ID100663398]"

date=2004-07-09,time=07:18:02,device_id=FGT1002801021129,log_id=0401110252,type=ids,subtype=prevention,pri=alert,attack_id=100663398,,src=xxx.xxx.xxx.x29,dst=xxx.xxx.xxx.x27,src_port=1685,dst_port=30971,interface=external,status=dropped,proto=6,service=30971/tcp,msg="TCP port scan [Reference: http://www.fortinet.com/ids/ID100663398]"

N/A	Pass	Fail	#	Check List Item	RISK
	X		15	*Permit only required inbound Protocols and Services (Fin Scan).*	H

Risk of Non Compliance	Intruders may exploit unknown and not required services. Helps to determine open and closed ports.
Procedure	Perform Port scanning of the external Interface IP from PC FSAUDIT xxx.xxx.xxx.x29 with FIN packets to see if they are handled differently. Use following commands: • Nmap –n –P0 -sF –p 1-65535 –oN inbound-fin-scan.txt xxx.xxx.xxx.x27 • Set up tcpdump Packet capture on the internal network side. Use following command to capture inbound packets: tcpdump -nn -vvv -w inbound-fin-scan. cap host 192.168.22.1
Verify	Should not detect any open ports. Verify the logged data for the scanning activity. Check tcpdump for records of the port scan traffic.
Conclusion	**No ports detected. Scanning activity logged. No activity in tcpdump records.**
Reference	SANS – GSNA Courseware SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton. Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence	X	Findings	X

```
# nmap 3.50 scan initiated Wed Jul 14 11:48:17 2004 as: nmap -n -P0 -sF -p 1-65535 -oN
inbound-fin-scan.txt xxx.xxx.xxx.x27 
All 65535 scanned ports on xxx.xxx.xxx.x27 are: filtered
# Nmap run completed at Thu Jul 15 09:42:05 2004 -- 1 IP address (1 host up) scanned in 78828.459
seconds
```


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2004-07-14 11:58:33 Local7.Alert 192.168.22.1 date=2004-07-14,time=11:53:29,device_id=FGT1002801021129,log_id=0400000000,type=ids,subtype=detection,pri=alert,attack_id=7274504,,src=xxx.xxx.xxx.x29,dst=xxx.xxx.xxx.x27,src_port=58736,dst_port=36463,status=detected,proto=6,service=36463/tcp,msg="tcpreassembly: STEALTH ACTIVITY (FIN scan)[Reference: http://www.fortinet.com/ids/ID7274504]"

2004-07-15 08:20:59 Local7.Alert 192.168.22.1 date=2004-07-15,time=08:15:46,device_id=FGT1002801021129,log_id=0400000000,type=ids,subtype=detection,pri=alert,attack_id=7274504,,src=xxx.xxx.xxx.x29,dst=xxx.xxx.xxx.x27,src_port=58737,dst_port=39481,status=detected,proto=6,service=39481/tcp,msg="tcpreassembly: STEALTH ACTIVITY (FIN scan)[Reference: http://www.fortinet.com/ids/ID7274504]"

N/A	Pass	Fail	#	Check List Item	RISK
	X		16	*Permit only required inbound Protocols and Services (ACK Scans).*	H

Risk of Non Compliance	Intruders may exploit unknown and not required services. Helps to determine ports that allow established connections.
Procedure	Perform Port scanning of the external Interface IP from PC FSAUDIT xxx.xxx.xxx.x29 with ACK packets to see if they are handled differently. Use following commands: • Nmap –n –P0 -sA –p 1-65535 –oN inbound-ack-scan.txt xxx.xxx.xxx.x27 Set up tcpdump Packet capture on the internal network side. Use following command to capture inbound packets: tcpdump -nn -vvv -w inbound-ack-scan.cap host 192.168.22.1
Verify	Should not detect any open ports Verify the logged data for the scanning activity. Check tcpdump for records of the port scan traffic.
Conclusion	**No ports detected. Scanning activity logged. No activity in tcpdump records.**
Reference	SANS – GSNA Courseware SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton. Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence	X	Findings	X

```
# nmap 3.50 scan initiated Tue Jul 13 12:20:56 2004 as: nmap -n -P0 -sA -p 1-65535 -oN
inbound-ack-scan.txt xxx.xxx.xxx.x27
All 65535 scanned ports on xxx.xxx.xxx.x27 are: filtered
# Nmap run completed at Wed Jul 14 02:58:04 2004 -- 1 IP address (1 host up) scanned
in 52628.584 seconds
```


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date=2004-07-13,time=17:57:02,device_id=FGT1002801021129,log_id=0400000000,type=ids,subtype=detection,pri=alert,attack_id=101449738,,src=xxx.xxx.xxx.x29,dst=xxx.xxx.xxx.x27,src_port=38115,dst_port=20432,status=detected,proto=6,service=20432/tcp,msg="ddos: shaft client to handler[Reference: http://www.fortinet.com/ids/ID101449738]"

2004-07-14 12:05:22 Local7.Alert 192.168.22.1 date=2004-07-14,time=12:00:18,device_id=FGT1002801021129,log_id=0400000000,type=ids,subtype=detection,pri=alert,attack_id=6553601,,interface=external,status=detected,msg="portscan: xxx.xxx.xxx.x29 is port-scanning to port 42463 on external (STEALTH)"

N/A	Pass	Fail	#	Check List Item	RISK
	X		17	*Permit only required Outbound Protocols and Services.*	H

Risk of Non Compliance	Malicious programs, proxy connections may provide back door connections to an intruder affecting confidentiality and integrity of data. Become an unwitting participant in DDos attacks
Procedure	Perform Port scanning of the internal Interface IP from PC FBSD 192.168.22.210. Use following commands: • Nmap –n –P0 -sT –-p 1-65535 –oN outbound-syn-scan.txt 192.168.22.1 • Nmap –n –P0 –sU –p 1-65535 –oN outbound-udp-scan.txt 192.168.22.1* (nmapnt -n -P0 -sU -p 1-65535 -oN outbound-udp-scan.txt 192.168.22.1)* • Set up tcpdump Packet capture on the external network side. Use following command to capture inbound packets: tcpdump -nn -vvv -w servicesouttcp-scan.cap host xxx.xxx.xxx.x27 (for TCP) tcpdump -nn -vvv -w servicesoutudp-scan.cap host xxx.xxx.xxx.x.27 (for UDP)
Verify	Should only detect ports 22/tcp and 443/tcp Verify the logged data for the scanning activity. Check tcpdump for records of the port scan traffic.
Conclusion	**Only port 22/tcp and 443/tcp were detected. Scanning activity logged. No activity in tcpdump records.**
Reference	SANS – GSNA Courseware SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton. Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence	X	Findings	X

```
# nmap 3.50 scan initiated Thu Jul  8 10:29:27 2004 as: nmap -n -P0 -sT -p 1-65535 -oN
outbound-syn-scan.txt 192.168.22.1 Interesting ports on 192.168.22.1:(The 65533 ports scanned but not shown
below are in state: filtered)
PORT    STATE SERVICE
22/tcp  open  ssh
443/tcp open  https
# Nmap run completed at Thu Jul  8 18:48:44 2004 -- 1 IP address (1 host up) scanned in 29957.303 seconds
```


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```
# Nmap (V. nmap) scan initiated 2.53 as: nmapnt -n -P0 -sU -p 1-65535 -oN outbound-udp-scan.txt
192.168.22.1
All 65535 scanned ports on  (192.168.22.1) are: filtered
# Nmap run completed at Tue Jul 13 07:30:13 2004 -- 1 IP address (1 host up) scanned in 78823 seconds
```

*Note: Due to hardware failure of PC that is running Free BSD (FSBD) we configured an available Windows 200 Professional PC with the same computer name and IP address to perform the above UDP test using NmapNT. This change applies to checklist items 17, 18 and 19 only.

date=2004-07-08,time=10:37:58,device_id=FGT1002801021129,log_id=0401110252,type=ids,subtype=prevention,pri=alert,attack_id=100663398,,src=192.168.22.210,dst=192.168.22.1,src_port=4610,dst_port=33337,interface=internal,status=dropped,proto=6,service=33337/tcp,msg="TCP port scan [Reference: http://www.fortinet.com/ids/ID100663398]"

date=2004-07-08,time=10:39:37,device_id=FGT1002801021129,log_id=0401110252,type=ids,subtype=prevention,pri=alert,attack_id=100663398,,src=192.168.22.210,dst=192.168.22.1,src_port=1104,dst_port=58891,interface=internal,status=dropped,proto=6,service=58891/tcp,msg="TCP port scan [Reference: http://www.fortinet.com/ids/ID100663398]"

N/A	Pass	Fail	#	Check List Item	RISK
	X		18	*Permit only required Outbound Protocols and Services (FIN Scan test).*	H

Risk of Non Compliance	Malicious programs, proxy connections may provide back door connections to an intruder affecting confidentiality and integrity of data. Become an unwitting participant in DDos attacks
Procedure	Perform Port scanning of the internal Interface IP from PC FBSD 192.168.22.210 with FIN packets to see if they are handled differently. Use following commands: • Nmap –n –P0 –sF –p 1-65535 –oN outbound-fin-scan.txt 192.168.22.1* (nmapnt -n -P0 -sF -p 1-65535 -oN outbound-fin-scan.txt 192.168.22.1}* • Set up tcpdump Packet capture on the external network side. Use following command to capture inbound packets: tcpdump -nn -vvv -w outbound-fin-scan. cap host xxx.xxx.xxx.x27
Verify	Should not detect any open ports: Verify the logged data for the scanning activity. Check tcpdump for records of the port scan traffic.
Conclusion	**No ports detected. Scanning activity logged. No activity in tcpdump records.**
Reference	SANS – GSNA Courseware SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton. Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence	X	Findings	X

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*Note: Due to hardware failure of PC that is running Free BSD (FSBD) we configured an available Windows 200 Professional PC with the same computer name and IP address to perform this test using NmapNT. This change applies to checklist items 17, 18 and 19 only.

```
# Nmap (V. nmap) scan initiated 2.53 as: nmapnt -n -P0 -sF -p 1-65535 -oN outbound-fin-scan.txt
192.168.22.1
All 65535 scanned ports on  (192.168.22.1) are: filtered
# Nmap run completed at Sat Jul 10 06:23:42 2004 -- 1 IP address (1 host up) scanned in 79005 seconds
```

```
date=2004-07-
09,time=21:37:42,device_id=FGT1002801021129,log_id=0400000000,type=ids,subtype=detecti
on,pri=alert,attack_id=7274504,,src=192.168.22.210,dst=192.168.22.1,src_port=47068,dst_port
=40525,status=detected,proto=6,service=40525/tcp,msg="tcpreassembly: STEALTH
ACTIVITY (FIN scan)[Reference: http://www.fortinet.com/ids/ID7274504]"

date=2004-07-
09,time=21:37:48,device_id=FGT1002801021129,log_id=0400000000,type=ids,subtype=detecti
on,pri=alert,attack_id=7274504,,src=192.168.22.210,dst=192.168.22.1,src_port=47067,dst_port
=40535,status=detected,proto=6,service=40535/tcp,msg="tcpreassembly: STEALTH
ACTIVITY (FIN scan)[Reference: http://www.fortinet.com/ids/ID7274504]"
```

N/A	Pass	Fail	#	Check List Item	RISK
	X		19	*Permit only required Outbound Protocols and Services (ACK Scan test).*	H

Risk of Non Compliance	Malicious programs, proxy connections may provide back door connections to an intruder affecting confidentiality and integrity of data. Become an unwitting participant in DDos attacks
Procedure	Perform Port scanning of the internal Interface IP from PC FBSD 192.168.22.210 with ACK packets to see if they are handled differently. Use following commands: • Nmap –n –P0 -sA –p 1-65535 –oN outbound-ack-scan.txt 192.168.22.1* (nmapnt -n -P0 -sA -p 1-65535 -oN outbound-ack-scan.txt 192.168.22.1)* Set up tcpdump Packet capture on the external network side. Use following command to capture inbound packets: tcpdump -nn -vvv -w outbound-ack-scan. cap host xxx.xxx.xxx.x27
Verify	Should not detect any open ports Verify the logged data for the scanning activity. Check tcpdump for records of the port scan traffic.
Conclusion	**No ports detected. Scanning activity logged. No activity in tcpdump records.**
Reference	SANS – GSNA Courseware SANS Institute – Webcast – Auditing a Network Perimeter by Chris Brenton. Tuesday, March 16, 2004, 1:00pm EST (1800 UTC) http://www.sans.org/webcasts/show.php?webcastid=90504

Subjective		Objective	X	Evidence	X	Findings	X

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```
# Nmap (V. nmap) scan initiated 2.53 as: nmapnt -n -P0 -sA -p 1-65535 -oN outbound-ack-scan.txt 192.168.22.1
All 65535 scanned ports on  (192.168.22.1) are: filtered
# Nmap run completed at Tue Jul 13 18:02:44 2004 -- 1 IP address (1 host up) scanned in 20571 seconds
```

*Note: Due to hardware failure of PC that is running Free BSD (FSBD), we configured an available Windows 200 Professional PC with the same computer name and IP address to perform this test using NmapNT. This change applies to checklist items 17, 18 and 19 only.

date=2004-07-13,time=13:10:42,device_id=FGT1002801021129,log_id=0400000000,type=ids,subtype=detection,pri=alert,attack_id=102367244,,src=192.168.22.210dst=192.168.22.1,src_port=52105,dst_port=6496,status=detected,proto=6,service=6496/tcp,msg="scan: nmap TCP[Reference: http://www.fortinet.com/ids/ID102367244]"

date=2004-07-13,time=13:10:48,device_id=FGT1002801021129,log_id=0400000000,type=ids,subtype=detection,pri=alert,attack_id=102367244,,src=192.168.22.210,dst=192.168.22.1,src_port=52105,dst_port=16381,status=detected,proto=6,service=16381/tcp,msg="scan: nmap TCP[Reference: http://www.fortinet.com/ids/ID102367244]"

N/A	Pass	Fail	#	Check List Item	RISK
		X	20	*Reject Inbound traffic containing ICMP (Internet Control Message Protocol) traffic. Log Event.*	M

Risk of Non Compliance	Intruders may gather network information for Denial of Service attacks.
Procedure	Verify that ICMP protocol 8, 11, and 3 are blocked at the external interface. Login as admin to the web interface. Select Firewall > Policy > 'EXT>INT'. Check if this specific service is included in the disallowed_services group or by itself appears in the ruleset and set to deny access.
Verify	Check predefined Service ICMP_Any is in the disallowed services list.
Conclusion	**Not in Compliance. Either way. The predefined Service ICMP_Any is not in the disallowed services list.**
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.6.2.2 - Exploit Protection) SANS – GSNA Courseware Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

date=2004-06-02,time=14:35:23,device_id=FGT1002801021129,log_id=0400000000,type=ids,subtype=detection,pri=alert,attack_id=17956867,,src=192.168.22.11,dst=192.168.22.200,icmp_id=0x0200,icmp_type=0x08,icmp_code=0x00,status=detected,proto=1,service=icmp,msg="icmp: PING NMAP[Reference: http://www.fortinet.com/ids/ID17956867]"

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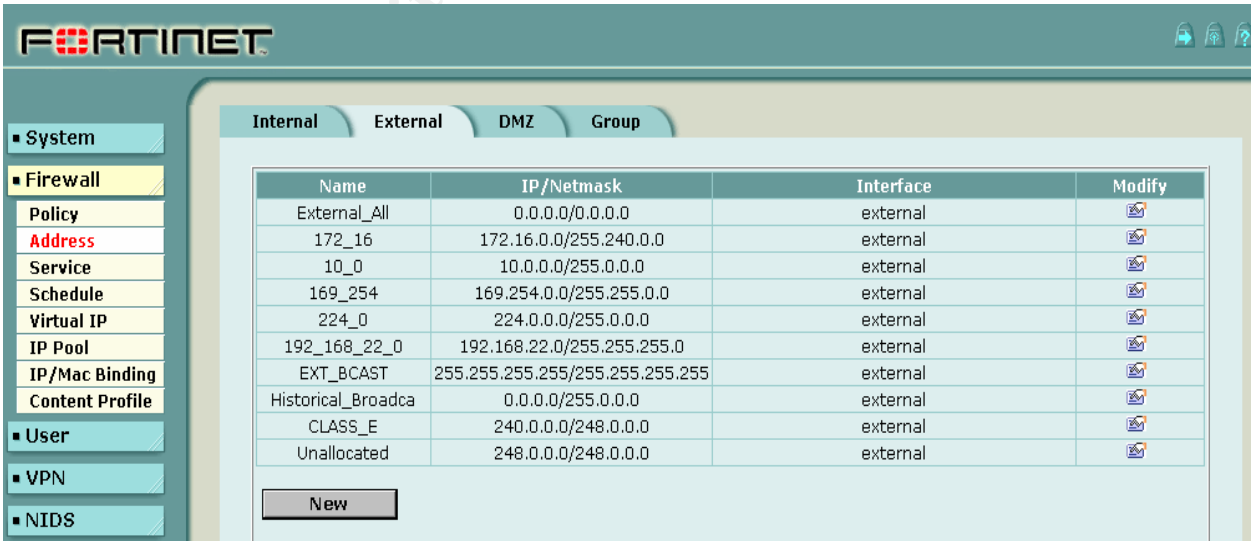
3.3.0 Address Filtering

N/A	Pass	Fail	#	Check List Item	RISK
	X		21	*Reject all Traffic from the External Networks that bear following source IP address:* *0.0.0.0/8 Historical broadcast* *10.0.0.0/8 RFC 1918 private network* *169.254.0.0/16 Link local networks* *172.16.0.0/12 RFC 1918 private network* *192.168.0.0/16 RFC 1918 private network* *224.0.0.0/4 Class D multicast* *240.0.0.0/5 Class E reserved* *248.0.0.0/5 Unallocated* *255.255.255.255/32 Broadcast*	H

Risk of Non Compliance	IP Spoofing to start denial of service attempts or send malicious codes.
Procedure	Login to Firewall as admin using the web interface. Select> firewall>Policy>'EXT>INT'
Verify	Verify that the above addresses are included in the policy and set to deny access and logging enabled.
Conclusion	**The address are included in the policy and set denied. Logging is enabled for all denied rules.**
Reference	MSDN – Chapter 15 – Securing your Network - http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnnetsec/html/thcmch15.asp SANS – GSNA Courseware. Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X



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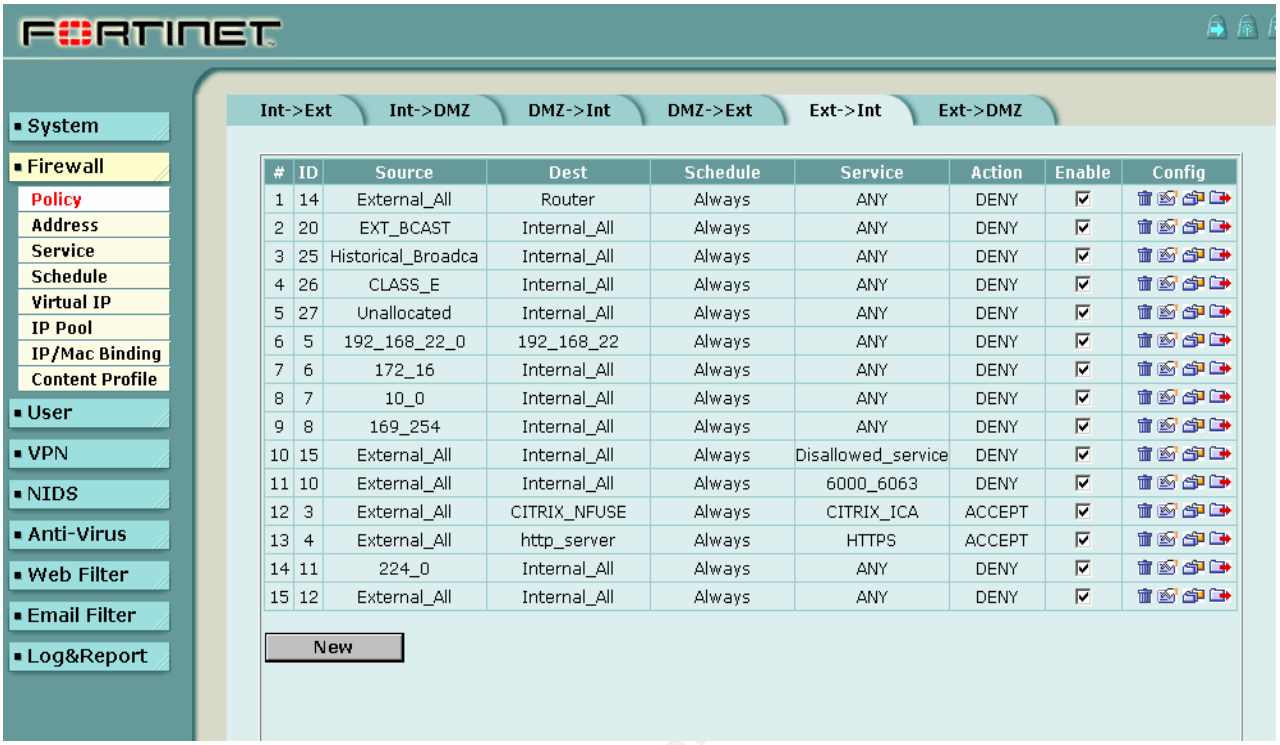

#	ID	Source	Dest	Schedule	Service	Action	Enable	Config
1	14	External_All	Router	Always	ANY	DENY	☑	
2	20	EXT_BCAST	Internal_All	Always	ANY	DENY	☑	
3	25	Historical_Broadca	Internal_All	Always	ANY	DENY	☑	
4	26	CLASS_E	Internal_All	Always	ANY	DENY	☑	
5	27	Unallocated	Internal_All	Always	ANY	DENY	☑	
6	5	192_168_22_0	192_168_22	Always	ANY	DENY	☑	
7	6	172_16	Internal_All	Always	ANY	DENY	☑	
8	7	10_0	Internal_All	Always	ANY	DENY	☑	
9	8	169_254	Internal_All	Always	ANY	DENY	☑	
10	15	External_All	Internal_All	Always	Disallowed_service	DENY	☑	
11	10	External_All	Internal_All	Always	6000_6063	DENY	☑	
12	3	External_All	CITRIX_NFUSE	Always	CITRIX_ICA	ACCEPT	☑	
13	4	External_All	http_server	Always	HTTPS	ACCEPT	☑	
14	11	224_0	Internal_All	Always	ANY	DENY	☑	
15	12	External_All	Internal_All	Always	ANY	DENY	☑	

N/A	Pass	Fail	#	Check List Item	RISK
	X		22	*Reject all Traffic from the Internal Networks that bear a source IP address which does not belong to the internal network (outbound)*	H

Risk of Non Compliance	IP Spoofing to start denial of service attempts or send malicious codes.
Procedure	Check the firewall Int to Ext ruleset for the specific policy. From internal PC FBSD 192.168.22.210 execute command as below: a) hping –S xxx.xxx.xxx.x43 –a 192.168.0.20 –p 21 b) hping –S xxx.xxx.xxx.x43 –a 192.168.20.20 –p 21
Verify	The addressees 192.168.22.0 /8 only should be allowed outbound access (Policyid 2) Other 192.168.XXX.XXX should be denied access (policyid 21)
Conclusion	**In compliance**
Reference	Guidelines on Firewalls and Firewall Policy NIST Publication 900-41 (Section 4.2 Implementing Firewall Ruleset). Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3.2. – Attack Tests). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

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date=2004-06-
02,time=15:36:20,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,pri
=notice,SN=106657,duration=10,policyid=2,proto=6,service=80/tcp,**status=accept,src=192.168.22.21**,
srcname=192.168.22.21,dst=xxx.xxx.xxx.x74,dstname=xxx.xxx.xxx.x74,src_int=internal,dst_int=externa
l,sent=977,rcvd=5953,sent_pkt=8,rcvd_pkt=7,src_port=2796,dst_port=80,vpn=n/a,tran_ip=xxx.xxx.xxx.
x27,tran_port=40975,

date=2004-06-
02,time=14:55:07,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,pri=
notice,SN=103322,duration=10,policyid=2,proto=6,service=110/tcp,**status=accept,src=192.168.22.220**,
srcname=192.168.22.220,dst=xxx.xxx.xxx.x97,dstname=xxx.xxx.xxx.x97,src_int=internal,dst_int=extern
al,sent=595,rcvd=742,sent_pkt=10,rcvd_pkt=12,src_port=2668,dst_port=110,vpn=n/a,tran_ip=xxx.xxx.xx
x.x27,tran_port=38776,

date=2004-06-
02,time=15:26:00,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,p
ri=notice,SN=105906,duration=0,policyid=21,proto=6,service=21/tcp,**status=deny,src=192.168.0.20**,
srcname=192.168.0.20,dst=xxx.xxx.xxx.x43,dstname=xxx.xxx.xxx.x43,src_int=internal,dst_int=extern
al,sent=0,rcvd=0,src_port=2013,dst_port=21,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,

date=2004-06-
02,time=15:26:01,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,p
ri=notice,SN=105907,duration=0,policyid=21,proto=6,service=21/tcp,**status=deny,src=192.168.0.20**,
srcname=192.168.0.20,dst=xxx.xxx.xxx.x43,dstname=xxx.xxx.xxx.x43,src_int=internal,dst_int=extern
al,sent=0,rcvd=0,src_port=2014,dst_port=21,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,

date=2004-06-
02,time=15:36:07,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,pr
i=notice,SN=106654,duration=0,policyid=21,proto=6,service=21/tcp,**status=deny,src=192.168.20.20**,
srcname=192.168.20.20,dst=xxx.xxx.xxx.x43,dstname=xxx.xxx.xxx.x43,src_int=internal,dst_int=extern
al,sent=0,rcvd=0,src_port=1861,dst_port=21,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,

date=2004-06-
02,time=15:36:08,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,pr
i=notice,SN=106655,duration=0,policyid=21,proto=6,service=21/tcp,**status=deny,src=192.168.20.20**,
srcname=192.168.20.20,dst=xxx.xxx.xxx.x43,dstname=xxx.xxx.xxx.x43,src_int=internal,dst_int=extern
al,sent=0,rcvd=0,src_port=1862,dst_port=21,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,

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N/A	Pass	Fail	#	Check List Item	RISK
	X		23	*Reject outbound traffic from a system using a source address that falls within the address ranges :10.0.0.0 /8 & 172.16.0.0 /16(RFC1918), 165.255.0.0 /16 (Link Local networks)*	H

Risk of Non Compliance	IP Spoofing to start denial of service attempts or send malicious codes.
Procedure	Check the Firewall INT>EXT ruleset for the specific policy. From internal PC FBSD 192.168.22.210 execute command as below: a) hping –S 10.10.20.20 –a 172.16.20.20 –p ++21 b) hping –S xxx.xxx.xxx.x43 –a 10.10.20.20 c) Hping –S xxx.xxx.xxx.x43 –a 169.254.20.20
Verify	Verify the above addresses are denied access. Verify the logs for the record of the denied activities.
Conclusion	In compliance
Reference	Guidelines on Firewalls and Firewall Policy NIST Publication 900-41 (Section 4.2 Implementing Firewall Ruleset). Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3.2. – Attack Tests). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

```
date=2004-06-02,time=14:23:23,device_id=FGT1002801021129,log_id=
0001000002,type=traffic,subtype=session,pri=notice,SN=100732,duration=0,policyid=17,proto=6,service=
21/tcp status=deny,src=172.16.20.20 srcname=172.16.20.20,dst=10.10.20.20,dstname=
10.10.20.20,src_int=internal,dst_int=external,sent=0,rcvd=0,src_port=2919,dst_port=21,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,

date=2004-06-02,time=14:23:24,device_id=FGT1002801021129,log_id=
0001000002,type=traffic,subtype=session,pri=notice,SN=100734,duration=0,policyid=17,proto=6,service=
22/tcp status=deny,src=172.16.20.20 srcname=172.16.20.20,dst=10.10.20.20,dstname=
10.10.20.20,src_int=internal,dst_int=external,sent=0,rcvd=0,src_port=2920,dst_port=22,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,

date=2004-06-02,time=14:23:25,device_id=FGT1002801021129,log_id=
0001000002,type=traffic,subtype=session,pri=notice,SN=100735,duration=0,policyid=17,proto=6,service=
23/tcp status=deny,src=172.16.20.20 srcname=172.16.20.20,dst=10.10.20.20,dstname=
10.10.20.20,src_int=internal,dst_int=external,sent=0,rcvd=0,src_port=2921,dst_port=23,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,
```

```
date=2004-06-02 ,time=16:43:27,device_id=FGT1002801021129,
log_id=0001000002,type=traffic,subtype=session,pri=notice,SN=109641,duration=0,policyid=23,
proto=6,service=0/tcp status=deny,src=10.10.20.20,srcname=10.10.20.20,dst=xxx.xxx.xxx.x43,
dstname=xxx.xxx.xxx.x43,src_int=internal,dst_int=external,sent=0,rcvd=0,src_port=1754,dst_port
=0,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,

date=2004-06- -02 ,time=16:43:28 device_id=FGT1002801021129,
log_id=0001000002,type=traffic,subtype=session,pri=notice,SN=109642,duration=0,policyid=23,p
roto=6,service=0/tcp,status=deny,src=10.10.20.20,srcname=10.10.20.20,dst=xxx.xxx.xxx.x43,d
stname=xxx.xxx.xxx.x43,src_int=internal,dst_int=external,sent=0,rcvd=0,src_port=1755,dst_port=
0,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,
```


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date=2004-06-
02,time=15:23:22,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,pri=notice,SN=105625,duration=0,policyid=24,proto=6,service=21/tcp,**status=deny,src=169.254.20.20**,srcname=169.254.20.20,dst=xxx.xxx.xxx.x43,dstname=xxx.xxx.xxx.x43,src_int=internal,dst_int=external,sent=0,rcvd=0,src_port=2505,dst_port=21,vpn=n/a,tran_ip=0.0.0.0,tran_port

date=2004-06-
02,time=15:23:22,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,pri=notice,SN=105628,duration=0,policyid=24,proto=6,service=21/tcp,**status=deny,src=169.254.20.20**,srcname=169.254.20.20,dst=xxx.xxx.xxx.x43,dstname=xxx.xxx.xxx.x43,src_int=internal,dst_int=external,sent=0,rcvd=0,src_port=2506,dst_port=21,vpn=n/a,tran_ip=0.0.0.0,tran_port

N/A	Pass	Fail	#	Check List Item	RISK
	X		24	*Reject inbound traffic from a system using a source address that falls within the address ranges : 10.0.0.0 /8, 172.16.0.0 /16, 165.255.0.0 /16 (RFC 1918)*	H

Risk of Non Compliance	IP Spoofing to start denial of service attempts or send malicious codes.
Procedure	Check the Firewall EXT>INT ruleset for the specific policy. From external PC FSAUDIT xxx.xxx.xxx.x29 execute command as below: a) hping –S xxx.xxx.xxx.x27 –a 10.10.21.21 –p 80 b) hping –S xxx.xxx.xxx.x27 –a 172.168.20.20 -p 23
Verify	Verify the above addresses are denied access. Verify the logs for the record of the denied activities
Conclusion	In compliance
Reference	Guidelines on Firewalls and Firewall Policy NIST Publication 900-41 (Section 4.2 Implementing Firewall Ruleset). Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3.2. – Attack Tests). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

date=2004-06-
01,time=09:46:53,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,pri=notice,SN=28808,duration=40,policyid=0,proto=6,service=80/tcp,**status=deny,src=172.16.20.20**,srcname=172.16.20.20,dst=xxx.xxx.xxx.x27,dstname=xxx.xxx.xxx.x27,src_int=n/a,dst_int=external,sent=0,rcvd=0,src_port=62894,dst_port=80,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,

2004-06-01 09:45:21 Local7.Notice 192.168.22.1 date=2004-06-
01,time=09:46:54,device_id=FGT1002801021129,log_id=0001000002,type=traffic,subtype=session,pri=notice,SN=28839,duration=40,policyid=0,proto=6,service=80/tcp,**status=deny,src=172.16.20.20**,srcname=172.16.20.20,dst=xx.xxx.xxx.x27,dstname=xxx.xxx.xxx.x27,src_int=n/a,dst_int=external,sent=0,rcvd=0,src_port=62895,dst_port=80,vpn=n/a,tran_ip=0.0.0.0,tran_port=0,

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N/A	Pass	Fail	#	Check List Item	RISK
	X		25	*Reject Outbound traffic containing broadcast addresses and Log event*	H

Risk of Non Compliance	Unwitting participant in Denial of Service Attacks.
Procedure	Check the Firewall INT>EXT ruleset for the specific policy. From internal PC FBSD192.168.22.210 execute command as below: nmap -sS -O -P0 -e dc0 -S 255.255.255.255 192.168.22.1
Verify	Check firewall logs to see if the broadcasts are recorded and dropped
Conclusion	In Compliance
Reference	Network Infrastructure Security Checklist – Version 4, Release 2.2 DISA Field Operations (Section 3.6.2.2 – Exploits Protection) Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 6.3.2. – Attack Tests). Firewall Checklist by Naidu, K. http://www.sans.org/score/firewallchecklist.php

Subjective		Objective	X	Evidence	X	Findings	X

```
date=2004-06-03,time=14:39:06,device_id=FGT1002801021129,log_id=
0401000002,type=ids,subtype=prevention,pri=alert,attack_id=109,src=255.255.255.255,dst=192.168.22.1,src_port=
47765,dst_port=635,interface=internal,status=dropped,proto=6,service=635/tcp,msg="IP spoofing [Reference:
http://www.fortinet.com/ids/ID109]"

date=2004-06-03,time=14:43:40,device_id=FGT1002801021129,log_id=
0401000002,type=ids,subtype=prevention,pri=alert,attack_id=109,src=255.255.255.255,dst=192.168.22.1,src_port=
2294,dst_port=21,interface=internal,status=dropped,proto=6,service=ftp,msg="IP spoofing [Reference:
http://www.fortinet.com/ids/ID109]"
```

3.4.0 Intrusion Detection and prevention

N/A	Pass	Fail	#	Check List Item	RISK
	X		26	Interfaces both internal and external must be monitored for network-based attacks	H

Risk of Non Compliance	• Inability to detect misconfigured firewalls. • Inability to detect attacks that firewalls legitimately allow through (such as attacks against web servers). • Inability to detect insider hacking.
Procedure	Login to the firewall internal interface 192.168.22.1 using "putty". In the CLI dialogue execute the following commands: Fortigate-100 # get nids detection interfaces
Verify	Both the internal and external is set to ON. Verify the DMZ interface is set to OFF
Conclusion	**In compliance**
Reference	Fortinet – Fortigate NIDS Guide. Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 5.5 CISCO IOS Intrusion Detection). Technical Incursion Countermeasures: FAQ – Network Intrusion Detection Systems http://www.ticm.com/kb/faq/idsfaq.html

Subjective		Objective	X	Evidence	X	Findings	X

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```
192.168.22.1 - PuTTY
login as: admin
admin@192.168.22.1's password:
Type ? for a list of commands.


Fortigate-100 # get nids detection interfaces
                                      ^
                                      |
Unknown command.

Fortigate-100 # get nids detection interface
internal: On
external: On
dmz: Off

Fortigate-100 #
```

N/A	Pass	Fail	#	Check List Item	RISK
	X		27	Checksum verification must be turned ON. This feature tests files passing through the Fortigate-100 to make sure that they have not been changed in transit.	H

Risk of Non Compliance	Inability to detect malicious changes in data during transit.
Procedure	Login to the firewall internal interface 192.168.22.1 using "putty". In the CLI dialogue execute the following commands: Fortigate-100 # get nids detection checksum
Verify	Verify the Conclusions: it must be IP: ON, TCP: ON, UDP: ON and ICMP:ON
Conclusion	**In compliance**
Reference	Fortinet – Fortigate NIDS Guide.

Subjective		Objective	X	Evidence	X	Findings	X

```
192.168.22.1 - PuTTY
login as: admin
admin@192.168.22.1's password:
Type ? for a list of commands.


Fortigate-100 # get nids detection checksum
IP: On
TCP: On
UDP: On
ICMP: On

Fortigate-100 #
```


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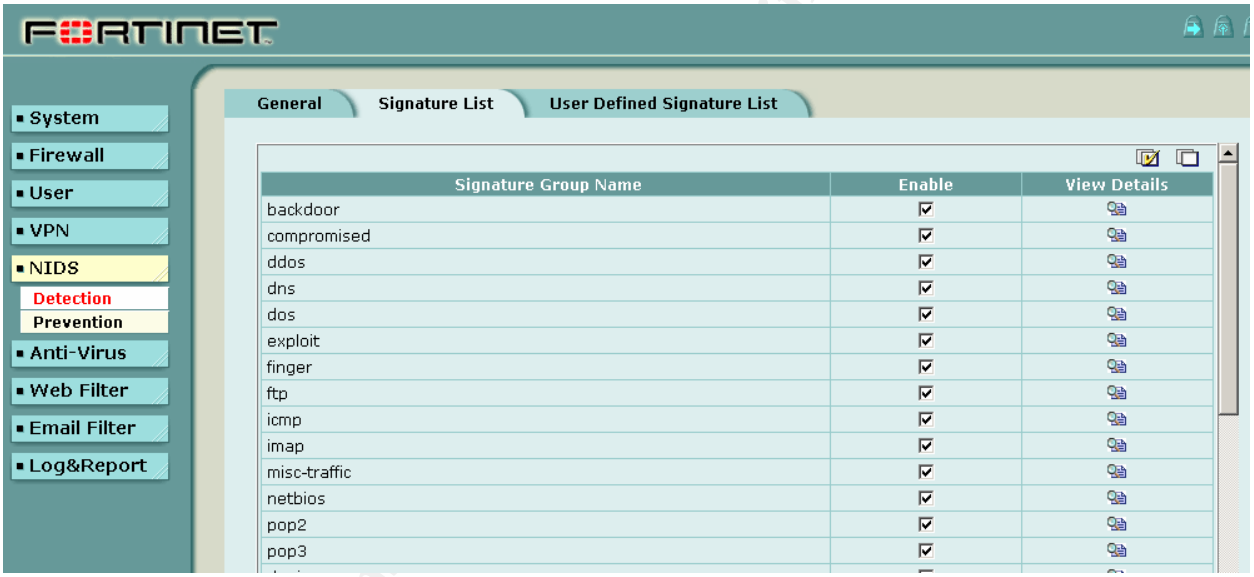
N/A	Pass	Fail	#	Check List Item	RISK
	X		28	All attack detection Signatures must be enabled. The NIDS detection module uses over 1000 signatures arranged into groups. By default all groups are enabled.	

Risk of Non Compliance	Inability to match and detect patterns of security violations of most common network attacks.
Procedure	Open the web interface: https://192.168.22.1. Login as admin. Go to NIDS > Detection > Signature List
Verify	All signatures must be enabled
Conclusion	**In compliance. Only a partial list is shown below.**
Reference	Fortinet – Fortigate NIDS Guide. Router Security Configuration Guide (SNAC) – NSA Revision Sep, 27, 2002, Version 1.1 (Section 5.5 CISCO IOS Intrusion Detection).

Subjective		Objective	X	Evidence	X	Findings	X



N/A	Pass	Fail	#	Check List Item	RISK
	X		29	NIDS attack prevention must be enabled. This module is disabled by default!	MH

Risk of Non Compliance	Inability to prevent the damage either by dropping the packets or by blocking network access.
Procedure	Login to the firewall internal interface 192.168.22.1 using "putty". In the CLI dialogue execute the following commands: Fortigate-100 # get nids prevention status
Verify	Verify IDP is enabled.
Conclusion	**In compliance.**
Reference	Fortinet – Fortigate NIDS Guide.

Subjective		Objective	X	Evidence	X	Findings	X

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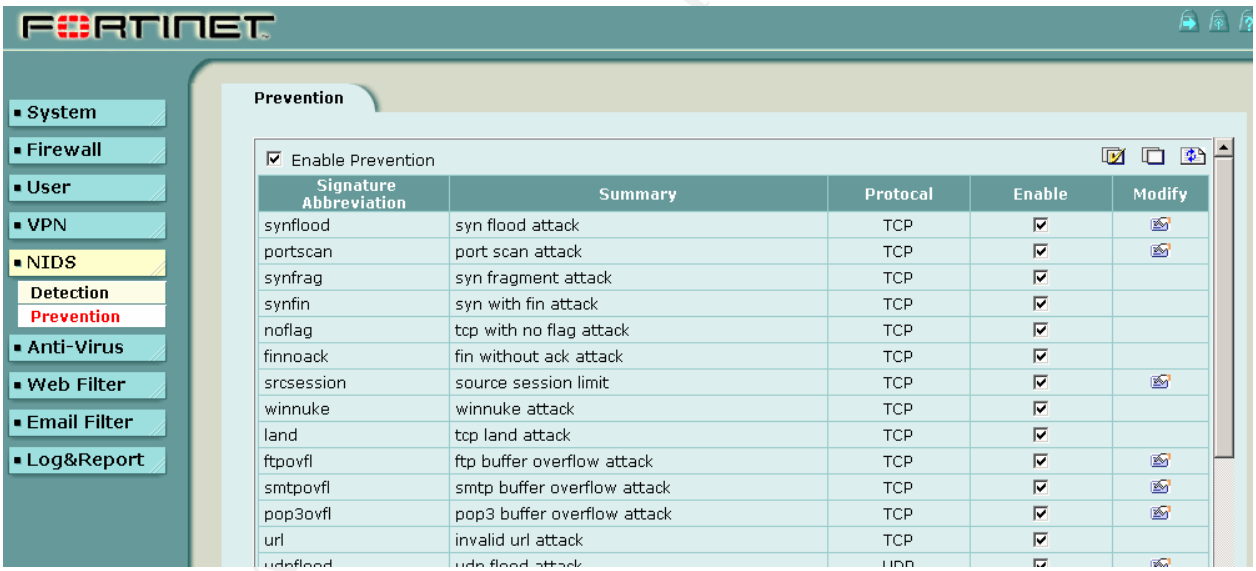
```
Fortigate-100 # get nids prevention status
IDP: enabled

Fortigate-100 #
```

N/A	Pass	Fail	#	Check List Item	RISK
	X		30	All attack prevention signatures must be enabled.	

Risk of Non Compliance	Inability to prevent the damage either by dropping the packets or by blocking network access.
Procedure	Open the web interface: https://192.168.22.1. Login as admin. Go to NIDS > Prevention
Verify	'Enable prevention' is checked. Verify that all individual prevention signature groups are enabled.
Conclusion	In Compliance. Only a partial list is shown below.
Reference	Fortinet – Fortigate NIDS Guide.

Subjective		Objective	X	Evidence	X	Findings	X



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N/A	Pass	Fail	#	Check List Item	RISK
	X		31	Test ID Prevention is functioning.	MH

Risk of Non Compliance	Undetected internal or external attacks resulting Denial of Service and or damage to systems and data.
Procedure	From the internal Test PC FSBD 192.168.22.210 execute the following command hping -S 192.168.22.1 –a 255.2555.255.255
Verify	Check the IDS prevention detects and prevents and logs the attack.
Conclusion	In compliance. IP Spoofing was detected from internal network (IP 192.168.30.63/24) not belonging to the company's subnet. Requires further investigation. See Part 4: Identified Vulnerabilities.- Finding: - IP Spoofing see Part4: Identified Vulnerabilities – Summary.
Reference	Fortinet – Fortigate NIDS Guide.

Subjective		Objective	X	Evidence	X	Findings	X

This is Real Data

2004-06-02 08:40:34 log_id=0401000002 type=ids subtype=prevention pri=alert attack_id=109 src= 192.168.30.63 dst=255.255.255.255 src_port=68 dst_port=67 interface=internal status=dropped proto=17 service=67/udp msg="IP spoofing [Reference: http://www.fortinet.com/ids/ID109]"

2004-06-02 08:33:02 log_id=0401000002 type=ids subtype=prevention pri=alert attack_id=109 src= 192.168.30.63 dst=255.255.255.255 src_port=68 dst_port=67 interface=internal status=dropped proto=17 service=67/udp msg="IP spoofing [Reference: http://www.fortinet.com/ids/ID109]"

This is Test Data

date=2004-06-03,time=14:24:16,device_id=FGT1002801021129,log_id= 0401000002,**type=ids,subtype=prevention**,pri=alert,attack_id=109,,src=255.255.255.255,dst=192.168.22.1,src_port= 61932,dst_port=27004,interface=internal,status=dropped,proto=6,service=27004/tcp,**msg="IP spoofing** [Reference: http://www.fortinet.com/ids/ID109]"

date=2004-06-03,time=14:25:16,device_id=FGT1002801021129,log_id= 0401000002,**type=ids,subtype=prevention**,pri=alert,attack_id=109,,src=255.255.255.255,dst=192.168.22.1,src_port= 61932,dst_port=647,interface=internal,status=dropped,proto=6,service=647/tcp,**msg="IP spoofing** [Reference: http://www.fortinet.com/ids/ID109]

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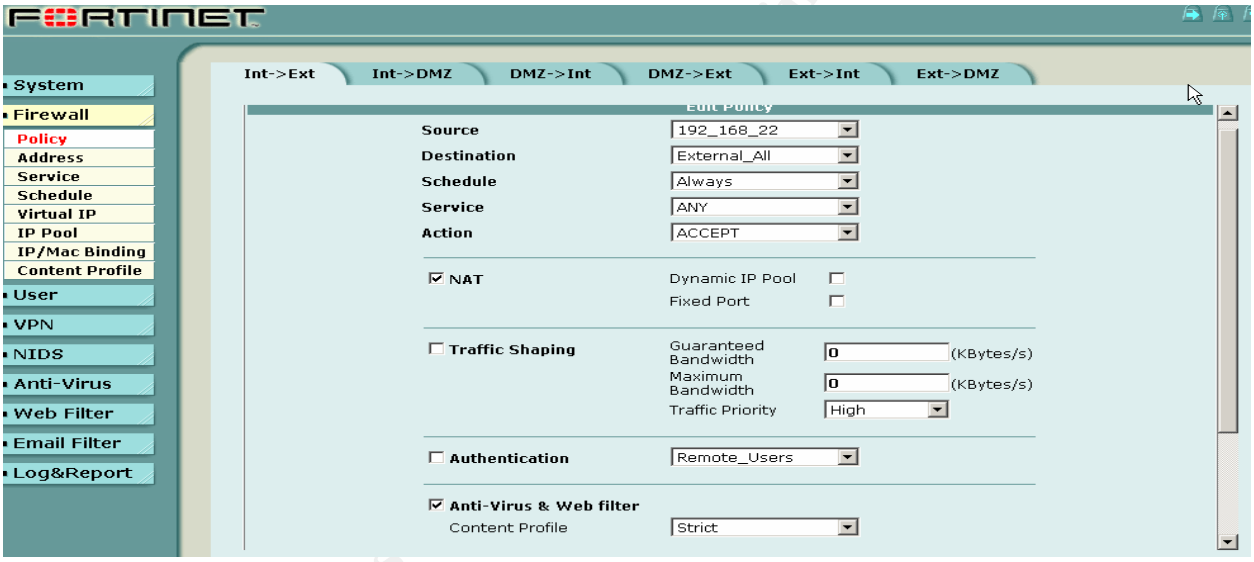
3.5.0 AV / File Blocking Protection

N/A	Pass	Fail	#	Check List Item	RISK
	X		32	Content filtering must be enabled in the firewall policy.	H

Risk of Non Compliance	Malicious codes and viruses infecting internal network. Some may create backdoor connections for intruders.
Procedure	Login to the web interface. Select Firewall>Policy>'INT.EXT'> Open (Edit) Policyid 2.
Verify	Antivirus and Web filter must be enabled and the 'Strict' content profile must be in use.
Conclusion	**In compliance**
Reference	Fortinet – Content Protection Guide

Subjective		Objective	X	Evidence	X	Findings	X



N/A	Pass	Fail	#	Check List Item	RISK
	X		33	Verify contents of 'Strict Content profile'. This controls how the antivirus protection behaves.	H

Risk of Non Compliance	Downloading of infected files or programs containing malicious codes or viruses.
Procedure	Login as admin at the web Interface. Select firewall> Content Profile>Strict.
Verify	All options must be selected for protection, except 'pass fragmented e-mails'.
Conclusion	**In Compliance**
Reference	Fortinet – Content Protection Guide

Subjective		Objective	X	Evidence	X	Findings	X

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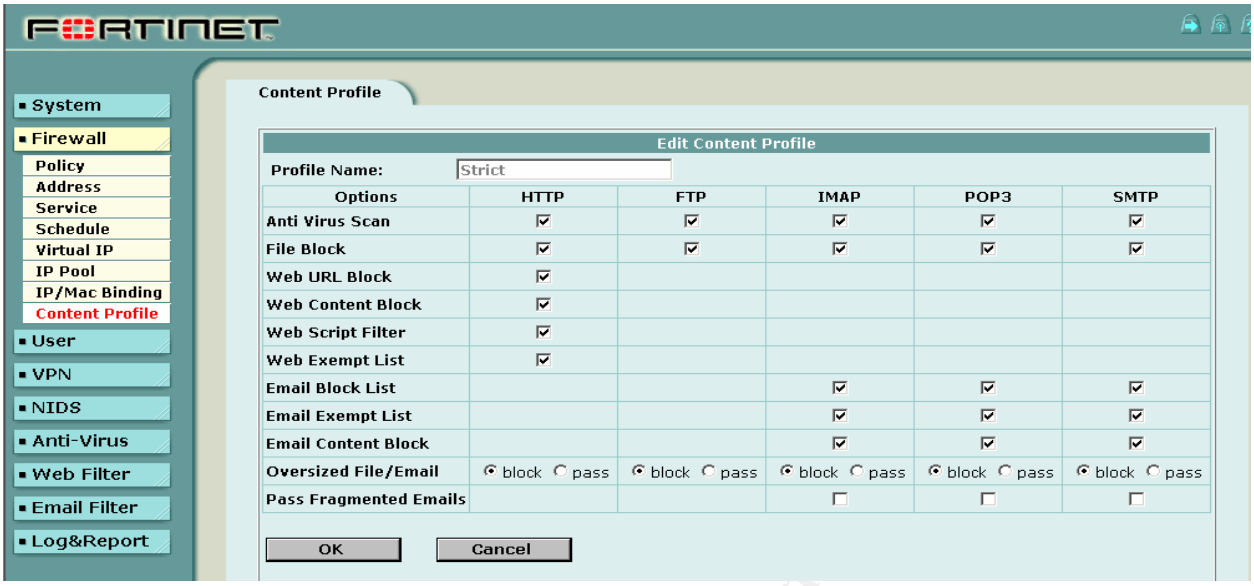

N/A	Pass	Fail	#	Check List Item	RISK
	X		34	File blocking must be enabled to remove all files that pose a potential threat and to provide the best protection from active computer virus attacks.	H

Risk of Non Compliance	Downloading of infected files or programs containing malicious codes or viruses.
Procedure	Login to the web interface as admin. Select: Antivirus>File Block.
Verify	Only files with .doc, .ppt, .xl extensions must be unblocked for HTTP, FTP, IMAP, POP3, SMTP protocols. All other file extensions must be blocked for all protocols.
Conclusion	**In compliance.**
Reference	Fortinet – Content Protection Guide

Subjective		Objective	X	Evidence	X	Findings	X

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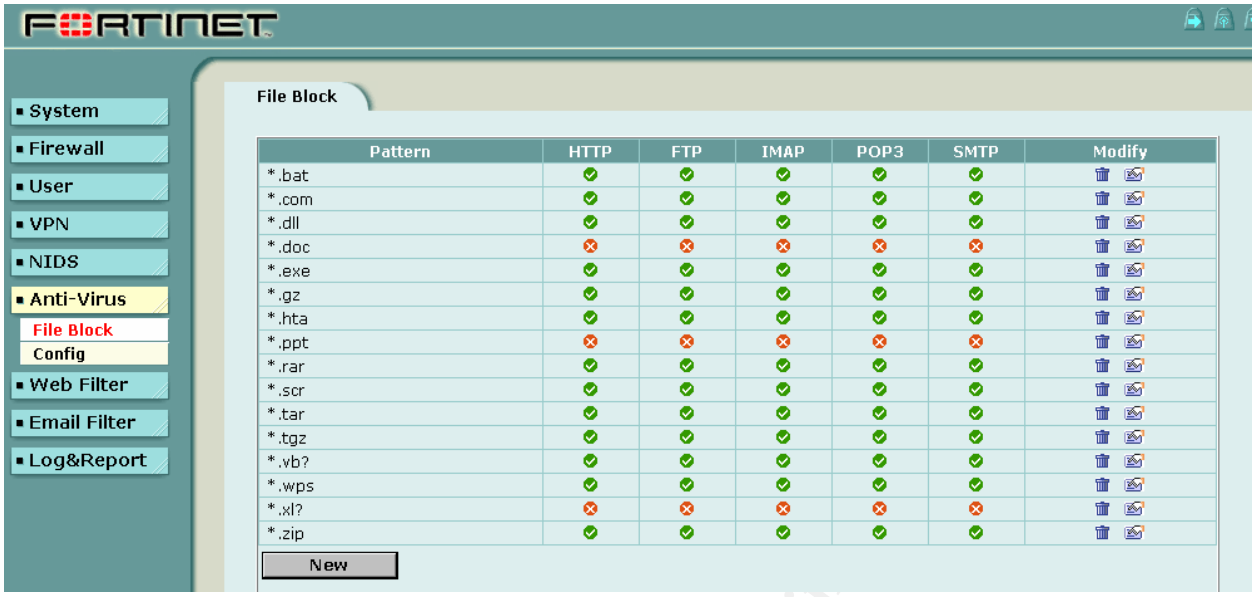
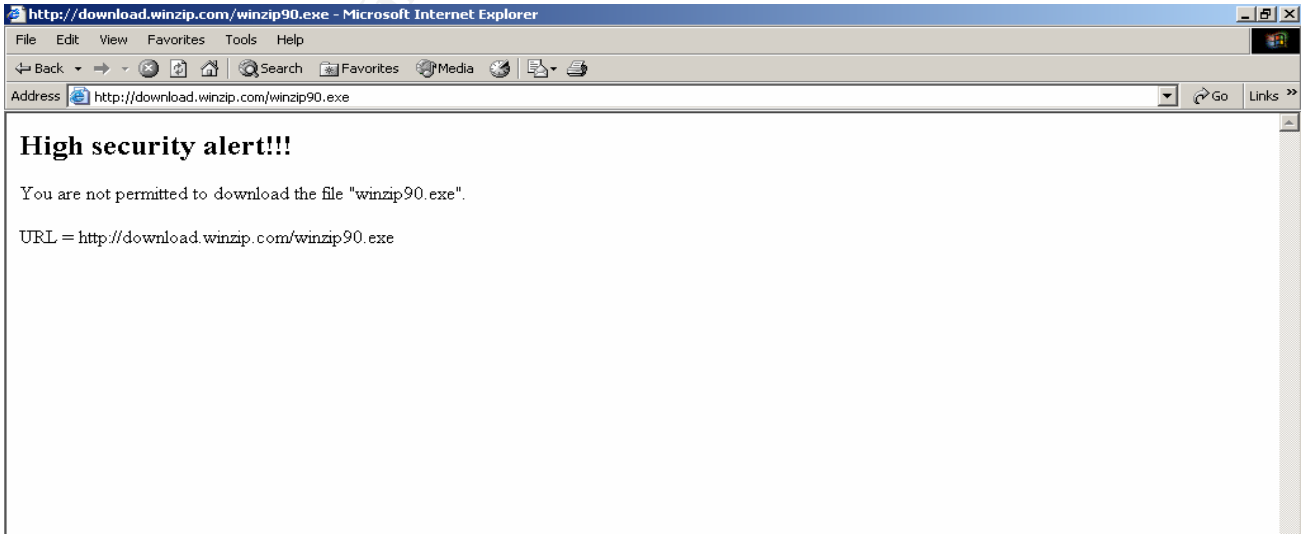


N/A	Pass	Fail	#	Check List Item	RISK
	X		35	Test File blocking functionality.	H

Risk of Non Compliance	Downloading of files or programs containing malicious codes or viruses.
Procedure	From any internal PC browse to http://www.winzip.com and attempt to download a trail version of winzip.exe
Verify	The down load must be blocked with a security alert message.
Conclusion	**In compliance. The log has also recorded zip files that were blocked with the destination information.**
Reference	Fortinet – Content Protection Guide

Subjective		Objective	X	Evidence	X	Findings	X



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Part 4: Audit Report and Risk Assessment

Executive Report

This is the audit report on Rama Inc.'s Firewall security. The company's computer networks are used to transmit critical administrative and financial data such as payroll, purchase orders and invoices, payments, e-mail and other information exchange over the internet. As the company plans to extend its Internet use to more critical applications, there are more opportunities for cyber intrusions, viruses and frequent denial of service attempts to the company's information system. This has created greater awareness for more enhanced Internet Security at Rama Inc.

Objectives

The objectives of the audit were to determine whether: (1) adequate controls are established to prevent, detect, and respond to unwanted Internet access to the company networks against denial of services and any unauthorized access to the internal resources. (2) Ensure working controls exist to protect information systems and technology from computer viruses. Controls should incorporate virus protection, detection, occurrence response and reporting.

Scope and methodology

We used COBIT as a reference tool to define the control objectives and Facilitated Risk Analysis Process to assess the risks and vulnerabilities to the company's networks through the firewall. We interviewed key officials and used non commercial software scanning tools to assess vulnerabilities and test firewall rules. We scanned the Firewall to identify installed network services. This audit was limited to the company's firewall model Fortigate -100, its configuration and its performance as a firewall, intrusion detection and Antivirus content protection control. This audit did not include security assessment of the company's internal network. The audit was conducted in accordance with best practices prescribed by SANS Institute and National Institute for Standards and Technologies, and other standards and guidelines as referenced through out this report.

Discussion of Audit results

The audit results confirm that the Fortigate-100 Firewall is performing its function as a technical control and meet the company's objectives. The controls are in place and are working as a defensive mechanism to thwart denial of service attacks, unauthorized access and protect the company's contents against antivirus and other intrusions. The details of the evidence and findings are listed in the previous section; Part 3: Audit of Fortigate-100 – Testing, Evidence and Findings

There are a few vulnerabilities, anomalies and observations that require attention and are listed under Current Findings and Recommendations. Additional list of list of recommendations can be found at the end of this section.

Current Status:

The initial risks that were identified (Ref: Table 5) as at level HIGH, are mitigated to a level LOW. This is because of the intended controls (Ref: Table 6) are in place and are effective. The resultant risks are exemplified in Table 7 below:

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Table 7: Current status - Risks

#	Vulnerability / Exposure	Risk	Risk Factor
1	Default Firewall Settings Misconfigured Firewalls Unauthorized Router Access	• Unknown and dangerous services pass through freely. • May be serving as unwitting participants in Denial of Service • Login by hostile agents or unauthorized users, inability to attribute accountability • Exposure of sensitive information to unauthorized listeners, session hijacking. • Address-spoofed DDoS traffic exiting your network, forwarding bad traffic to peers • Flooding attacks or DDoS attacks using ICMP. • Malicious third parties may gain access to critical applications or sensitive data • Denial of service where remote users may not be able to gain access to data • Misconfigured router, which may result in unauthorized access or modification of organization's information resources	LOW
2	Malware, Spyware, Viruses and Trojans	• Increased cot of recovery (correcting information and reestablishing services) • Loss of information (critical data, proprietary information, contracts) • Loss of trade secrets • Increased cost of retrospectively securing the system	LOW

Current Findings and Recommendation

Identified Vulnerabilities - Summary

a) Lack of Policies.
b) Firewall administration is not restricted to a specific trusted pc.
c) Unused Firewall interface DMZ is not disabled.
d) Firewall is missing the latest patches and updates.
e) Risky services and protocols are not restricted in the outbound policy.
f) ICMP Protocol is not set for rejection in the inbound policy

Finding: IP Spoofing:
During test of Checklist item 31 IP Spoofing attempts were detected by the Fortigate-100 IDS /prevention module. The spoofed address 192.168.30.63 does not belong to the company's internal network.
Root Cause: On investigations it was detected that an Internal PC in the accounting department had a pc with 2 two Network Interface Cards, one of which was connected to a network

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192.168.30.0/24 belonging to adjacent neighboring firm XUZ Inc.! Further investigations revealed that it was a forgotten connection once used for sharing some resources! This backdoor connection is potentially dangerous and by passes the firewall!
The administrator was instructed to remove the second network interface and remove the network connection on the wall.
A company security policy / Change Control and regular review of the log would have revealed this much earlier.

Identified Vulnerabilities - Details

Vulnerability	1	Checklist Item #	-	Risk (Not Implementing)	Low – Medium
Lack of Policies: Security Policy, Acceptable Use Policy.					
Description	Security policies define the procedures, guidelines and practices for configuring and managing security in an organization. Through committed enforcement of these policies, organizations can demonstrate due diligence to their stake holders and customers and reduce the risks to the organization's information assets.				
Threat	Lack of base line and no accountability.				
Audit Finding	-				
Recommendation	Security policies, standards and procedures provide information security a structure. Vulnerability assessments and risk analysis prepare the grounds for the choice of policies needed by the organization. Simple policies that meet the needs of the organization can be created. Guidance is available on the internet, SANS and other security resources				
Cost	NIL				
References	Importance of Corporate Policy: http://securityresponse.symantec.com/avcenter/security/Content/security.articles/corp.security.policy.html				
Compensating Controls	-				

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Vulnerability	2	Checklist Item #	1.a	Risk (Not Implementing)	High
Only FW administrator and other authorized personnel will be granted access to the FW for administration. Note: Although the results are for test 1.a is incompliance, it is recommended that an additional, separate, user with read write permissions is created for administering the Firewall.					
Description	*In addition to how administrators access the router, there may be a need to have more than one level of administrator, or more than one administrative role.				
Threat	Dependence on only one administrator affects Real-time Recovery objectives.				
Audit Finding	Part 3: Audit of Fortigate-100 – Testing, Evidence and Findings Checklist item 1				
Recommendation	*Define clearly the capabilities of each level or role in the router security policy. For example, one role might be 'network manager', and the administrators authorized to assume that role may be able to view and modify the configuration settings and interface parameters. Another role might be 'operators', administrators authorized to assume that role might be authorized only to clear connections and counters. In general, it is best to keep the number of fully privileged administrators to a minimum.				
*References	Router Security Configuration Guide (SNAC) – NSA Revision 27, 2002, Version 1.1 (Section 4.1.5. – Logins, Privileges, Passwords and Accounts)				
Cost	NIL				
Compensating Controls	Separation of duties.				

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Vulnerability	3	Checklist Item #	1.b	Risk (Not Implementing)	High
FW Administration allowed only from specific trusted host.					

Description	Ensure that the computer allows administration from only an authenticated host.
Threat	Unauthorized users may compromise the firewall through unsecured computers, using the idle or unused portion or id portion of the admin time out period (when left unguarded). Attempts to compromise include password cracking tools.
Audit Finding	Part 3: Audit of Fortigate-100 – Testing, Evidence and Findings Checklist item 1
Recommendation	Allowing administration of the firewall from any connected computer is a security risk. The knowledge of the username and Password to connect to the computer from any internal PC can be obtained either through social engineering or using password cracking tools. Restricting the FW administration from a restricted PC adds additional layer to the defense-in-depth.
Cost	NIL
Compensating Controls	STRONG, Complex Passwords

Vulnerability	4	Checklist Item #	5	Risk (Not Implementing)	Low- Medium
The FW administrator will disable FW interfaces that are not in use.					

Description	The DMZ Interface is unused and should be disabled.
Threat	Hacking attempts, Firewall configuration changes
Audit Finding	**Part 3: Audit of Fortigate-100 – Testing, Evidence and Findings** Checklist Item 5
Recommendation	An unused interface is not monitored or controlled, and it is probably not updated. This might expose your system to unknown attacks on those interfaces.
Cost	- NIL-
Compensating Controls	Regular systematic reviewing of log data.

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Vulnerability	5	Checklist Item #	10	Risk (Not Implementing)	Medium
Ensure that the latest patches and updates are applied to the firewall components. If patches and updates are automatically downloaded from the vendors' websites, ensure that the update is received from a trusted site.					
Description	Exploiting known software vulnerabilities is a primary means of gaining privileged access to a system or implementing a denial of service attack.				
Threat	Unauthorized Firewall configurations changes, new virus and worm attacks and exploitation of the known vulnerability				
Finding	Part 3: Audit of Fortigate-100 – Testing, Evidence and Findings Checklist item 10				
Recommendation	Patch management is an important part of good security management practice. Company's should establish change control and patch management and monitor versions changes and hotfixes to the firewall and other operating systems. Subscription to manufacturer's notification services on this issue will be of great assistance.				
*References	Patches and Updates: http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnnetsec/html/thcmch15.asp				
Cost	NIL				
Compensating Controls	LOGS. Frequent review of logs				

Vulnerability	6	Checklist Item #	13	Risk (Not Implementing)	Medium
Reject the following non-required, risky protocols and services in either direction.					
Description	Checklist item 13 includes a list of known risky protocols and services that should be rejected either way. The firewall is configured to reject the listed services only inbound. The firewall is stateful inspection type and rejects the risky protocols when connections were attempted to these ports. However malicious programs, on compromised computers of the internal network may allow dangerous connections.				
Threat	Internal rogue applications connecting to these external ports creating backdoor.				
Finding	Part 3: Audit of Fortigate-100 – Testing, Evidence and Findings Checklist 13				
Recommendation	Define a policy on required external services for internal users. Explicity deny connection to un necessary external services including outbound proxy service connections and log events.				
Cost	- NIL-				
Compensating Controls	Logs. Frequent review of Logs for intrusions and Statetables. Regular auditing and scanning of internal network for unnecessary protocols and services. Security policies.				

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Vulnerability	7	Checklist Item #	20	Risk (Not Implementing)	Low
Reject Inbound traffic containing ICMP (Internet Control Message Protocol) traffic. Log Event.					

Description	*ICMP is a stateless protocol that sits on top of IP and allows host availability information to be verified from one host to another.
Threat	Network enumeration*. ICMP can be used to map the networks behind certain types of firewalls.* Intruders may gather network information for Denial of Service Attacks
Finding	**Part 3: Audit of Fortigate-100 – Testing, Evidence and Findings** Checklist item 22
Recommendation	*Blocking ICMP traffic at the outer perimeter router protects you from attacks such as cascading ping floods. Other ICMP vulnerabilities exist that justify blocking this protocol. While ICMP can be used for troubleshooting, it can also be used for network discovery and mapping. Therefore, control the use of ICMP. If you must enable it, use it in echo-reply mode only.
*Reference	Screen ICMP Traffic from the internal Network: http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnnetsec/html/thcmch15.asp
Cost	-NIL-
Compensating Controls	LOGS. Frequent review of intrusions, notices.

Additional Recommendations

In this digital world of information exchange, a company's vital information can be stolen without being lost! Establishing an information security framework will minimize such risks and provide additional confidence in the company's information to the staff, clients, vendors and shareholders. This audit is just the beginning towards fulfillment of a secure information infrastructure. The company can further consolidate their Information Systems Security through an audit of their internal network for vulnerabilities and establishing key performance indicators by recording and measuring the increased /decreased incidents.

A good source to start with is the 'Security Self-Assessment Guide' a NIST special Publication 800-26. The document guides through five levels of effectiveness with checklists for each area of: Management Control, Operational Control and Technical Control. Additional recommendation includes:

- Frequent review of firewall policies and ports for unused rules.
- Conduct regular audits and Review Logs regularly
- Check periodically for information at the vendor site for helpful information on new virus attacks and the ID defenses (ports to be blocked etc).
- User awareness training will help reduce security related incidents.
- Risk analysis revealed the importance of the availability of the Fortigate-100. It is recommended that the company should make a backup system available for emergencies, to minimize downtime.

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- Network Ingress Filtering: Defeating Denial of Service Attacks which employ IP Source Address Spoofing – RFC 2267
- Requirements for IP Version 4 Routers – RFC 1812
- Consensus Roadmap for Defeating Distributed Denial of Service Attacks - SANS
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- Guidelines on Firewalls and Firewall Policy-NIST Publication 800-41
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