Administrator's Report on Auditing a Netscreen-100 Firewall

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Option 1

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Abstract

While there is a vast and growing literature on auditing Internet firewalls, the audit of Netscreen firewalls has been a neglected topic. In this paper, I will attempt to counter that trend by outlining and defending a technically rigorous methodology for auditing the Netscreen-100 firewall. I begin by providing an exhaustive list of firewall security control objectives. I then conduct a formal pre-audit risk assessment using Tom Peltier's Facilitated Risk Assessment Process, in order to ensure that security controls are aligned with business objectives. Next, I delineate and justify an audit checklist designed specifically for Netscreen-100 firewalls. I then use that checklist to conduct an audit of a Netscreen-100 firewall that protects an e-commerce system. Finally, I conduct a post-audit risk assessment, in order to measure the effectiveness of compensating controls.

Introduction – Why This Practical Is Not Just Another Practical on How to Audit Firewalls

While firewalls are hardly a new security technology—and the audit of firewalls is not an unusual topic—I have tried to make an original contribution to the literature of network security with this paper. In support of that goal, my paper accomplishes the following goals.

- Provide a comprehensive list of firewall security control objectives.
- Advance the state of the discussion on pre-audit risk assessment by adopting Tom Peltier's Facilitated Risk Assessment Process (FRAP) methodology. The FRAP methodology is designed to ensure that security controls are aligned with business objectives.
- Discuss the neglected topic of how to audit a Netscreen firewall, namely, the Netscreen-100.
- Evaluate the risk of the firewall's configuration in the context of the services behind the firewall that are reachable through the firewall.
- After using Nessus to identify potentially vulnerable services on internal services accessible through the firewall, I heavily scrutinize each finding. In the process, I discuss a broad variety of security vulnerabilities on systems behind the firewall, including vulnerabilities in Apache, OpenSSH, and Oracle. I also identify the conditions that led Nessus to report false positives. This "big picture" perspective allows me to describe the residual risk in terms of the specific software running on the systems behind the firewall.

I hope readers get out of the practical as much as I tried to put into it.

Assignment 1 – Research in Audit, Measurement, Practice and Control

Identify the system to be audited

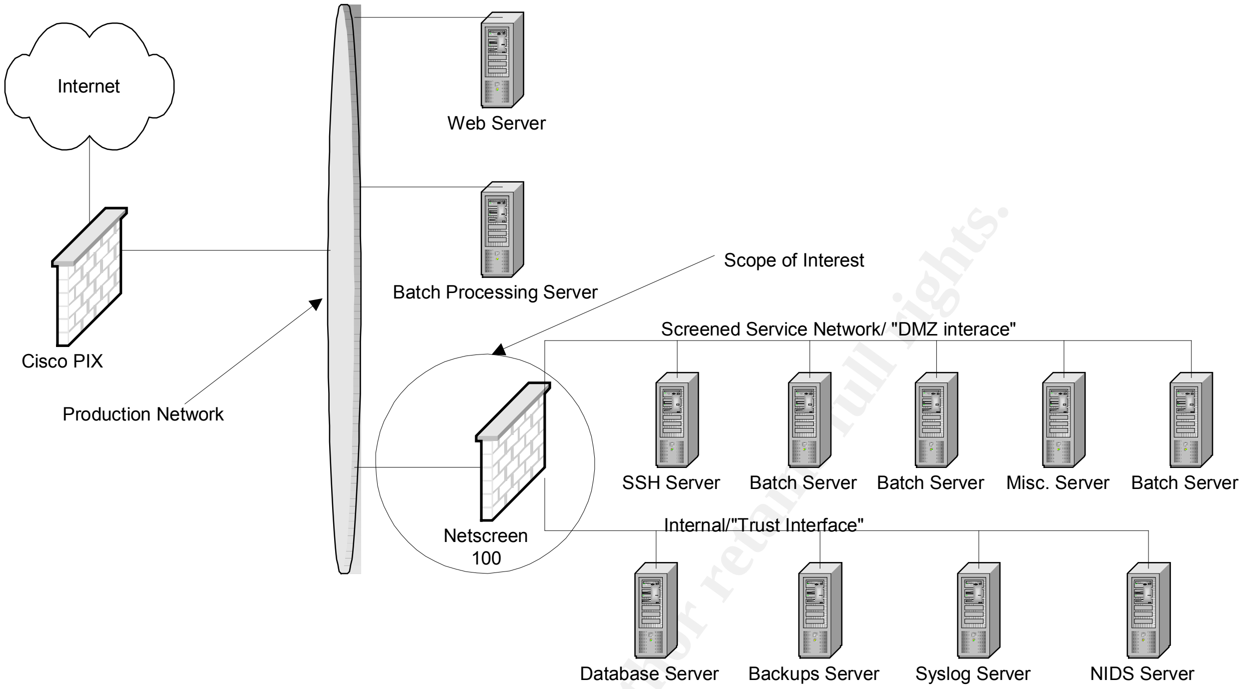
I am auditing a Netscreen firewall that is used by a technology company to protect a production e-commerce environment. Although I am conducting the audit as a system administrator—that is, I have privileged or administrative control over the firewall—in other ways my role resembles that of an independent auditor. When I began the audit, I was a new employee and had no pre-existing knowledge of the system. Moreover, although I have administrative control over the firewalls, I quickly learned that I did not have complete "political" control over them. If I wanted to change the firewall configuration or network perimeter architecture, I had to persuade both the affected business units and senior IT management to implement my recommendations.

In order to audit a firewall, the auditor must measure the firewall against a standard. Ideally, that standard is codified as part of an organizational security policy document. Unfortunately, my organization did not have an approved security policy at the time of the audit. Although management recognized the importance of having an approved and enforced security policy, policy creation can be time-consuming and management could not afford to delay the audit while a policy was written and approved; they needed the audit report immediately. In this situation, I chose to audit the firewall against recognized industry best practices.

The firewall is responsible for protecting the database server in the back end of the e-commerce network. Administrative access to the firewall is restricted by ACLs that require the management session to originate from an authorized IP address, as well as password authentication. With administrative access, the firewall administrator can perform any task related to firewall management, including policy administration, event analysis, performance monitoring, and interface configuration.

The particular firewall I am auditing is a Netscreen 100 firewall running version 3.0.1r2.0 of the Netscreen ScreenOS. As shown in Figure 1, the firewall is not Internet facing; instead, it is an internal firewall that segregates our e-commerce environment from the rest of our production network. Multiple layers of router Access Control Lists (ACLs), firewalls, and load balancer NQLs separate the e-commerce environment from the Internet; these other layers of perimeter defense are not indicated in figure 1.

Figure 1 – Grossly Simplified Network Diagram



Evaluate the Risk to the System

There are two main components to risk evaluation for security audits. The first is identifying the security control objectives of the system to be audited. The second is assessing risks that could mitigate that system's effectiveness in meeting its security control objectives.

Firewall Security Control Objectives

Before we can begin a security audit of any system, we first need to understand how the system is intended to contribute to security. In other words, we need to understand the *security control objectives* of the system. According to the IT Governance Institute's *Control Objectives for Information and related Technology* (COBIT), an IT Control Objective as " a statement of the desired result or purpose to be achieved by implementing control procedures in a particular IT activity."[1] Thus, the security control objectives of the system are directly related to the role of the system.

The security control objectives for the firewall that constitutes the scope of my audit are defined in Table 1.

[1] COBIT Steering Committee and the IT Governance Institute, p. 5.

Table 1. Summary of Firewall Control Objectives

No.	Control Objective
CO1	An e-commerce system on a production network must be specially segregated from the rest of the production network through an additional layer of security provided by one or more dedicated internal firewalls.
CO2	For any network protected by a firewall, the firewall must be the single point of connection between the untrusted network and the protected network.
CO3	The firewall(s) must be kept current with the latest vendor upgrades, security patches, and security problem fix software.
CO4	The firewall(s) must act as a single point of network access where traffic can be analyzed and controlled.
CO5	The firewall(s) should control any application and infrastructure management flows in *both* directions.
CO6	The firewall(s) must deny by default any services not explicitly authorized.
CO7	All ports on the firewall itself should be disabled by default; only ports that have been specifically authorized should be open.
CO8	The firewall(s) should protect the e-commerce system against denial of service attacks and any unauthorized access to the e-commerce system.
CO9	No vulnerable services should be accessible through the perimeter's countermeasures.
CO10	The firewall(s) must be able to hide details of the internal network architecture through various methods, including but not limited to the use of Network Address Translation (NAT) with RFC 1918 addressing.
CO11	Only authorized personnel may be permitted to administer the firewall(s). Administrative access to the firewall(s) must be strictly limited to those personnel responsible for maintaining the firewall(s).
CO12	Firewall administrators must have at least two user-IDs. One of these user-IDs (e.g., root) must provide privileged access and have its activities be logged; the other must be a normal user-ID for the day-to-day work of an ordinary user.
CO13	Firewall policies must not be changed unless the proposed change(s) have been approved by both the Security team and the Change Control Board.
CO14	Firewall management sessions are extremely sensitive and must be encrypted.
CO15	IP spoofing detection must be enabled on the firewall.
CO16	The firewall architecture must provide high availability, by having two firewalls in parallel, so that if one firewall fails, traffic can seamlessly flow through the other.
CO17	All HA master-slave firewall pairs must maintain synchronized configurations.
CO18	The firewall(s) must provide an audit trail or log of all attempted and successful network connections.
CO19	The audit trail or log must include action taken by administrators, including user IDs; login date/time; log-out date/time; changes to policies; changes or additions to user privileges; and system start-ups and shut-downs.
CO20	Firewall logs must be stored on a dedicated syslog server.
CO21	The audit trails must be retained in accordance with the organization's data retention policy.

CO22	Firewall configuration back up and restore procedures must be documented.

Firewall Risk Analysis

Prior to assessing the risks to the system, I first evaluated the importance of this potential security audit. Given that my organization's security team was understaffed, would conducting this audit be a good use of company time? The answer was immediately obvious. Not only would the audit be worthwhile, but also it should be made a high priority for the company in order to prevent *substantial* damage to the business, including lost revenue and damage to the company's reputation.

Having satisfied myself with the need for and priority of this audit, my next (pre-audit) step was to evaluate specific risks of particular concern. Unfortunately, this task was complicated by the fact that I was unable to obtain any documentation or network diagrams concerning this firewall. To their credit, management was well aware of these shortcomings and the importance of fixing them. Indeed, fixing those gaps were part of the reason I was hired! Nevertheless, it was obvious that a large number of important *procedural* controls were entirely missing. Moreover, based on what little I knew at the time about the firewall configuration and network architecture, I was also worried about the presence and effectiveness of the *technical* controls.

I therefore decided to conduct a formal risk analysis, in order to help tailor the scope of the audit according to the business needs of the company. A complete risk analysis methodology includes the following steps.

1. Identify the asset to be protected.
2. Ascertain threats, risks, concerns, or issues to that asset.
3. Prioritize the risk or determine the asset's vulnerability to the threat.
4. Implement corrective measures, controls, safeguards, or accept the risk.
5. Monitor the effectiveness of the controls.[2]

Since this risk analysis was a *pre-audit* risk analysis, I would only be completing steps 1-3; moreover, my progress on step 3 would obviously be limited by incomplete information. In the following pages, I summarize the results of my pre-audit risk analysis.

<u>Step 1. Asset Identification.</u>

There are two types of assets: physical (i.e., hardware) and logical (i.e., intellectual property). In my case, the assets may be summarized as follows:

[2] Peltier, p. 5.

Table 2. List of Assets

Asset	Type
Netscreen 100 Appliance	Physical
Access to Screened Service Network (SSN) or internal network	Logical
Detailed information about our internal network architecture, including hostnames, communication protocols, and information flow.	Logical
Netscreen 100 Policies (similar to ACLs) and Configuration	Logical
Financial information (to the extent that an intruder might be able to aggregate data based on the number of connections to the e-commerce database)	Logical
Potential forensic information, including logs.	Logical
Company reputation (to the extent that a firewall compromise could cause damage to that reputation)	Logical

Steps 2-3. Threat Identification and Vulnerability Determination

Before I summarize the threats, I first want to clarify the distinction between threats and vulnerabilities. Although those terms are often used as if they were synonymous, they are not. A threat is not a vulnerability; a vulnerability is not a threat. A *threat* may be defined as "an event with the potential to cause unauthorized access, modification, disclosure, or destruction of information resources, applications, or systems" (emphasis mine).[3] In contrast, a *vulnerability* is a condition of "weakness in a system, application, infrastructure, control or design flaw that can be exploited to violate system integrity."[4] For example, if the asset I wish to protect is an expensive car, one threat to that asset would be physical theft of the asset (an event), while a vulnerability would be the situation in which the car is unattended with the doors unlocked (a condition).

With that distinction in mind, I first identified the threats to each asset. I then determined the vulnerability of each asset to each of the threats just identified. Since this is a *pre-audit* risk assessment, my vulnerability determination would have to be based upon my *background knowledge* of the company, the system, and the relevant set of controls. In addition, for each of the vulnerabilities, I determined the degree of risk that I could use to refine the audit scope and prioritizing tasks. The degree of risk is a qualitative measurement of the likelihood of occurrence. Possible values for the degree of risk include high, medium, low, and unknown.

[3] Peltier, p. 21.
[4] Peltier, p. 21.

Table 3. Pre-Audit Risk Analysis

Asset	Threat	Vulnerability	Degree of Risk	Impact
Netscreen 100 Appliance	Physical access to data center	Physical access is restricted by security guards, two-factor biometric authentication, and an access control list.	Low	Could lead to destruction, theft, or tampering with physical assets.
	Unauthorized modification to physical interface connections (e.g., switching or unplugging connections)	All authorized personnel have successfully completed a background check. Video surveillance in and outside of data center.	Low	Disruption or degradation of service.
	Unauthorized disclosure of firewall hardware	Someone with knowledge of our firewall hardware could disclose to an unauthorized party. Nevertheless, this is unlikely, given our procedural controls. All authorized personnel must successfully complete a background check and sign a nondisclosure agreement. Mitigating controls for unauthorized personnel include all of the above physical security controls.	Low	Greater probability of an attacker successfully compromising the security of the network.

Asset	Threat	Vulnerability	Degree of Risk	Impact
	Destruction of or damage to hardware	The hardware could be destroyed by the forces of nature (i.e., fire) or a human (accidentally or intentionally). Nevertheless, this is unlikely given our numerous compensating controls, including disaster recovery controls, background checks for all authorized personnel; and fire detection and suppression systems.	Low	Disruption or degradation of service.
	Theft of hardware	See above.	Low	Disruption of service, financial loss to company.
Access to SSN or Internal Network	Unauthorized network access to SSN or internal network	Existing (authorized) firewall policy allows an attacker to gain access to resources on either the SSN or internal network.	High	Greater probability of an attacker successfully compromising the security of servers in the SSN or internal network.

Asset	Threat	Vulnerability	Degree of Risk	Impact
	Denial of Service attack	Denial-of-Service attacks are a well-known problem. Given the lack of an approved security policy, it seemed likely that security vulnerabilities were not being updated in a timely manner, if at all.	High	A prolonged disruption of firewall availability would be a customer-visible outage and have a direct impact on revenue.
Details of our internal network architecture.	Unauthorized disclosure of internal network architecture	Although controls are in place to prevent the unauthorized disclosure of the architecture by an employee, it is not known if an outsider would be able to gain knowledge of our internal architecture.	Un-known	Greater probability of an attacker successfully compromising the security of the network.
Netscreen 100 Policies and Configuration	Unauthorized access to policies or configuration	Netscreen 100s offer two methods of administrative access: command-line (via SSH) and web-based (via SSL). An exploit in the Netscreen's implementation of either service could result in an intruder gaining unauthorized access.	Un-known	An intruder with unauthorized administrative access could deliberately bring the firewall down, disrupting network availability. The intruder could also modify the firewall configuration to make it easier to compromise the other machines on the network. A compromise of the e-commerce server could lead to theft of sensitive customer data, which would be a disaster for the business.

Asset	Threat	Vulnerability	Degree of Risk	Impact
	Unauthorized modification of policies or configuration	An attacker with unauthorized access could make unauthorized changes to the firewall policies or configuration.	Un-known	Greater probability of an attacker successfully compromising the security of the network. Disruption or degradation of service.
	Unauthorized disclosure of policies or configuration	An attacker with unauthorized access would be able to view the firewall policies and configuration, which would be an unauthorized disclosure of sensitive information.	Un-known	Greater probability of an attacker successfully compromising the security of the network.
	Destruction of policies or configuration	An attacker with unauthorized access could delete the policies or configuration.	Un-known	Partial or total disruption of service.
Financial information	Unauthorized access to (confidential) corporate financial data	Given that the firewall sees all connections between the batch processing server and the e-commerce database, it might be possible for an intruder with access to the firewall to determine aggregate information about the number of transactions between the two systems.	Un-known	Using that information, the intruder could make educated guesses about some of the company's financial data. This could be useful to a competitor.

Asset	Threat	Vulnerability	Degree of Risk	Impact
Potential forensic data	Unauthorized access to forensic data	Unauthorized access to forensic data might allow an intruder to learn confidential information about the company's financial condition, internal network architecture, usernames of authorized firewall administrators, as well as the contents of the forensic data.	Medium	The knowledge gained from this information could help an attacker compromise the SSN or internal networks.
	Unauthorized modification of forensic data	An attacker with administrative access on the firewall might be able to modify the firewall logs.	Medium	Unauthorized modifications to forensic data might hamper investigations into security incidents. It would also disrupt the chain of custody of evidence. The data might not be usable in court.
	Unauthorized disclosure of forensic data	Unauthorized access to forensic data might allow an intruder to learn confidential information about the company's financial condition, internal network architecture, usernames of authorized firewall administrators, as well as the contents of the forensic data.	Medium	The knowledge gained from this information could help an attacker successfully compromise security.
	Unauthorized destruction of forensic data	An attacker with administrative access on the firewall might be able to delete the firewall logs.	Medium	Destruction of the firewall logs could hamper security incident investigations.
Company	Damage to	A security compromise	Medium	Public

Asset	Threat	Vulnerability	Degree of Risk	Impact
reputation	reputation	could lead to public embarrassment.		embarrassment can cause loss of customer and shareholder confidence.

Based on the results of my pre-audit risk analysis, I decided to forego an audit of the physical asset (the firewall appliance hardware and associated cables) and instead audit all of the logical assets. In some cases, prior to conducting my audit, I already had reason to be concerned, while in other cases the degree of risk was unknown and needed investigation.

Current State of Practice

Given the prevalence of Internet firewalls, suggestions for auditing firewalls are not hard to find. For example, a Google search for "firewall audit" return about 172,000 hits. In my experience, many of the relevant resources tended to fall into one of two categories: those that focus heavily on procedural controls and those that focus primarily on technical controls. It was less common to find an audit checklist that provided a comprehensive set of tests for both procedural and technical controls. Nevertheless, audit checklists designed specifically for Netscreen firewalls were not nearly as common. A Google search for "Netscreen audit" returned only 3,010 hits. Moreover, I was unable to locate a single audit checklist written specifically for the Netscreen 100.

Description of Research Process

I began my research by using a standard set of search queries on various Internet search engines. The search engines and search queries are summarized in Table 4.

Table 4. Search Engines and Queries Used

Search Engine	Search Queries
www.google.com	firewall audit
www.altavista.com	Netscreen audit
www.metacrawler.com	Netscreen 100 audit
www.yahoo.com	ScreenOS audit

Next, I consulted specific sites, that specialize in information systems security and information systems security audit. These sites included:

- SecurityFocus (http://www.securityfocus.com/)
- AuditNet (http://www.auditnet.org/)
- ISACA – Information Systems Audit and Control Association (http://www.isaca.org/)

- SANS Reading Room (http://rr.sans.org)
- SANS Posted Practicals for GIAC Systems and Network Auditor (GSNA) and GIAC Certified Firewall Analysts (GCUX) – (http://www.giac.org/cert.php)

Finally, I consulted numerous security reference books in my own personal library. As a result, I was able to locate a number of resources I could use in developing an audit checklist for the Netscreen 100. In this section, I will briefly summarize the highlights of some of the more interesting audit checklists and related material I was able to locate.

Dan Strom's Netscreen-5 Audit Checklist

In his practical for GSNA certification, Dan Strom developed an audit checklist for Netscreen-5s.[5] The Netscreen-5 is the smallest appliance in the Netscreen product line; it is suitable for small office or home office usage. Strom's checklist includes specific audit tests to check the strength of administrative options such as the version of ScreenOS, enabling of built-in Netscreen options for blocking certain kinds of attacks, standard firewall ruleset checks, and VPN configuration.

Stephen Gill's Checklist for Hardening Netscreen Firewalls

In the course of my research, I also discovered an interesting paper by Stephen Gill describing various methods for hardening Netscreen firewalls.[6] (Gill's paper focuses on Netscreen-500s, but most of his suggestions can also be implemented on Netscreen-100s.) Although not written as an audit checklist, all of Gill's hardening steps could be useful in building an audit checklist for Netscreen-100s.

Terry Cavendar's Checkpoint Firewall Audit Work Program

Cavendar's Checkpoint firewall audit work program is another example of a related audit checklist that could be useful in building an audit checklist specifically for Netscreen-100s.[7] Cavendar's work program includes an examination of firewall documentation, logical access, configuration, logs, physical security, business continuity, as well as port scanning the firewall from all interfaces.

Cheswick, Bellovin, and Rubin's List of "Particularly Serious Risks" for Firewalls

In the second edition of their landmark book *Firewalls and Internet Security: Repelling the Wily Hacker,* respected security professionals William R. Cheswick, Steven M. Bellovin, and Aviel D. Rubin provide a list of "particularly serious risks" for Internet firewalls in general.[8] The list is exclusively composed of technical vulnerabilities and includes such items as, "IP source routing can subvert address-based authentication," "UDP-based services can be abused to create broadcast storms," and so forth.

[5] Strom.
[6] Gill.
[7] Cavendar.
[8] Cheswick, Bellovin, and Rubin, pp. 389-390.

Lance Spitzner's Firewall Audit Methodology

In his article, "Auditing Your Firewall Setup," Lance Spitzner describes a generic methodology for auditing firewalls.[9] Spitzner's methodology consists of two steps. First, the auditor must test the firewall itself. Second, the auditor must test the rulebase to determine if unauthorized traffic can pass through the firewall. Spitzner's article describes specific tests that can be performed under each step.

AuditNet's Generic Firewall Work Program

I chose to include the generic firewall work program on the AuditNet website because it provided the most comprehensive set of tests relating to non-technical controls.[10] Specific areas of testing include firewall management practices, maintenance, policies and procedures concerning the operation and maintenance of the firewall (not to be confused with ACLs or what Netscreen calls "policies"), and documentation.

Charles Cresson Wood's Information Security Policies Made Easy

Finally, I used Charles Cresson Wood's popular book, Information Security Policies Made Easy.[11] Although the book is designed primarily as a reference work on information security policies, it also contains an excellent discussion of the risks associated with not having each policy.

[9] Spitzner, Lance. "Auditing Your Firewall Setup." URL: http://www.spitzner.net/audit.html (8 July 2003).
[10] "Firewall Review." URL: http://www.auditnet.org/docs/Firewall%20Review%20May%2028,%202004.pdf (8 July 2003).
[11] Wood, Charles Cresson. Information Security Policies Made Easy. 8th ed. Houston: Pentasafe, 2001.

Assignment 2 – Create an Audit Checklist

Introduction

The object of this checklist is to assist one in performing an audit of a network perimeter. Completion of this checklist will require the usage of freeware tools, including nmap, Nessus, and some mechanism for capturing network packets (e.g., Snort).

Note: Several of these tests have the potential to be disruptive. Be sure to obtain proper authorization before conducting this audits; the only thing that differentiates legitimate auditors from the bad guys is having permission.

Scope

The scope of the network perimeter audit is limited to the firewall protecting the company's e-commerce environment. The tests performed as part of this audit fall into the following categories.

- Change Management
- System Hardening
- Netscreen-100 Policies / Non-Leakage
- Ability to withstand specific attacks
- High Availability
- Logging

Conventions

The Netscreen-100 Audit Checklist is organized as a table for convenience. The columns of the checklist may be summarized as follows:

Control Objective and Reference: the control objective summarizes one or more particular control objectives for the system to be audited. Remember that the "Firewall Security Control Objectives" were summarized in Assignment 1, Table 1. The reference provides the source for the item.

Risk: what can go wrong, how likely that event is, and the consequences of that event.

Compliance: how the auditor can *know* if the system is compliant.

Testing: how the auditor can *check* to see if the system is compliant. When appropriate, commands to be issued at the command-line interface (CLI) are displayed in **`Terminal Bold`** font.

Type: the "type" column in the audit checklist is used to identify whether a given test is objective ("O") or subjective ("S").

Netscreen-100 Audit Checklist

#	Control Objective and Reference	Risk	Compliance	Test	Type
A. Change Management Section					
1	CO13. Firewall policies must not be changed unless the proposed change(s) have been approved by both the Security team and the Change Control Board (CCB). Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 134.	Firewall changes that are not approved by Security or the CCB risk disrupting critical production systems, not to mention creating unnecessary security exposures.	This is a binary compliance item. The firewall is compliant if all variations between the current configuration and the baseline configuration are documented in formal, approved CCB change tickets. Otherwise, the firewall is not compliant.	Verify that all changes to the firewall policies were authorized by the CCB, by performing the following steps. First, compare the current firewall configuration against the baseline configuration. Second, validate that all configuration changes were formally approved in an official CCB change ticket.	O
B. Firewall Hardening Section					
1	CO3. The firewall(s) must be kept current with the latest vendor upgrades, security patches, and security problem fix software.	Older versions or un-patched versions of operating systems often have security vulnerabilities that are exploitable either	There is a range of conditions for compliance for this item. If the Netscreen-100 is running the latest	Verify that the latest patches have been applied to the firewall software or appliance. Consult the firewall vendor's website to determine which patches or upgrades are available. Then compare that information to	O

	Reference: Spitzner, Lance. “Auditing Your Firewall Setup.” December 12, 2000. URL: http://www.spitzner.net/audit.html (8 July 2003).	remotely or locally on the server.	version of the ScreenOS, it is compliant. If the Netscreen-100 is running an older version but newer version(s) do not address security vulnerabilities, it is compliant. Otherwise, the system is non-compliant.	the current firewall configuration. - **`get system`** The software version will appear near the top of the output and look similar to the following: `SW Version/Checksum: 3.0.3r6.0/6b60e662` - Compare that output with the list of current releases on the Netscreen website at <http://www.netscreen.com/services/download_soft/current_releases.jsp>. - If the firewall is not running the latest version, investigate vendor documentation to determine if the latest software version fixes known security vulnerabilities.	
2	CO19. The audit trail or log must include action taken by administrators, including user IDs; login date/time; log-out date/time; changes to policies; changes or additions to user privileges; and system start-ups and shut-downs. Reference: Garfinkel, Simson and Gene Spafford. Practical Unix & Internet Security. Second ed. O'Reilly & Associates, 1996, p. 513.	If the system clock is not accurate, it becomes more difficult to correlate events among the firewall logs and other sources of data.	This is a binary compliance item. A system is compliant if the displayed system clock date, time, and time zone are accurate. Otherwise, the system is not compliant.	Verify the system clock date, time, and time zone on the firewall is accurate. - **`get clock`** - Compare the system date and time displayed in the upper-right hand corner against a trusted time source.	O

		If the firewall is not configured to synchronize its system clock with a reliable, accurate timeserver, it becomes more difficult to correlate events in the firewall logs with events in other logs (i.e., Unix syslogs). *Note: determining the accuracy of the local time server is outside the scope of this audit.*	This is a binary compliance item. A system is compliant if the firewall has been configured to synchronize its system clock with a local time server. In response to the audit command, compliant firewalls will respond with "NTP is enabled." Otherwise, the system is not compliant.	Verify the accuracy of the Network Time Protocol (NTP) server settings. • **`get ntp`**	O
3	CO11. Only authorized personnel may be permitted to administer the firewall(s). Administrative access to the firewall(s) must be strictly limited to those personnel responsible for maintaining the firewall(s). Reference: Lowder, Jeffery J. "Firewall Management and Internet Attacks." Information Security Management Handbook. Ed. Harold F. Tipton and Mi[k]ki Krause. 4th ed. Vol.	Management access to the firewall should be restricted in order to ensure the firewall is not susceptible to an exploit that could result in an attacker being able to login to the firewall. There is no reason why web management sessions initiated from a non-company IP address should be allowed. (Note: this statement does not	This is a binary compliance item. A system is compliant if management of the firewall has been restricted to a source IP address that resides within the company's network. Otherwise, the system is not compliant.	Ensure that management of the firewall is only permitted from a valid company source IP address. • **`get admin`** `(look for the lines that begin with "Mng Host IP")` • Compare that output with documentation or interviews with network administrators regarding the company's network address space.	O

	1. Boca Raton, Florida: Auerbach, 2000, p. 126.	apply to web management sessions initiated over a VPN connection.)			
4	CO11. Only authorized personnel may be permitted to administer the firewall(s). Administrative access to the firewall(s) must be strictly limited to those personnel responsible for maintaining the firewall(s). Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 87.	The intention of this policy is to ensure that no unauthorized persons access organizational computers or communication systems.	This is a binary compliance item. A system is compliant if administrative access can be gained only after successful authentication. Otherwise, the system is not compliant.	Verify that firewall administrators must be authenticated by attempting to establish a management session. • Initiate an SSH session to the management interface of the firewall(s). • Initiate an HTTPS connection to the management interface of the firewall(s).	O
5	CO11. Only authorized personnel may be permitted to administer the firewall(s). Administrative access to the firewall(s) must be strictly limited to those personnel responsible for maintaining the firewall(s). • If supported by the firewall, strong authentication should be required for administrative access to	Strong authentication greatly decreases the likelihood of administrative access by an unauthorized user.	This is a binary compliance item. A system is compliant if administrative access requires strong authentication (i.e., RADIUS). Otherwise, the system is not compliant.	If applicable, ensure that strong authentication is required for firewall administration, by attempting to log onto the firewall. • **`get auth`** `(look for the line that begins with "User authentication type")`	O

	the firewalls. The strong authentication shall consist of two factors. First, the user will be required to supply a one-time password generated by a SecurID "keyfob." (The Netscreens support this indirectly through a RADIUS server.) Second, the user will be required to supply a reusable password. Reference: International Standards Organization. ISO 17799: Information Technology—Code of Practice for Information Security Management. London: BSI, 2000, p. 35.				
6	CO11. Only authorized personnel may be permitted to administer the firewall(s). Administrative access to the firewall(s) must be strictly limited to those personnel responsible for maintaining the firewall(s). Reference: International	Providing access on the firewall to users without a business need significantly increases security risks.	This is a binary compliance item. A system is compliant if the only user accounts on the system belong to actual administrators of the firewall(s). Otherwise, the	Ensure that the only personnel with accounts on the firewall are those with a business need for such accounts. • **`get admin user`**	O

	Standards Organization. ISO 17799: Information Technology—Code of Practice for Information Security Management. London: BSI, 2000, p. 34.		system is not compliant.		
7	CO12. Firewall administrators must have at least two user-IDs. One of these user-IDs (e.g., root) must provide privileged access and have its activities be logged; the other must be a normal user-ID for the day-to-day work of an ordinary user. Reference: International Standards Organization. ISO 17799: Information Technology—Code of Practice for Information Security Management. London: BSI, 2000, p. 34.	If each firewall administrator does not have their own account, it becomes more difficult to track administrative activities back to a particular user, decreasing accountability.	This is a binary compliance item. A system is compliant if each firewall administrator has his or her own unique account and uses that account for day-to-day administration. Otherwise, the system is not compliant.	Ensure that each firewall administrator has his or her own unique account. • `get admin user` • Compare the output of that command with a list of known firewall administrators. Then verify that the firewall administrators are using their personal (unique) accounts for firewall administration by checking the logs: • `get log event` Then verify that administrative is logged by modifying a policy and then checking the logs: • `get log event`	O

8	CO14. Firewall management sessions are extremely sensitive and must be encrypted. Reference: International Standards Organization. ISO 17799: Information Technology—Code of Practice for Information Security Management. London: BSI, 2000, pp. 9-10.	Forcing all management sessions through SSH or SSL tunnels inserts another layer of protection against eavesdropping attacks. This is especially significant if password authentication is used for management sessions.	This is a binary compliance item. A system is compliant if the following conditions apply to each interface: • "telnet disabled" • If web management is allowed ("web enabled"), the sessions are encrypted via SSL ("SSL enabled"). Otherwise, the system is not compliant.	Ensure that remote management of the firewall may only be performed via SSH or SSL. Telnet and (non-SSL) HTTP access must be disabled. Get a list of all interfaces by issuing the following command: • **`get interface`** Then, for each interface, issue the following command: • **`get interface <interface>`**	O
9	Web management sessions that have been idle for 10 minutes should be timed out. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 68.	The longer a management session is idle, the greater the risk of an unauthorized person gaining privileged access to the firewall.	This is a binary compliance item. A system is compliant if a web management idle timeout has been set for 10 minutes or fewer. Otherwise, the system is not compliant.	Verify that a web management idle timeout has been set for 10 minutes or fewer. • **`get admin auth`**	O

C. Netscreen-100 Policies / Non-Leakage Section					
1	CO15. IP spoofing detection must be enabled on the firewall. Reference: Cheswick, William R., Steven M. Bellovin, and Aviel D. Rubin. Firewalls and Internet Security: Repelling the Wily Hacker. Second ed. Boston: Addison-Wesley, 2003, p. 20; Northcutt, Stephen. Mark Cooper, Matt Fearnow, and Karen Frederick. Intrusion Signatures and Analysis. Boston: New Riders, 2001, p. 143.	In an IP Spoof attack, the attacker attempts to bypass firewall security by imitating a valid client IP address. When protection is enabled, the NetScreen device checks its own route table before permitting the traffic to pass through. If the originating IP address is not in the device route table, the device denies traffic from that source and drops any packets from it.	This is a binary compliance item. A system is compliant if "IP Address Spoofing Protection" has been set to "On". Otherwise, the system is not compliant.	Verify that IP Spoofing detection is enabled on the firewall. • **`get firewall`** `(look for the line that begins with "IP Address Spoofing Protection")`	O
2	CO7. All ports on the firewall itself should be disabled by default; only ports that have been specifically authorized should be open. Reference: The SANS Institute, “7.2 Auditing the Perimeter” (2003), p. 4-6.	The more services that are allowed by the firewall, the greater the risk of a security compromise.	This is a binary compliance item. A system is compliant if all ports have been disabled by default and only specific, authorized ports have been opened. Otherwise, the system is not compliant.	Port scan the firewall itself, scanning for ICMP, TCP, and UDP. • **`nmap –T Aggressive -sP <ip address range> -oN <output file>`** • **`nmap –P0 –T Aggressive -sT <ip address range> -oN <output file>`** • **`nmap –P0 –T Aggressive -sU <ip address range> -`**	O

				oN <output file>	
3	CO2 and CO4. For any network protected by a firewall, the firewall must be the single point of connection between the untrusted network and the protected network. The firewall(s) must act as a single point of network access where traffic can be analyzed and controlled. Reference: Lowder, Jeffery J. "Firewall Management and Internet Attacks." Information Security Management Handbook. Ed. Harold F. Tipton and Mi[k]ki Krause. 4th ed. Vol. 1. Boca Raton, Florida: Auerbach, 2000, p. 117.	It is impossible to control the volume and type of traffic entering and leaving the network if there is an undocumented or unauthorized access point such as modems, other firewalls, or network drops patched directly to the hub outside the firewall. The firewall cannot protect against traffic that does not pass through it.	This is a binary compliance item. The firewall is compliant if it is the single point of connection between the untrusted network and the protected network. If the **traceroute** output does not consistently list the firewall (or a blank hop representing the firewall) for each machine, this may indicate the machine is not firewalled and hence the firewall is not compliant. Otherwise, the system is not compliant.	Determine if the firewall is the single point of connection to the untrusted network from the protected network. First, check the hosts on the firewall's DMZ interface. • **nmap -v -P0 -T Aggressive -g 22 -sA <IP address> -o <output file>** • **traceroute <IP address>** `(repeat for each individual machine on the DMZ interface)` Then repeat the above steps for machines on the firewall's trusted interface.	O
4	CO1, CO5, and CO6. An e-commerce system on a production network must be specially segregated from the rest of the production network through an	A firewall that allows unauthorized traffic to pass through it increases the exposure of protected servers. It	This is a binary compliance item. A system is compliant if all ports have been disabled by default in both	Validate that the firewall is accepting ONLY the traffic that you allow, by scanning every network segment from every other network segment to see what packets can and cannot get through the firewall. For each	O

	additional layer of security provided by one or more dedicated internal firewalls. The firewall(s) should control any application and infrastructure management flows in *both* directions. The firewall(s) must deny by default any services not explicitly authorized. Reference: The SANS Institute, “7.2 Auditing the Perimeter” (2003), p. 4-25.	is important to ensure that the firewall is passing only allowed inbound traffic. Effective outbound filtering is also important. Why? Because of outbound hacking, unauthorized use, risky behavior, and Trojan program activity.	directions and only specific, authorized ports have been opened. Otherwise, the system is not compliant.	segment-to-segment test, you will place your auditing system on one side of the firewall and scan a target host on the other side of the firewall. Run a sniffer on the other side or monitor network intrusion detection system (NIDS) logs to record any packets that pass through the firewall: • **`tail –f fast.alert`** Once tcpdump is running, then initiate the scan: • **`nmap –v –T Aggressive -sP <IP address> -o <output file>`** • **`nmap –v –P0 –T Aggressive -g 22 -sA <IP address> -o <output file>`** • **`nmap –v –P0 –T Aggressive -g 53 -sU <IP address> -o <output file>`** If the firewall has a dedicated interface for a screened service network (SSN, sometimes called a demilitarized zone or DMZ), position the audit system on the SSN and attempt to penetrate the internal	

				network. If possible, take one of your production systems offline and replace the IP address with your auditing system. This simulates if one of your SSN systems is compromised and that your internal network is still protected by the firewall.	

5	CO5. The firewall(s) should control any application and infrastructure management flows in *both* directions. CO10. The firewall(s) must be able to hide details of the internal network architecture through various methods, including but not limited to the use of Network Address Translation (NAT) with RFC 1918 addressing. • ICMP responses should be limited to routers and hosts in the SSN. • Outbound ICMP should be blocked unless needed by a particular application to work. If necessary, the destination IP addresses should be restricted. Reference: The SANS Institute, “7.4 Network Auditing Essentials” (2003), pp. 6-9 and 6-21.	ICMP is extremely useful for network troubleshooting and maintenance. Unfortunately, it is also extremely useful for attacks and reconnaissance. Examples include: (1) the combination of source routing and spoofing is dangerous; and (2) inbound ICMP redirects. While "security through obscurity" as the *only* layer of security is unwise, obscurity *can* be useful as *one of several* layers of security.[12] Outbound ICMP is also risky. Examples include: (1) if “host unreachable” messages are not filtered, an attacker can determine which IP addresses represent valid, running hosts; and (2) the ability to “tunnel” traffic through specially crafted ICMP packets (e.g., Stacheldraht which uses echo-	This is a binary compliance item. A system is compliant if both of the following conditions are true. (1) ICMP responses are limited to routers and hosts in the SSN. (2) Outbound ICMP is blocked in all cases except where needed. If needed, the destination IP addresses must be restricted. Otherwise, the system is not compliant.	Audit inbound ICMP rules using nmap. • **`nmap –T Aggressive –sP <ip address range> -o <output file>`** Audit outbound ICMP rules using nmap. • **`nmap –T Aggressive –sP <ip address range> -o <output file>`**	O

6	CO5 and CO6. The firewall(s) should control any application and infrastructure management flows in *both* directions. The firewall(s) must deny by default any services not explicitly authorized. Reference: The SANS Institute, “7.4 Network Auditing Essentials” (2003), p. 6-23.	If a site reveals open ports in response to a SYN scan, an attacker may be able to perform reconnaissance without appearing in the logs. Effective outbound filtering is also important, given that it can limit outbound hacking, unauthorized use, risky behavior, and Trojan program activity.	This is a binary compliance item. The firewall is compliant if does not reveal open ports in response to a SYN scan. Otherwise, the system is not compliant.	Audit inbound TCP rules with a “SYN” scan, by running nmap -sS. • **`nmap -P0 -T Aggressive -sS <ip address range> -o <output file>`** *Note: SYN scans do not work against proxy firewalls.*	O
				Audit *outbound* TCP rules with a “SYN” scan. • **`nmap -P0 -T Aggressive -sS <ip address range> -o <output file>`**	O
7	CO5 and CO6. The firewall(s) should control any application and infrastructure management flows in *both* directions. The firewall(s) must deny by default any services not explicitly authorized. Reference: The SANS Institute, “7.4 Network Auditing Essentials” (2003), p. 6-29.	A firewall that allows unauthorized traffic to pass through it increases the exposure of protected servers. It is important to ensure that the firewall is passing only allowed inbound traffic. Effective outbound filtering is also important, given that it can limit outbound hacking, unauthorized use, risky behavior, and Trojan program activity.	This is a binary compliance item. The firewall is compliant if does not reveal unauthorized TCP ports. Otherwise, the system is not compliant.	Audit inbound TCP rules with a TCP Full Connect Scan, by running nmap -sT. • **`nmap -P0 -sT <ip address range> -o <output file>`** *Note: TCP Full Connect scans do not require root privilege. Since Full Connect scans complete the 3-way handshake, they should be logged by Unix hosts.*	O

				Audit *outbound* TCP rules with a TCP Full Connect Scan. • **nmap –P0 –sT <ip address range> -o <output file>**	O
				Audit inbound UDP rules with a UDP scan, by running nmap -sU. • **nmap –P0 –sU <ip address range> -o <output file>** *Note: performing UDP scans with nmap requires root privilege.*	O
				Audit outbound UDP rules with a UDP scan. • **nmap –P0 –sU <ip address range> -o <output file>**	O
8	CO6. All services should be disabled on each host by default. Only those services that are actually needed should be enabled. Reference: Spitzner, Lance. "Auditing Your Firewall Setup." December 12, 2000. URL: http://www.spitzner.net/audit.html (8 July 2003).	Even if there are no known vulnerabilities against a specific service, there is no reason to risk system compromise by running a service if it is not needed.	This is a binary compliance item. The firewall is compliant if services are disabled by default. Otherwise, the system is not compliant.	Verify that no extraneous ports are open on machines in the SSN, by conducting both TCP connect and UDP scans against each host in the SSN. • **nmap –sT <IP address> -o <output file>** • **nmap –sU <IP address> -o <output file>** *Note: be sure to schedule the scanning time in advance with operations.*	O
9	CO9. No vulnerable	If a vulnerable	This is a binary	Verify that no vulnerable services	O

	services should be accessible through the perimeter’s countermeasures. Reference: The SANS Institute, “7.4 Network Auditing Essentials” (2003), p. 6-48.	service is accessible through the perimeter’s countermeasures, then an attacker who knows how to exploit the vulnerable service will be able to successfully attack the system.	compliance item. The firewall is compliant if no vulnerable services are accessible through the perimeter's countermeasures. Otherwise, the system is not compliant.	can be accessed through the perimeter’s countermeasures. Use nmap to scan behind the firewall for “internal” hosts that run the externally accessible services identified in steps 5-8. • **`nmap –sT <IP address range> -p <port range>`** • **`nmap -sU <IP address range> -p <port range>`** Since this (hopefully) is a much-reduced set of ports, the scan should go much more quickly. The result of this scan is a list of which hosts run which services in our “permitted services” list. Using that list, then target the hosts in that list with Nessus. • Access a server running Nessus via the Nessus client to conduct the vulnerability assessment. The Nessus client/server configuration is beyond the scope of this document. The product of this step is a list of hosts running vulnerable services, which can be accessed through the	

				perimeter's countermeasures.	
10	CO7. All ports on the firewall itself should be disabled by default; only ports that have been specifically authorized should be open. Reference: Spitzner, Lance. "Auditing Your Firewall Setup." December 12, 2000. URL: http://www.spitzner.net/audit.html (8 July 2003).	Even if there are no known vulnerabilities against a specific service, there is no reason to risk system compromise by running a service if it is not needed. The more services that are allowed by the firewall, the greater the risk of a security compromise.	This is a binary compliance item. The firewall is compliant if all of the policies have been used in the last three months. Otherwise, the system is not compliant.	Conduct a manual review of the firewall policies (rules). For each rule, verify that the policy is actually being used, by searching for evidence that it has been used in the last three months. First, get a list of all policies. • **`get policy`** Next, get the traffic log for each policy. • **`get log traffic policy <policy ID>`** *Note: depending on how far back the logs are stored on the Netscreen-100 itself, you may need to check the logs on the syslog server.*	O
11	CO5. The firewall(s) should control any application and infrastructure management flows in *both* directions. • The firewall must be able to properly handle fragmented IP packets. Reference: The SANS Institute, "7.4 Network	Packet fragmentation can be used to bypass firewalls. The idea is to break a packet up into little bitty pieces and send them one at a time. For example, the ACK or SYN bits in a TCP packet could end up in a different	This is a binary compliance item. The firewall is compliant if it is able to handle fragmented IP packets. Otherwise, the system is not compliant.	Verify the firewall's ability to handle fragmented IP packets. • **`nmap –f –sT <ip address>`**	O

	Auditing Essentials” (2003), p. 6-24.	fragment from the port number. The fragments are then reassembled on the other side of our firewall (at the destination host); they pass unmolested. In these situations, a firewall cannot know if it should let something through, because it does not know if it is part of an existing conversation. There is thus little information on which to base a filtering decision.			

D. Ability to Withstand Specific Attacks Section					
1	CO5. The firewall(s) should control any application and infrastructure management flows in *both* directions. • Source-routed packets must be denied or dropped by the firewall. Reference: Northcutt, Stephen, Lenny Zeltser, Scott Winters, Karen Kent Frederick, and Ronald W. Ritchey. Inside Network Perimeter Security. Boston: New Riders, 2003, p. 156; The SANS Institute, “7.2 Auditing the Perimeter” (2003), p. 3-70.	Using source-routed packets, an attacker can enter a network with a false IP address and have data from the network sent to his actual IP address.	This is a binary compliance item. The firewall is compliant if the "Source Route IP Option Filter" has been set to "On". Otherwise, the system is not compliant.	Validate that source-routed packets are denied or dropped by the firewall. • `get firewall` (look for the line that begins with "Source Route IP Option Filter")	O
2	CO8. The firewall(s) should protect the e-commerce system against denial of service attacks and any unauthorized access to the e-commerce system. • SYN attack detection must be enabled on the firewall.	A SYN Flood attack inundates a site with SYN packets containing forged (“spoofed”) IP source addresses with nonexistent or unreachable addresses. The firewall responds with SYN/ACK packets to	This is a binary compliance item. The firewall is compliant if "SYN Flood Protection" has been set to "On". Otherwise, the system is not compliant.	Verify that SYN attack detection has been enabled on the firewall. • `get firewall` (look for the line that begins with "Syn Flood Protection")	O

	Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 103; cf. Northcutt, Stephen. Mark Cooper, Matt Fearnow, and Karen Frederick. Intrusion Signatures and Analysis. Boston: New Riders, 2001, p. 198.	these addresses and then waits for responding ACK packets. Because the SYN/ACK packets are sent to nonexistent or unreachable IP addresses, they never elicit responses and eventually time out. By flooding a server or host with connections that cannot be completed, the attacker eventually fills the host's memory buffer. Once this buffer is full, no further connections can be made and the host's operating system might be damaged. Either way, the attack disables the host and its normal operations. A SYN Flood attack is classified as a denial-of-service (DoS) attack.			

3	CO8. The firewall(s) should protect the e-commerce system against denial of service attacks and any unauthorized access to the e-commerce system. - ICMP flood detection must be enabled on the firewall. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 103; cf. Northcutt, Stephen. Mark Cooper, Matt Fearnow, and Karen Frederick. Intrusion Signatures and Analysis. Boston: New Riders, 2001, p. 198.	An ICMP flood occurs when ICMP echo requests are broadcast with the purpose of flooding a system with so much data that it first slows down, and then times out and is disconnected. An ICMP flood is classified as a DOS attack.	This is a binary compliance item. The firewall is compliant if "ICMP Flood Detection" has been set to "On". Otherwise, the system is not compliant.	Verify that ICMP Flood detection has been enabled on the firewall. - **`get firewall`** `(look for the line that begins with "ICMP Flood Detection")`	O

4	CO8. The firewall(s) should protect the e-commerce system against denial of service attacks and any unauthorized access to the e-commerce system. • UDP flood detection must be enabled on the firewall. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 103; cf. Gill, Stephen. "Application Note: Hardening Netscreen Firewalls." Version 1.2. 18 July 2002. URL: http://www.qorbit.net/documents/screenos-hardening-appnote.pdf (8 July 2003).	UDP flooding occurs when UDP packets are sent with the purpose of slowing down the system to the point that it can no longer process valid connection requests. A UDP flood is classified as a DoS attack.	This is a binary compliance item. The firewall is compliant if "UDP Flood Detection" has been set to "On". Otherwise, the system is not compliant.	Verify that UDP Flood detection has been enabled on the firewall. • **`get firewall`** `(look for the line that begins with "UDP Flood Protection")`	O

5	CO8. The firewall(s) should protect the e-commerce system against denial of service attacks and any unauthorized access to the e-commerce system. • Ping of Death detection must be enabled on the firewall. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 103; cf. Northcutt, Stephen. Mark Cooper, Matt Fearnow, and Karen Frederick. Intrusion Signatures and Analysis. Boston: New Riders, 2001, p. 316.	Although the TCP/IP protocol specifies a specific packet size, some ping implementations permit users to set a desired packet size. In a Ping of Death attack, the attacker sends a packet of a size that greatly exceeds the maximum limit for TCP/IP, resulting in DoS, and crashing, freezing, and rebooting of the firewall.	This is a binary compliance item. The firewall is compliant if "Ping-of-Death Protection" has been set to "On". Otherwise, the system is not compliant.	Verify that Ping of Death detection has been enabled on the firewall. • **`get firewall`** `(look for the line that begins with "Ping-of-Death Protection")`	O

6	CO8. The firewall(s) should protect the e-commerce system against denial of service attacks and any unauthorized access to the e-commerce system. - Teardrop attack detection must be enabled on the firewall. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 103; cf. Northcutt, Stephen. Mark Cooper, Matt Fearnow, and Karen Frederick. Intrusion Signatures and Analysis. Boston: New Riders, 2001, pp. 304-11.	In a Teardrop attack, the attacker changes one of the options in an IP header so that the sum of the offset and one fragmented packet differ from that of the next fragmented packet. This causes the packets to overlap, which can cause the server attempting to reassemble the packet to crash. These packets are dropped when the NetScreen device detects the discrepancy.	This is a binary compliance item. The firewall is compliant if "Tear Drop Protection" has been set to "On". Otherwise, the system is not compliant.	Verify that Tear Drop Attack detection has been enabled on the firewall. - **`get firewall`** `(look for the line that begins with "Tear Drop Protection")`	O

7	CO10. The firewall(s) must be able to hide details of the internal network architecture through various methods, including but not limited to the use of Network Address Translation (NAT) with RFC 1918 addressing. • Port Scan Attack detection must be enabled on the firewall. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 103; cf. Northcutt, Stephen. Mark Cooper, Matt Fearnow, and Karen Frederick. Intrusion Signatures and Analysis. Boston: New Riders, 2001, pp. 304-11.	In a Port Scan attack, the attacker sends packets that have different port numbers to scan the available services and find a port that responds.	This is a binary compliance item. The firewall is compliant if "Port Scan Protection" has been set to "On". Otherwise, the system is not compliant.	Verify that Port Scan Attack detection has been enabled on the firewall. • `get firewall` (look for the line that begins with "Port Scan Protection")	O

8	CO10. The firewall(s) must be able to hide details of the internal network architecture through various methods, including but not limited to the use of Network Address Translation (NAT) with RFC 1918 addressing. - Address Sweep Attack Detection must be enabled on the firewall. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 103; cf. Cheswick, William R., Steven M. Bellovin, and Aviel D. Rubin. Firewalls and Internet Security: Repelling the Wily Hacker. Second ed. Boston: Addison-Wesley, 2003, p. 4.	The Address Sweep attack is similar to the ICMP Flood attack; the attacker sends ICMP echo requests (pings) to different destination addresses to locate one that responds. The responding address is targeted by the attacker.	This is a binary compliance item. The firewall is compliant if "IP Sweep Protection" has been set to "On". Otherwise, the system is not compliant.	Verify that Address Sweep Attack detection has been enabled on the firewall. - **`get firewall`** `(look for the line that begins with "IP Sweep Protection")`	O

9	CO8. The firewall(s) should protect the e-commerce system against denial of service attacks and any unauthorized access to the e-commerce system. • Land Attack detection must be enabled on the firewall. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 103; cf. Northcutt, Stephen. Mark Cooper, Matt Fearnow, and Karen Frederick. Intrusion Signatures and Analysis. Boston: New Riders, 2001, pp. 190-195.	When launching a Land Attack, the attacker sends spoofed SYN packets that contain the IP address of the victim as both the source IP address and the destination IP address, thus creating a combination of IP spoofing and a SYN attack. When this happens, the receiving system sends the SYN-ACK packet to itself, creating an empty connection that continues until the time exceeds the system's Idle Timeout threshold. A flood of these empty connections overwhelms the system and results in DoS.	This is a binary compliance item. The firewall is compliant if "Land Attack Protection" has been set to "On". Otherwise, the system is not compliant.	Verify that Land Attack detection has been enabled on the firewall. • **`get firewall`** `(look for the line that begins with "Land Attack Protection")`	O

E. High Availability (HA) Section					
1	CO16. The firewall architecture must provide high availability by having two firewalls in parallel, so that if one firewall fails, traffic can seamlessly flow through the other. <u>Reference:</u> The SANS Institute, "7.2 Auditing the Perimeter" (2003), p. 4-37.	If the firewall does not detect the failure of the HA link between the master and the slave, the HA feature will not work.	This is a binary compliance item. The firewall is compliant if the HA link failure detection works. If the firewall state was "master" before the test, it should be "slave" after the test (and vice versa). Otherwise, the system is not compliant.	First, identify which firewall in the HA pair—either the master or the slave—is currently active. • **`get ha`** `(look for the line that begins "state:")` Next, verify the high availability (HA) link failure detection. • Unplug the interface cables between the HA master and the HA slave. Then determine if the other firewall is active. • **`get ha`** *Note: Be sure to schedule the testing time in advance with operations.*	O
2	CO17. All HA master-slave firewall pairs must maintain synchronized configurations. <u>Reference:</u> The SANS Institute, "7.2 Auditing the Perimeter" (2003), p. 4-37.	Before you can run your NetScreen-100 in an HA configuration, the master unit and the slave unit must have identical system configurations.	This is a binary compliance item. The firewall is compliant if the master and slave have synchronized configurations. Otherwise, the system is not compliant.	Check to see if there are any log entries in the Event Alarm complaining of "inconsistent configuration between master and slave". • **`get log event`**	O

3	CO14. Firewall management sessions are extremely sensitive and must be encrypted. • HA traffic must be authenticated and encrypted. Reference: Gill, Stephen. "Application Note: Hardening Netscreen Firewalls." Version 1.2. 18 July 2002. URL: http://www.qorbit.net/documents/screenos-hardening-appnote.pdf (8 July 2003), p. 11.	If HA traffic is not encrypted, it is theoretically possible for an attacker to learn policy and topology information. If HA traffic is not authenticated, it is possible for an attacker to make unauthorized modifications to the policies. These attacks are not possible, however, if a crossover cable is used.	This is a binary compliance item. The firewall is compliant if HA traffic encryption and authentication are set to "enable". Otherwise, the system is not compliant.	Verify that HA traffic is authenticated and encrypted. • `get ha` (look for "encryption:" and "authentication:")	O

F. Logging Section

1	CO18. The firewall(s) must provide an audit trail or log of all attempted and successful network connections. Reference: Spitzner, Lance. "Auditing Your Firewall Setup." December 12, 2000. URL: http://www.spitzner.net/audit.html (8 July 2003); Gill, Stephen. "Application Note: Hardening Netscreen Firewalls." Version 1.2. 18 July 2002. URL: http://www.qorbit.net/documents/screenos-hardening-appnote.pdf (8 July 2003), p. 6.	Firewall logs are an important source of data for network troubleshooting and for security incident response. If the firewall is not capturing the proper log data, this may adversely affect network troubleshooting or security incident response.	This is a binary compliance item. The firewall is compliant if the firewall is logging as expected. Otherwise, the system is not compliant.	Manually inspect each policy and verify that each policy has been configured to record an entry in the log file whenever traffic matches the conditions specified in the policy. • **`get policy`** `(look for the column titled "STLC" to the far right)` STLC stands for "Schedule, Traffic, Log, and Content." If logging for a given policy has been enabled, you should see an "X" in the third character position. For example: `--X-` If logging has not been enabled, you will see an "-" in the third character position.	O

2	CO19. The audit trail or log must include action taken by administrators, including user IDs; login date/time; log-out date/time; changes to policies; changes or additions to user privileges; and system start-ups and shut-downs. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, pp. 102-109.	Such logs could be useful when troubleshooting connectivity problems. In addition, although a malicious firewall administrator could erase any logs on the firewall, there is some security value in logging administrative activity.	This is a binary compliance item. The firewall is compliant if the firewall records administrative activity. Otherwise, the system is not compliant.	Verify that the firewall records all firewall management activity. • `get log event` Inspect the log entries to determine if administrative activity is in fact logged. If you cannot find evidence that a particular type of administrative activity, consider making the relevant kind of test change to force the appropriate kind of confirmation to appear in the Netscreen-100's event log.	O

3	C20. Firewall logs must be stored on a dedicated syslog server. Reference: Cheswick, William R., Steven M. Bellovin, and Aviel D. Rubin. Firewalls and Internet Security: Repelling the Wily Hacker. Second ed. Boston: Addison-Wesley, 2003, p. 159; cf. Gill, Stephen. "Application Note: Hardening Netscreen Firewalls." Version 1.2. 18 July 2002. URL: http://www.qorbit.net/documents/screenos-hardening-appnote.pdf (8 July 2003), p. 6.	In the event of a firewall compromise or of system failure, the log data would be lost. Storing the log data on a second, hardened server greatly reduces the risk of log data being lost.	This is a binary compliance item. The firewall is compliant if the syslog hostname, security facility, and facilities have been configured and if the module field is not blank. Otherwise, the system is not compliant.	Verify that the firewall is logging to a dedicated syslog server. • Verify the firewall has been configured to send logs to a dedicated syslogs server **`get syslog config`** • Check the logs on the relevant syslog server to validate that it is capturing the firewall logs as expected.	O
4	CO21. The audit trails must be retained in accordance with the organization's data retention policy. Reference: Wood, Charles Cresson. Information Security Policies Made Easy. Eighth ed. Houston: Pentasafe, 2001, p. 105.	The importance of log data may not be known immediately. If the firewall logs are retained for a reasonable amount of time, important data may be lost by the time it is determined relevant as part of an Incident Response Team investigation.	This is a binary compliance item. The firewall is compliant if the logs are retained in accordance with the data retention policy. Otherwise, the system is not compliant.	Verify that firewall logs are kept as long as required by the organization's data retention policy.	O

G. Miscellaneous Section					
1	CO22. Procedures for backing up and restoring the firewall configuration must be documented. Reference: Lowder, Jeffery J. “Firewall Management and Internet Attacks.” Information Security Management Handbook. Ed. Harold F. Tipton and Mi[k]ki Krause. 4th ed. Vol. 1. Boca Raton, Florida: Auerbach, 2000, p. 126; The SANS Institute, “7.2 Auditing the Perimeter” (2003), p. 4-16.	If the procedures for backing up and restoring firewall configuration are not documented, the configuration may not be properly backed up or restored. A change in personnel could mean that a firewall administrator might be unfamiliar with the procedure. Having documented procedures also increases the likelihood that the procedures have been thought through, presumably in a non-crisis situation.	This is a binary compliance item. The organization is compliant if there are documented procedures for backup and restoration of the firewall configuration. Otherwise, the system is not compliant.	Determine whether documented procedures exist for backup and restoration of the firewall configuration.	

Assignment 3 – Audit Evidence

In this section, I will summarize the evidence relating to the ten tests I believe are the most critical to determining the degree of risk posed by the firewall's current configuration and management practices. Five of the tests are stimulus-response: B4, B7, C2, C4, C9.

Checklist Item B1: PASS

Control Objective: The firewall(s) must be kept current with the latest vendor upgrades, security patches, and security problem fix software.

NetScreen Command Line Interface (CLI)

Execution of the "get system" command at the ScreenOS CLI revealed the firewall is running ScreenOS version 3.0.3r6.

```
      Remote Management Console

      ns100(M)-> get system
      Serial Number: <censored>, Control Number: 00000000
      SW Version/Checksum: 3.0.3r6.0/6b60e662, HW Version: 3110(0)-(11)
      Image: ns100.3.0.3r6, Firewall+VPN, FPGA checksum: 00000000 (0/0)
```

Note: the remainder of the "get system" command output was omitted.

NetScreen.com "Current Release" Web Page

According to Netscreen's website, the latest version of the ScreenOS for Netscreen-100s in production is 3.0.3r5.[13]

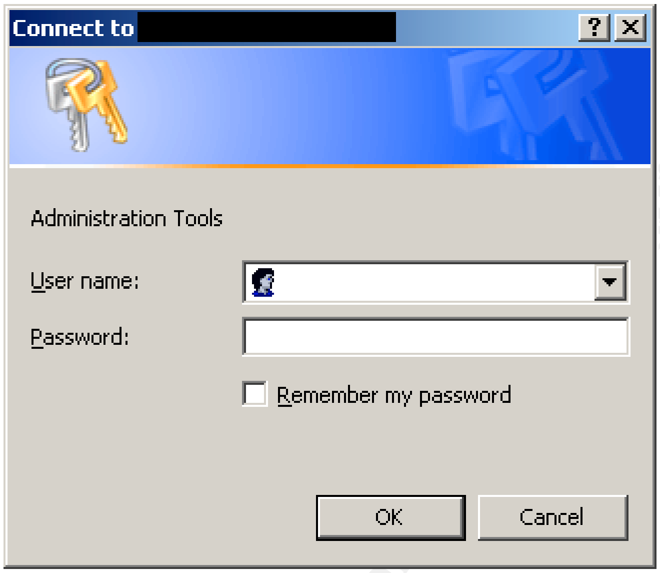
Checklist Item B4: PASS

Objective: Only authorized personnel may be permitted to administer the firewall(s). Administrative access to the firewall(s) must be strictly limited to those personnel responsible for maintaining the firewall(s).

```
# ssh -c 3DES <firewall management IP censored>
jlowder@<firewall management IP censored>'s password:
Permission denied, please try again.
jlowder@<firewall management IP censored>'s password:
Permission denied, please try again.
jlowder@<firewall management IP censored>'s password:
Permission denied.
#
```

When I pressed <ENTER> without supplying a password, the firewall presented the "Permission denied, please try again" error message and then prompted me for my password again. After the third failed attempt, it displayed a "Permission denied" error message.

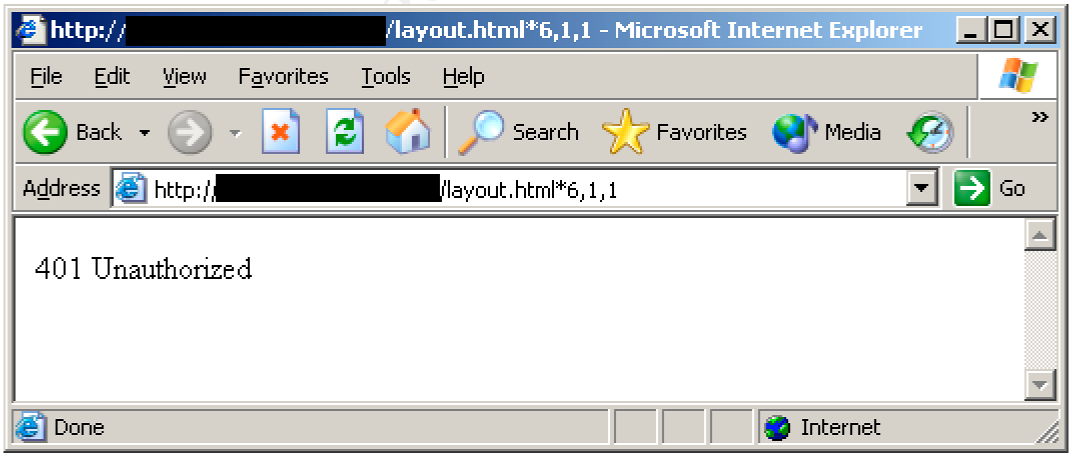
Figure 2 – Login Screen for Web-Based Management Session



Connect to [redacted]

When I pressed "OK" without supplying a username or password, the firewall presented the "Connect to" dialog box again. After three failed attempts, it displayed a "401 Unauthorized" error message.

Figure 3 – Unauthorized Error Message after Repeated Failed Logins



http://[redacted]/layout.html*6,1,1 - Microsoft Internet Explorer

Address http://[redacted]/layout.html*6,1,1

401 Unauthorized

Since both SSH and HTTP connections to the management interface required me to supply a valid username and password, the firewall is compliant with item B4.

Checklist Item B7: PASS

Objective: Firewall administrators must have at least two user-IDs. One of these user-IDs (e.g., root) must provide privileged access and be logged; the other must be a normal user-ID for the day-to-day work of an ordinary user.

```
ns100(M)-> get admin user
User Name                       Privilege
<privileged>                    ROOT
<user1>                         All
<backup>                        READ-ONLY
<user2>                         All
ns100(M)->
```

Note: I have censored the actual account names and instead replaced them with descriptions that should indicate the type of account they are.

The first user-ID is the privileged account. The second and fourth user-IDs belong to the employees responsible for firewall administration. I compared those user-IDS against an organizational chart provided by the Human Resources department. I confirmed that the employees with firewall user IDs are indeed members of the security team responsible for administering the firewall. The third user-ID has read-only access and is used for backups.

I then checked the event log to determine which accounts were being used for day-to-day firewall administration and maintenance. Although I cannot include the entire output of the command here, I will provide a representative sample of what I observed.

```
ns100(M)-> get log event
2003-07-17 00:21:01 system warn  00515 Admin <backup> has logged out via SCS
from <IP address censored>:49547
2003-07-17 00:21:01 system warn  00515 Admin <backup> has logged on via SCS
from <IP address censored>:49547
2003-07-17 00:21:00 system notif 00528 SCS: SSH user <backup> has been
authenticated using password from <IP address censored>:49547.
2003-07-16 14:32:07 system info  00767 <user1>: System Config saved from host
<IP address censored>
2003-07-16 14:32:17 system notif 00018 <user1>: Policy 91 has been moved
before 65
2003-07-16 14:32:07 system notif 00018 <user1>: Policy (91, <censored>) has
been added from host <IP address censored>
2003-07-16 14:29:24 system warn  00515 <user1>: Admin "<user1>" has logged on
via the WebUI(http) to port 80 from <IP address censored>:23751.
```

In the above example, <user1> changed the firewall policies, not <privileged> user. This is what I consistently observed when I examined a representative sample of the firewall logs: all policy configuration changes were made by either <user1> or <user2>, not <privileged>. Thus, the control objective is being met.

Checklist Item B8: FAIL

Objective: Firewall management sessions are extremely sensitive and must be encrypted.

```
Remote Management Console

ns100(M)-> get interface
Interface:
Name       Stat IP Address      Subnet Mask     MAC             Manage IP
trust      up   <censored>      255.255.255.128 <censored>      <censored>
untrust    up   <censored>      255.255.255.128 <censored>      <censored>
DMZ        up   <censored>      255.255.255.128 <censored>      <censored>
ns100(M)-> get interface trust
interface trust, mode route, up/full-duplex
  ip <censored>/255.255.255.128 gateway 0.0.0.0, virtual mac 0010.dbff.0100
  gateway 0.0.0.0, manage ip <censored>, mac <censored>
  ping enabled, telnet disabled, SCS enabled, SNMP enabled
  Global-Pro disabled, web enabled, ident-reset disabled
  SSL enabled
  bandwidth: physical 100000kbps, configured 0kbps, current 0bps
             total configured gbw 0kbps, total allocated gbw 0kbps
ns100(M)-> get interface untrust
interface untrust, up/full-duplex
  ip <censored>/255.255.255.128 gateway <censored>, virtual mac
0010.dbff.0101
  gateway <censored>, manage ip <censored>, mac <censored>
  ping enabled, telnet disabled, SCS enabled, SNMP disabled
  Global-Pro enabled, web enabled, ident-reset enabled
  SSL disabled
  bandwidth: physical 100000kbps, configured 0kbps, current 0bps
             total configured gbw 0kbps, total allocated gbw 0kbps
ns100(M)-> get interface dmz
interface DMZ, up/full-duplex
  ip <censored>/255.255.255.128 gateway 0.0.0.0, virtual mac 0010.dbff.0102
  gateway 0.0.0.0, manage ip <censored>, mac <censored>
  ping enabled, telnet disabled, SCS disabled, SNMP disabled
  Global-Pro disabled, web disabled, ident-reset disabled
  SSL disabled
  bandwidth: physical 100000kbps, configured 0kbps, current 0bps
             total configured gbw 0kbps, total allocated gbw 0kbps
```

The "trust" interface is compliant because both CLI-based and web-based management sessions are encrypted. CLI sessions use "SCS" or Secure Command Shell (i.e., SSH), while web-based sessions use SSL. The "dmz" interface is also compliant since all management activity has been prohibited on that interface. Nevertheless, the "untrust" interface is not compliant. While CLI sessions must use SSH ("SCS enabled"), web-based sessions use unencrypted HTTP ("web enabled" and "SSL disabled"). Therefore, because of the configuration of the "untrust" interface—arguably the most critical of all three interfaces with respect to the need for encryption—the firewall is not compliant.

Checklist Item C2: FAIL

Objective: All ports on the firewall itself should be disabled by default; only ports that have been specifically authorized should be open.

```
$ nmap –sT <management IP> -oA untrusted-to-firewall-tcp.txt
$ cat untrusted-to-firewall-tcp.txt
Interesting ports on <hostname censored> (<IP address censored>):
(The 65532 ports scanned but not shown below are in state: filtered)
Port       State       Service
22/tcp     open        ssh
80/tcp     open        http
113/tcp    closed      auth

$ nmap –sU <management IP> -oA untrusted-to-firewall-udp.txt
$ cat untrusted-to-firewall-udp.txt
All 65535 scanned ports on <hostname censored> (<IP address censored>) are:
filtered

$ nmap –sP <management IP> -oA untrusted-to-firewall-icmp.txt
$ cat untrusted-to-firewall-icmp.txt
Host <hostname censored> (<IP address censored>) appears to be up.
```

The HTTP service (TCP port 80) should not be running on the untrusted management interface of the firewall, according to best practices. (Notice the correspondence between this finding and the related finding under checklist item B8.) Therefore, the firewall fails checklist item C2.

Checklist Item C4: PASS

Objective: The firewall(s) should control any application and infrastructure management flows in *both* directions. The firewall(s) must deny by default any services not explicitly authorized.

Scan of DMZ from Untrust: PASS

Nmap Output

```
# nmap -sP -iL nmap-input.txt
Reading target specifications from FILE: nmap-input.txt

Starting nmap 3.20 ( www.insecure.org/nmap/ ) at 2003-07-23 16:39 PDT
Host host4.foo.com (<IP address censored>) appears to be up.
Nmap run completed -- 5 IP addresses (1 host up) scanned in 1.226 seconds
# /usr/local/bin/nmap -v -g53 -P0 -sS -T Aggressive -iL nmap-input.txt -oN
untrust-to-dmz-tcp-syn.txt
Reading target specifications from FILE: nmap-input.txt

Starting nmap 3.20 ( www.insecure.org/nmap/ ) at 2003-07-23 17:08 PDT
Host host2.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host2.foo.com (<IP address censored>) at
17:08
Adding open port 22/tcp
The SYN Stealth Scan took 123 seconds to scan 1611 ports.
Interesting ports on host2.foo.com (<IP address censored>):
(The 1610 ports scanned but not shown below are in state: filtered)
Port       State       Service
```

```
22/tcp     open        ssh

Host host3.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host3.foo.com (<IP address censored>) at
17:10
Adding open port 22/tcp
The SYN Stealth Scan took 114 seconds to scan 1611 ports.
Interesting ports on host3.foo.com (<IP address censored>):
(The 1610 ports scanned but not shown below are in state: filtered)
Port       State       Service
22/tcp     open        ssh

Host host4.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host4.foo.com (<IP address censored>) at
17:12
Adding open port 1521/tcp
Adding open port 22/tcp
The SYN Stealth Scan took 300 seconds to scan 1611 ports.
Interesting ports on host4.foo.com (<IP address censored>):
(The 1574 ports scanned but not shown below are in state: filtered)
Port       State       Service
22/tcp     open        ssh
1400/tcp   closed      cadkey-tablet
1401/tcp   closed      goldleaf-licman
1402/tcp   closed      prm-sm-np
1403/tcp   closed      prm-nm-np
1404/tcp   closed      igi-lm
1405/tcp   closed      ibm-res
1406/tcp   closed      netlabs-lm
1407/tcp   closed      dbsa-lm
1408/tcp   closed      sophia-lm
1409/tcp   closed      here-lm
1410/tcp   closed      hiq
1411/tcp   closed      af
1413/tcp   closed      innosys-acl
1414/tcp   closed      ibm-mqseries
1415/tcp   closed      dbstar
1416/tcp   closed      novell-lu6.2
1417/tcp   closed      timbuktu-srv1
1418/tcp   closed      timbuktu-srv2
1419/tcp   closed      timbuktu-srv3
1420/tcp   closed      timbuktu-srv4
1422/tcp   closed      autodesk-lm
1423/tcp   closed      essbase
1425/tcp   closed      zion-lm
1426/tcp   closed      sas-1
1427/tcp   closed      mloadd
1428/tcp   closed      informatik-lm
1429/tcp   closed      nms
1430/tcp   closed      tpdu
1450/tcp   closed      dwf
1500/tcp   closed      vlsi-lm
1501/tcp   closed      sas-3
1502/tcp   closed      shivadiscovery
1503/tcp   closed      imtc-mcs
1504/tcp   closed      evb-elm
1505/tcp   closed      funkproxy
```

```
1521/tcp   open        oracle

Host host5.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host5.foo.com (<IP address censored>) at
17:17
Adding open port 22/tcp
The SYN Stealth Scan took 115 seconds to scan 1611 ports.
Interesting ports on host5.foo.com (<IP address censored>):
(The 1610 ports scanned but not shown below are in state: filtered)
Port       State       Service
22/tcp     open        ssh

Host host1.foo.com (<IP address censored> appears to be up ... good.
Initiating SYN Stealth Scan against host1.foo.com (<IP address censored> at
17:19
Adding open port 22/tcp
The SYN Stealth Scan took 113 seconds to scan 1611 ports.
Interesting ports on host1.foo.com (<IP address censored>:
(The 1610 ports scanned but not shown below are in state: filtered)
Port       State       Service
22/tcp     open        ssh

Nmap run completed -- 5 IP addresses (5 hosts up) scanned in 764.949 seconds

# /usr/local/bin/nmap -v -g53 -P0 -sU -T Aggressive -iL nmap-input.txt -oN
untrust-to-dmz-udp.txt
Host host2.foo.com (<IP address censored>)appears to be up ... good.
Initiating UDP Scan against host2.foo.com (<IP address censored>)at 17:27
 (no udp responses received -- assuming all ports filtered)
All 1470 scanned ports on host2.foo.com (<IP address censored>)are: filtered

Host host3.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host3.foo.com (<IP address censored>) at 17:33
 (no udp responses received -- assuming all ports filtered)
All 1470 scanned ports on host3.foo.com (<IP address censored>) are: filtered

Host host5.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host5.foo.com (<IP address censored>) at 17:39
(no udp responses received -- assuming all ports filtered)
All 1470 scanned ports on host5.foo.com (<IP address censored>) are: filtered

Host host4.foo.com (<IP address censored>)appears to be up ... good.
Initiating UDP Scan against host4.foo.com (<IP address censored>)at 17:45
(no udp responses received -- assuming all ports filtered)
All 1470 scanned ports on host4.foo.com (<IP address censored>)are: filtered

Host host1.foo.com (<IP address censored>)appears to be up ... good.
Initiating UDP Scan against host1.foo.com (<IP address censored>)at 17:51
(no udp responses received -- assuming all ports filtered)
All 1470 scanned ports on host1.foo.com (<IP address censored>)are: filtered

Nmap run completed -- 5 IP addresses (5 hosts up) scanned in 1889.080 seconds
```

Results of the Nmap Scan Recorded with the Sniffer Snort

Since we are running the Snort Intrusion Detection System in the e-commerce system, I checked the Snort logs to learn how much of my Nmap scan was detected by Snort. Snort monitors network traffic on both the DMZ and Trust interfaces of the Netscreen-100 firewall. When it detects traffic that matches an enabled signature, it writes data in a binary format into the appropriate directory tree: dmz for DMZ interface traffic and trust for Trust interface traffic. Barnyard is a separate Snort process that converts the raw, binary data into a human-readable text format. Barnyard creates two files: `fast.alert` and `dump.log`. The `fast.alert` file is an executive summary of the day's alerts, while the `dump.log` file contains both the alerts and the raw data dump of that alert.

Although my Nmap scan ran between approximately 4:45 and 6:00 p.m. PDT, Barnyard converts the timestamps on all log entries to UTC/GMT. Therefore, any scan traffic should be identified between 2345 and 0100 GMT. I used the `tail` command to monitor the `fast.alert` file for any entries that matches the IP address of my Nessus server; I executed this command prior to launching my nmap scan. The output of the command is included below.

```
# clear; tail -f fast.alert
#
```

No nmap traffic was detected by Snort.

Assessment

The firewall clearly controls application and infrastructure management flows from the untrusted interface to the DMZ interface. It denies by default any services not explicitly authorized. Moreover, the network-based intrusion detection system did not detect any network traffic on unauthorized ports. Therefore, the firewall is compliant with item C4 regarding untrusted to DMZ traffic.

Scan of Trust from Untrust: PASS

Nmap Output

```
# /usr/local/bin/nmap -v -sP -T Aggressive -iL trust-hosts.txt -oN untrust-to-trust-icmp.txt
Reading target specifications from FILE: trust-hosts.txt

Starting nmap 3.20 ( www.insecure.org/nmap/ ) at 2003-07-23 18:02 PDT
Host <ip address censored> appears to be down.
Host <ip address censored> appears to be down.
Host <ip address censored> appears to be down.
Host <ip address censored> appears to be down.
Nmap run completed -- 4 IP addresses (0 hosts up) scanned in 1.995 seconds

# /usr/local/bin/nmap -v -g53 -P0 -sS -T Aggressive -iL trust-hosts.txt -oN untrust-to-trust-tcp-syn.txt
Reading target specifications from FILE: trust-hosts.txt
```

```
Starting nmap 3.20 ( www.insecure.org/nmap/ ) at 2003-07-23 18:04 PDT
Host host13.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host13.foo.com (<IP address censored>) at
18:4
The SYN Stealth Scan took 117 seconds to scan 1611 ports.
All 1611 scanned ports on host13.foo.com (<IP address censored>) are:
filtered

Host host14.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host14.foo.com (<IP address censored>) at
18:6
The SYN Stealth Scan took 117 seconds to scan 1611 ports.
All 1611 scanned ports on host14.foo.com (<IP address censored>) are:
filtered

Host host15.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host15.foo.com (<IP address censored>) at
18:7
The SYN Stealth Scan took 119 seconds to scan 1611 ports.
All 1611 scanned ports on host15.foo.com (<IP address censored>) are:
filtered

Host host12.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host12.foo.com (<IP address censored>) at
18:9
The SYN Stealth Scan took 115 seconds to scan 1611 ports.
All 1611 scanned ports on host12.foo.com (<IP address censored>) are:
filtered

Nmap run completed -- 4 IP addresses (4 hosts up) scanned in 468.070 seconds
# /usr/local/bin/nmap -v -g53 -P0 -sU -T Aggressive -iL trust-hosts.txt -oN
untrust-to-trust-udp.txt
Reading target specifications from FILE: trust-hosts.txt

Starting nmap 3.20 ( www.insecure.org/nmap/ ) at 2003-07-23 18:16 PDT
Host host13.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host13.foo.com (<IP address censored>) at 18:16
(no udp responses received -- assuming all ports filtered)
All 1470 scanned ports on host13.foo.com (<IP address censored>) are:
filtered

Host host14.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host14.foo.com (<IP address censored>) at 18:22
(no udp responses received -- assuming all ports filtered)
All 1470 scanned ports on host14.foo.com (<IP address censored>) are:
filtered

Host host15.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host15.foo.com (<IP address censored>) at 18:28
(no udp responses received -- assuming all ports filtered)
All 1470 scanned ports on host15.foo.com (<IP address censored>) are:
filtered

Host host12.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host12.foo.com (<IP address censored>) at 18:34
(no udp responses received -- assuming all ports filtered)
```

```
All 1470 scanned ports on host12.foo.com (<IP address censored>) are:
filtered

Nmap run completed -- 4 IP addresses (4 hosts up) scanned in 1511.200 seconds
```

Results of the Nmap Scan Recorded with the Sniffer Snort

```
# clear; tail -f fast.alert
#
```

No nmap traffic was detected by Snort.

Assessment

The firewall clearly controls application and infrastructure management flows from the untrusted interface to the trusted interface. It denies by default any services not explicitly authorized. Moreover, the network-based intrusion detection system did not detect any network traffic on unauthorized ports. Therefore, the firewall is compliant with item C4 regarding untrusted to trusted traffic.

Scan of Untrust from DMZ: PASS

Nmap Output

```
# /usr/local/bin/nmap -v -sP -T Aggressive -iL untrust-hosts.txt -oN dmz-to-
untrust-icmp.txt
Reading target specifications from FILE: untrust-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 17:19 PDT
Host host6.foo.com (<IP address censored>) appears to be up.
Host host7.foo.com (<IP address censored>)appears to be up.
Nmap run completed -- 2 IP addresses (2 hosts up) scanned in 0.481 seconds
# /usr/local/bin/nmap -v -g22 -P0 -sS -T Aggressive -iL untrust-hosts.txt -oN
dmz-to-untrust-tcp-syn.txt
Reading target specifications from FILE: untrust-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 17:21 PDT
Host host6.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host6.foo.com (<IP address censored>) at
17:21
Adding open port 135/tcp
Adding open port 813/tcp
Adding open port 683/tcp
Adding open port 703/tcp
Adding open port 111/tcp
Adding open port 32770/tcp
Adding open port 22/tcp
The SYN Stealth Scan took 1 second to scan 1644 ports.
Interesting ports on host6.foo.com (<IP address censored>):
(The 1637 ports scanned but not shown below are in state: closed)
Port       State       Service
```

```
22/tcp     open        ssh
111/tcp    open        sunrpc
135/tcp    open        loc-srv
683/tcp    open        unknown
703/tcp    open        unknown
813/tcp    open        unknown
32770/tcp  open        sometimes-rpc3

Host host7.foo.com (<IP address censored>)appears to be up ... good.
Initiating SYN Stealth Scan against host7.foo.com (<IP address censored>)at
17:21
Adding open port 53/tcp
Adding open port 32772/tcp
Adding open port 111/tcp
Adding open port 22/tcp
Adding open port 32771/tcp
Adding open port 32777/tcp
Adding open port 4045/tcp
The SYN Stealth Scan took 0 seconds to scan 1644 ports.
Interesting ports on host7.foo.com (<IP address censored>):
(The 1637 ports scanned but not shown below are in state: closed)
Port       State       Service
22/tcp     open        ssh
53/tcp     open        domain
111/tcp    open        sunrpc
4045/tcp   open        lockd
32771/tcp  open        sometimes-rpc5
32772/tcp  open        sometimes-rpc7
32777/tcp  open        sometimes-rpc17

Nmap run completed -- 2 IP addresses (2 hosts up) scanned in 1.387 seconds
# /usr/local/bin/nmap -v -g53 -P0 -sU -T Aggressive -iL untrust-hosts.txt -oN
dmz-to-untrust-udp.txt
Reading target specifications from FILE: untrust-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-29 08:32 PDT
Host host6.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host6.foo.com (<IP address censored>) at 08:32
The UDP Scan took 8872 seconds to scan 1471 ports.
Interesting ports on host6.foo.com (<IP address censored>):
(The 1452 ports scanned but not shown below are in state: closed)
Port       State       Service
111/udp    open        sunrpc
135/udp    open        loc-srv
655/udp    open        unknown
680/udp    open        unknown
700/udp    open        unknown
798/udp    open        unknown
799/udp    open        unknown
800/udp    open        mdbs_daemon
814/udp    open        unknown
1022/udp   open        unknown
1023/udp   open        unknown
32770/udp  open        sometimes-rpc4
32771/udp  open        sometimes-rpc6
32772/udp  open        sometimes-rpc8
32773/udp  open        sometimes-rpc10
```

```
32774/udp  open        sometimes-rpc12
32776/udp  open        sometimes-rpc16
32777/udp  open        sometimes-rpc18
32778/udp  open        sometimes-rpc20

Host host7.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host7.foo.com (<IP address censored>) at 11:00
The UDP Scan took 26120 seconds to scan 1471 ports.
Interesting ports on host7.foo.com (<IP address censored>):
(The 1448 ports scanned but not shown below are in state: closed)
Port       State       Service
53/udp     open        domain
111/udp    open        sunrpc
123/udp    open        ntp
161/udp    open        snmp
514/udp    open        syslog
742/udp    open        netrcs
1015/udp   open        unknown
1016/udp   open        unknown
1017/udp   open        unknown
1018/udp   open        unknown
1019/udp   open        unknown
1020/udp   open        unknown
1021/udp   open        unknown
1022/udp   open        unknown
1023/udp   open        unknown
4045/udp   open        lockd
32771/udp  open        sometimes-rpc6
32773/udp  open        sometimes-rpc10
32774/udp  open        sometimes-rpc12
32777/udp  open        sometimes-rpc18
32778/udp  open        sometimes-rpc20
32780/udp  open        sometimes-rpc24
32787/udp  open        sometimes-rpc28

# Nmap run completed at Tue Jul 29 18:15:22 2003 -- 2 IP addresses (2 hosts
up) scanned in 34992.678 seconds
```

Results of the Nmap Scan Recorded with the Sniffer Snort

```
# clear; tail -f fast.alert
#
```

No nmap traffic was detected by Snort.

Assessment

The firewall clearly controls application and infrastructure management flows from the DMZ interface to the untrusted interface. It denies by default any services not explicitly authorized. Moreover, the network-based intrusion detection system did not detect any network traffic on unauthorized ports. Therefore, the firewall is compliant with item C4 regarding DMZ to untrusted traffic.

Scan of Trust from DMZ: PASS

Nmap Output

```
# /usr/local/bin/nmap -v -sP -T Aggressive -iL trust-hosts.txt -oN dmz-to-
trust-icmp.txt
Reading target specifications from FILE: trust-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 17:22 PDT
Host host13.foo.com (<IP address censored>) appears to be up.
Host host12.foo.com (<IP address censored>) appears to be up.
Host host14.foo.com (<IP address censored>) appears to be up.
Host host15.foo.com (<IP address censored>) appears to be up.
Nmap run completed -- 4 IP addresses (4 hosts up) scanned in 0.370 seconds
# /usr/local/bin/nmap -v -g22 -P0 -sS -T Aggressive -iL trust-hosts.txt -oN
dmz-to-trust-tcp-syn.txt
Reading target specifications from FILE: trust-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 17:22 PDT
Host host13.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host13.foo.com (<IP address censored>) at
17:22
Adding open port 22/tcp
The SYN Stealth Scan took 102 seconds to scan 1644 ports.
Interesting ports on host13.foo.com (<IP address censored>):
(The 1643 ports scanned but not shown below are in state: filtered)
Port       State       Service
22/tcp     open        ssh

Host host12.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host12.foo.com (<IP address censored>) at
17:24
Adding open port 22/tcp
The SYN Stealth Scan took 100 seconds to scan 1644 ports.
Interesting ports on host12.foo.com (<IP address censored>):
(The 1643 ports scanned but not shown below are in state: filtered)
Port       State       Service
22/tcp     open        ssh

Host host14.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host14.foo.com (<IP address censored>) at
17:25
Adding open port 22/tcp
The SYN Stealth Scan took 99 seconds to scan 1644 ports.
Interesting ports on host14.foo.com (<IP address censored>):
(The 1643 ports scanned but not shown below are in state: filtered)
Port       State       Service
22/tcp     open        ssh

Host host15.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host15.foo.com (<IP address censored>) at
17:27
Adding open port 22/tcp
The SYN Stealth Scan took 103 seconds to scan 1644 ports.
Interesting ports on host15.foo.com (<IP address censored>):
```

```
(The 1643 ports scanned but not shown below are in state: filtered)
Port       State       Service
22/tcp     open        ssh

Nmap run completed -- 4 IP addresses (4 hosts up) scanned in 404.719 seconds
# /usr/local/bin/nmap -v -g53 -P0 -sU -T Aggressive -iL trust-hosts.txt -oN
dmz-to-trust-udp.txt
Reading target specifications from FILE: trust-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 14:13 PDT
Host host13.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host13.foo.com (<IP address censored>) at 14:13
The UDP Scan took 5608 seconds to scan 1471 ports.
(no udp responses received -- assuming all ports filtered)
All 1471 scanned ports on host13.foo.com (<IP address censored>) are:
filtered

Host host12.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host12.foo.com (<IP address censored>) at 19:08
The UDP Scan took 10508 seconds to scan 1471 ports.
(no udp responses received -- assuming all ports filtered)
All 1471 scanned ports on host12.foo.com (<IP address censored>) are:
filtered

Host host14.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host14.foo.com (<IP address censored>) at 20:42
The UDP Scan took 10508 seconds to scan 1471 ports.
(no udp responses received -- assuming all ports filtered)
All 1471 scanned ports on host14.foo.com (<IP address censored>) are:
filtered

Host host15.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host15.foo.com (<IP address censored>) at 23:31
The UDP Scan took 10508 seconds to scan 1471 ports.
(no udp responses received -- assuming all ports filtered)
All 1471 scanned ports on host15.foo.com (<IP address censored>) are:
filtered

Nmap run completed -- 5 IP addresses (5 hosts up) scanned in 45038.287
seconds
```

Results of the Nmap Scan Recorded with the Sniffer Snort

```
# clear; tail -f fast.alert
------------------------------------------------------------------------
07/28/03-23:17:26.466667 {ICMP} <host1.foo.com IP address censored> ->
<host14.foo.com IP address censored>
[**] [1:402:4] ICMP Destination Unreachable (Port Unreachable) [**]
[Classification: Misc activity] [Priority: 3]
------------------------------------------------------------------------
07/28/03-23:17:26.466675 {ICMP} <host1.foo.com IP address censored> ->
<host14.foo.com IP address censored>
[**] [1:402:4] ICMP Destination Unreachable (Port Unreachable) [**]
[Classification: Misc activity] [Priority: 3]
------------------------------------------------------------------------
```

```
07/28/03-23:17:26.466689 {ICMP} <host1.foo.com IP address censored> ->
<host14.foo.com IP address censored>
[**] [1:402:4] ICMP Destination Unreachable (Port Unreachable) [**]
[Classification: Misc activity] [Priority: 3]
------------------------------------------------------------------------
07/28/03-23:17:26.466703 {ICMP} <host1.foo.com IP address censored> ->
<host14.foo.com IP address censored>
[**] [1:402:4] ICMP Destination Unreachable (Port Unreachable) [**]
[Classification: Misc activity] [Priority: 3]
------------------------------------------------------------------------
07/28/03-23:17:26.466738 {ICMP} <host1.foo.com IP address censored> ->
<host14.foo.com IP address censored>
[**] [1:402:4] ICMP Destination Unreachable (Port Unreachable) [**]
[Classification: Misc activity] [Priority: 3]
------------------------------------------------------------------------
(output truncated)
#
```

Snort recorded a tremendous number of these ICMP alerts. No other traffic was recorded by Snort.

Assessment

The firewall clearly controls application and infrastructure management flows from the DMZ interface to the trusted interface. It denies by default any services not explicitly authorized. Moreover, the network-based intrusion detection system did not detect any network traffic on unauthorized ports. Therefore, the firewall is compliant with item C4 regarding DMZ to trusted traffic.

Scan of Untrust from Trust: PASS

Nmap Output

```
# nmap -v -sP -T Aggressive -iL untrust-hosts.txt -oN trust-to-untrust-
icmp.txt
Reading target specifications from FILE: untrust-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 17:03 PDT
Host host6.foo.com (<IP address censored>) appears to be up.
Host host7.foo.com (<IP address censored>) appears to be up.
Nmap run completed -- 2 IP addresses (2 hosts up) scanned in 0.385 seconds
# nmap -v -g22 -P0 -sS -T Aggressive -iL untrust-hosts.txt -oN trust-to-
untrust-tcp.txt
Reading target specifications from FILE: untrust-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 17:04 PDT
Host host6.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host6.foo.com (<IP address censored>) at
17:04
Adding open port 703/tcp
Adding open port 32770/tcp
Adding open port 135/tcp
Adding open port 22/tcp
Adding open port 111/tcp
Adding open port 683/tcp
Adding open port 813/tcp
The SYN Stealth Scan took 1 second to scan 1644 ports.
Interesting ports on host6.foo.com (<IP address censored>):
(The 1637 ports scanned but not shown below are in state: closed)
Port       State       Service
22/tcp     open        ssh
111/tcp    open        sunrpc
135/tcp    open        loc-srv
683/tcp    open        unknown
703/tcp    open        unknown
813/tcp    open        unknown
32770/tcp  open        sometimes-rpc3

Host host7.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host7.foo.com (<IP address censored>) at
17:04
Adding open port 32777/tcp
Adding open port 4045/tcp
Adding open port 32772/tcp
Adding open port 22/tcp
Adding open port 111/tcp
Adding open port 53/tcp
Adding open port 32771/tcp
The SYN Stealth Scan took 0 seconds to scan 1644 ports.
Interesting ports on host7.foo.com (<IP address censored>):
(The 1637 ports scanned but not shown below are in state: closed)
Port       State       Service
22/tcp     open        ssh
53/tcp     open        domain
111/tcp    open        sunrpc
4045/tcp   open        lockd
32771/tcp  open        sometimes-rpc5
32772/tcp  open        sometimes-rpc7
32777/tcp  open        sometimes-rpc17

Nmap run completed -- 2 IP addresses (2 hosts up) scanned in 0.683 seconds
# nmap -v -g53 -P0 -sU -T Aggressive -iL untrust-hosts.txt -oN trust-to-
untrust-udp.txt
Reading target specifications from FILE: untrust-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 17:16 PDT
Host host6.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host6.foo.com (<IP address censored>) at 17:16
The UDP Scan took 1452 seconds to scan 1471 ports.
Adding open port 32771/udp
Adding open port 1023/udp
Adding open port 32778/udp
Adding open port 680/udp
Adding open port 32773/udp
Adding open port 655/udp
Adding open port 798/udp
Adding open port 111/udp
Adding open port 32776/udp
Adding open port 799/udp
Adding open port 135/udp
Adding open port 800/udp
Adding open port 814/udp
Adding open port 32774/udp
Adding open port 32777/udp
Adding open port 1022/udp
Adding open port 700/udp
Adding open port 32770/udp
Adding open port 32772/udp
Interesting ports on host6.foo.com (<IP address censored>):
(The 1452 ports scanned but not shown below are in state: closed)
Port       State       Service
111/udp    open        sunrpc
135/udp    open        loc-srv
655/udp    open        unknown
680/udp    open        unknown
700/udp    open        unknown
798/udp    open        unknown
799/udp    open        unknown
800/udp    open        mdbs_daemon
814/udp    open        unknown
1022/udp   open        unknown
1023/udp   open        unknown
32770/udp  open        sometimes-rpc4
32771/udp  open        sometimes-rpc6
32772/udp  open        sometimes-rpc8
32773/udp  open        sometimes-rpc10
32774/udp  open        sometimes-rpc12
32776/udp  open        sometimes-rpc16
32777/udp  open        sometimes-rpc18
32778/udp  open        sometimes-rpc20

Host host7.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host7.foo.com (<IP address censored>) at 17:41
The UDP Scan took 831 seconds to scan 1471 ports.
Adding open port 1646/udp
Adding open port 1022/udp
Adding open port 32787/udp
Adding open port 32777/udp
Adding open port 1016/udp
Adding open port 32774/udp
Adding open port 514/udp
Adding open port 1021/udp
Adding open port 161/udp
Adding open port 1017/udp
Adding open port 4045/udp
Adding open port 1020/udp
Adding open port 1019/udp
Adding open port 742/udp
Adding open port 123/udp
Adding open port 111/udp
Adding open port 32773/udp
Adding open port 1018/udp
Adding open port 32780/udp
Adding open port 1015/udp
Adding open port 32778/udp
Adding open port 1023/udp
Adding open port 32771/udp
Adding open port 53/udp
Interesting ports on host7.foo.com (<IP address censored>):
(The 1447 ports scanned but not shown below are in state: closed)
Port       State       Service
53/udp     open        domain
111/udp    open        sunrpc
123/udp    open        ntp
161/udp    open        snmp
514/udp    open        syslog
742/udp    open        netrcs
1015/udp   open        unknown
1016/udp   open        unknown
1017/udp   open        unknown
1018/udp   open        unknown
1019/udp   open        unknown
1020/udp   open        unknown
1021/udp   open        unknown
1022/udp   open        unknown
1023/udp   open        unknown
1646/udp   open        radacct
4045/udp   open        lockd
32771/udp  open        sometimes-rpc6
32773/udp  open        sometimes-rpc10
32774/udp  open        sometimes-rpc12
32777/udp  open        sometimes-rpc18
32778/udp  open        sometimes-rpc20
32780/udp  open        sometimes-rpc24
32787/udp  open        sometimes-rpc28

Nmap run completed -- 2 IP addresses (2 hosts up) scanned in 2283.721 seconds
#
```

Results of the Nmap Scan Recorded with the Sniffer Snort

```
# clear; tail -f fast.alert
07/29/03-00:17:00.292903 {ICMP} <host6.foo.com IP address censored> ->
<host14.foo.com IP address censored>
[**] [1:402:4] ICMP Destination Unreachable (Port Unreachable) [**]
[Classification: Misc activity] [Priority: 3]
------------------------------------------------------------------------
```

The above entry repeated hundreds of times; I am quoting only an excerpt of the output. Then the following entry repeated hundreds of times.

```
------------------------------------------------------------------------
07/29/03-00:41:12.710627 {ICMP} <host7.foo.com IP address censored> ->
<host14.foo.com IP address censored>
[**] [1:402:4] ICMP Destination Unreachable (Port Unreachable) [**]
[Classification: Misc activity] [Priority: 3]
#
```

Assessment

The firewall clearly controls application and infrastructure management flows from the trusted interface to the untrusted interface. It denies by default any services not explicitly authorized. Moreover, the network-based intrusion detection system did not detect any network traffic on unauthorized ports. Therefore, the firewall is compliant with item C4 regarding trusted to untrusted traffic.

Scan of DMZ from Trust: PASS

<u>Nmap Output</u>

```
# nmap -v -sP -T Aggressive -iL dmz-hosts.txt -oN trust-to-dmz-icmp.txt
Reading target specifications from FILE: dmz-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 16:11 PDT
Host host1.foo.com (<IP address censored>) appears to be up.
Host host2.foo.com (<IP address censored>) appears to be up.
Host host3.foo.com (<IP address censored>) appears to be up.
Host host4.foo.com (<IP address censored>) appears to be up.
Host host5.foo.com (<IP address censored>) appears to be up.
Nmap run completed -- 5 IP addresses (5 hosts up) scanned in 0.428 seconds
# nmap -v -g22 -P0 -sS -T Aggressive -iL dmz-hosts.txt -oN trust-to-dmz-tcp-
syn.txt
Reading target specifications from FILE: dmz-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 16:15 PDT
Host host1.foo.com (<IP address censored>)appears to be up ... good.
Initiating SYN Stealth Scan against host1.foo.com (<IP address censored>)at
16:15
Adding open port 898/tcp
Adding open port 22/tcp
The SYN Stealth Scan took 35 seconds to scan 1644 ports.
Interesting ports on host1.foo.com (<IP address censored>):
(The 1087 ports scanned but not shown below are in state: closed)
Port       State       Service
1/tcp      filtered    tcpmux
2/tcp      filtered    compressnet
4/tcp      filtered    unknown
12/tcp     filtered    unknown
15/tcp     filtered    netstat
16/tcp     filtered    unknown
17/tcp     filtered    qotd
21/tcp     filtered    ftp
22/tcp     open        ssh
23/tcp     filtered    telnet
31/tcp     filtered    msg-auth
33/tcp     filtered    dsp
44/tcp     filtered    mpm-flags
50/tcp     filtered    re-mail-ck
52/tcp     filtered    xns-time
53/tcp     filtered    domain
54/tcp     filtered    xns-ch
56/tcp     filtered    xns-auth
57/tcp     filtered    priv-term
58/tcp     filtered    xns-mail
62/tcp     filtered    acas
70/tcp     filtered    gopher
74/tcp     filtered    netrjs-4
```

```
76/tcp     filtered    deos
79/tcp     filtered    finger
82/tcp     filtered    xfer
83/tcp     filtered    mit-ml-dev
87/tcp     filtered    priv-term-l
88/tcp     filtered    kerberos-sec
89/tcp     filtered    su-mit-tg
90/tcp     filtered    dnsix
92/tcp     filtered    npp
95/tcp     filtered    supdup
97/tcp     filtered    swift-rvf
99/tcp     filtered    metagram
106/tcp    filtered    pop3pw
108/tcp    filtered    snagas
109/tcp    filtered    pop-2
112/tcp    filtered    mcidas
115/tcp    filtered    sftp
117/tcp    filtered    uucp-path
118/tcp    filtered    sqlserv
119/tcp    filtered    nntp
120/tcp    filtered    cfdptkt
124/tcp    filtered    ansatrader
128/tcp    filtered    gss-xlicen
133/tcp    filtered    statsrv
135/tcp    filtered    loc-srv
136/tcp    filtered    profile
139/tcp    filtered    netbios-ssn
144/tcp    filtered    news
147/tcp    filtered    iso-ip
150/tcp    filtered    sql-net
151/tcp    filtered    hems
155/tcp    filtered    netsc-dev
160/tcp    filtered    sgmp-traps
162/tcp    filtered    snmptrap
169/tcp    filtered    send
172/tcp    filtered    cl-1
174/tcp    filtered    mailq
176/tcp    filtered    genrad-mux
177/tcp    filtered    xdmcp
185/tcp    filtered    remote-kis
189/tcp    filtered    qft
192/tcp    filtered    osu-nms
195/tcp    filtered    dn6-nlm-aud
202/tcp    filtered    at-nbp
204/tcp    filtered    at-echo
206/tcp    filtered    at-zis
217/tcp    filtered    dbase
218/tcp    filtered    mpp
220/tcp    filtered    imap3
222/tcp    filtered    rsh-spx
224/tcp    filtered    unknown
227/tcp    filtered    unknown
232/tcp    filtered    unknown
233/tcp    filtered    unknown
236/tcp    filtered    unknown
239/tcp    filtered    unknown
242/tcp    filtered    direct
```

```
244/tcp    filtered    dayna
246/tcp    filtered    dsp3270
247/tcp    filtered    subntbcst_tftp
254/tcp    filtered    unknown
255/tcp    filtered    unknown
258/tcp    filtered    Fw1-mc-gui
262/tcp    filtered    arcisdms
266/tcp    filtered    unknown
267/tcp    filtered    unknown
268/tcp    filtered    unknown
274/tcp    filtered    unknown
278/tcp    filtered    unknown
279/tcp    filtered    unknown
280/tcp    filtered    http-mgmt
282/tcp    filtered    cableport-ax
283/tcp    filtered    unknown
284/tcp    filtered    unknown
285/tcp    filtered    unknown
294/tcp    filtered    unknown
301/tcp    filtered    unknown
302/tcp    filtered    unknown
304/tcp    filtered    unknown
305/tcp    filtered    unknown
306/tcp    filtered    unknown
313/tcp    filtered    magenta-logic
314/tcp    filtered    opalis-robot
316/tcp    filtered    decauth
318/tcp    filtered    unknown
320/tcp    filtered    unknown
323/tcp    filtered    unknown
324/tcp    filtered    unknown
331/tcp    filtered    unknown
334/tcp    filtered    unknown
338/tcp    filtered    unknown
344/tcp    filtered    pdap
346/tcp    filtered    zserv
354/tcp    filtered    bh611
355/tcp    filtered    datex-asn
359/tcp    filtered    tenebris_nts
360/tcp    filtered    scoi2odialog
361/tcp    filtered    semantix
364/tcp    filtered    aurora-cmgr
371/tcp    filtered    clearcase
372/tcp    filtered    ulistserv
374/tcp    filtered    legent-2
375/tcp    filtered    hassle
379/tcp    filtered    is99c
380/tcp    filtered    is99s
383/tcp    filtered    hp-alarm-mgr
384/tcp    filtered    arns
387/tcp    filtered    aurp
391/tcp    filtered    synotics-relay
396/tcp    filtered    netware-ip
403/tcp    filtered    decap
405/tcp    filtered    ncld
415/tcp    filtered    bnet
419/tcp    filtered    ariel1
```

```
422/tcp    filtered    ariel3
425/tcp    filtered    icad-el
427/tcp    filtered    svrloc
428/tcp    filtered    ocs_cmu
429/tcp    filtered    ocs_amu
434/tcp    filtered    mobileip-agent
435/tcp    filtered    mobilip-mn
436/tcp    filtered    dna-cml
442/tcp    filtered    cvc_hostd
444/tcp    filtered    snpp
451/tcp    filtered    sfs-smp-net
453/tcp    filtered    creativeserver
462/tcp    filtered    datasurfsrvsec
466/tcp    filtered    digital-vrc
471/tcp    filtered    mondex
472/tcp    filtered    ljk-login
473/tcp    filtered    hybrid-pop
474/tcp    filtered    tn-tl-w1
475/tcp    filtered    tcpnethaspsrv
477/tcp    filtered    ss7ns
479/tcp    filtered    iafserver
484/tcp    filtered    integra-sme
486/tcp    filtered    sstats
488/tcp    filtered    gss-http
489/tcp    filtered    nest-protocol
490/tcp    filtered    micom-pfs
492/tcp    filtered    ticf-1
495/tcp    filtered    intecourier
499/tcp    filtered    iso-ill
500/tcp    filtered    isakmp
501/tcp    filtered    stmf
504/tcp    filtered    citadel
505/tcp    filtered    mailbox-lm
507/tcp    filtered    crs
509/tcp    filtered    snare
510/tcp    filtered    fcp
520/tcp    filtered    efs
521/tcp    filtered    ripng
522/tcp    filtered    ulp
523/tcp    filtered    ibm-db2
528/tcp    filtered    custix
534/tcp    filtered    mm-admin
539/tcp    filtered    apertus-ldp
541/tcp    filtered    uucp-rlogin
545/tcp    filtered    ekshell
549/tcp    filtered    idfp
558/tcp    filtered    sdnskmp
560/tcp    filtered    rmonitor
563/tcp    filtered    snews
569/tcp    filtered    ms-rome
570/tcp    filtered    meter
580/tcp    filtered    sntp-heartbeat
581/tcp    filtered    bdp
582/tcp    filtered    scc-security
583/tcp    filtered    philips-vc
585/tcp    filtered    imap4-ssl
587/tcp    filtered    submission
```

```
592/tcp    filtered    eudora-set
593/tcp    filtered    http-rpc-epmap
594/tcp    filtered    tpip
599/tcp    filtered    acp
601/tcp    filtered    unknown
603/tcp    filtered    unknown
606/tcp    filtered    urm
607/tcp    filtered    nqs
608/tcp    filtered    sift-uft
609/tcp    filtered    npmp-trap
614/tcp    filtered    unknown
617/tcp    filtered    sco-dtmgr
622/tcp    filtered    unknown
623/tcp    filtered    unknown
624/tcp    filtered    unknown
630/tcp    filtered    unknown
631/tcp    filtered    ipp
632/tcp    filtered    unknown
633/tcp    filtered    unknown
635/tcp    filtered    unknown
642/tcp    filtered    unknown
643/tcp    filtered    unknown
652/tcp    filtered    unknown
653/tcp    filtered    unknown
657/tcp    filtered    unknown
661/tcp    filtered    unknown
662/tcp    filtered    unknown
665/tcp    filtered    unknown
667/tcp    filtered    unknown
668/tcp    filtered    unknown
671/tcp    filtered    unknown
673/tcp    filtered    unknown
674/tcp    filtered    acap
677/tcp    filtered    unknown
686/tcp    filtered    unknown
687/tcp    filtered    unknown
691/tcp    filtered    resvc
692/tcp    filtered    unknown
695/tcp    filtered    unknown
697/tcp    filtered    unknown
698/tcp    filtered    unknown
700/tcp    filtered    unknown
706/tcp    filtered    silc
710/tcp    filtered    unknown
711/tcp    filtered    unknown
712/tcp    filtered    unknown
713/tcp    filtered    unknown
717/tcp    filtered    unknown
720/tcp    filtered    unknown
721/tcp    filtered    unknown
722/tcp    filtered    unknown
723/tcp    filtered    unknown
728/tcp    filtered    unknown
734/tcp    filtered    unknown
738/tcp    filtered    unknown
740/tcp    filtered    netcp
746/tcp    filtered    unknown
```

```
751/tcp    filtered    kerberos_master
753/tcp    filtered    rrh
754/tcp    filtered    krb_prop
755/tcp    filtered    unknown
756/tcp    filtered    unknown
759/tcp    filtered    con
761/tcp    filtered    kpasswd
762/tcp    filtered    quotad
770/tcp    filtered    cadlock
772/tcp    filtered    cycleserv2
773/tcp    filtered    submit
774/tcp    filtered    rpasswd
782/tcp    filtered    hp-managed-node
783/tcp    filtered    hp-alarm-mgr
786/tcp    filtered    concert
787/tcp    filtered    unknown
791/tcp    filtered    unknown
798/tcp    filtered    unknown
800/tcp    filtered    mdbs_daemon
803/tcp    filtered    unknown
805/tcp    filtered    unknown
806/tcp    filtered    unknown
808/tcp    filtered    unknown
815/tcp    filtered    unknown
816/tcp    filtered    unknown
817/tcp    filtered    unknown
820/tcp    filtered    unknown
822/tcp    filtered    unknown
827/tcp    filtered    unknown
834/tcp    filtered    unknown
837/tcp    filtered    unknown
838/tcp    filtered    unknown
842/tcp    filtered    unknown
844/tcp    filtered    unknown
849/tcp    filtered    unknown
854/tcp    filtered    unknown
856/tcp    filtered    unknown
860/tcp    filtered    unknown
861/tcp    filtered    unknown
863/tcp    filtered    unknown
867/tcp    filtered    unknown
868/tcp    filtered    unknown
872/tcp    filtered    unknown
878/tcp    filtered    unknown
882/tcp    filtered    unknown
883/tcp    filtered    unknown
889/tcp    filtered    unknown
890/tcp    filtered    unknown
891/tcp    filtered    unknown
892/tcp    filtered    unknown
893/tcp    filtered    unknown
895/tcp    filtered    unknown
896/tcp    filtered    unknown
898/tcp    open        sun-manageconsole
903/tcp    filtered    unknown
905/tcp    filtered    unknown
908/tcp    filtered    unknown
```

```
916/tcp    filtered    unknown
918/tcp    filtered    unknown
920/tcp    filtered    unknown
922/tcp    filtered    unknown
923/tcp    filtered    unknown
926/tcp    filtered    unknown
932/tcp    filtered    unknown
933/tcp    filtered    unknown
940/tcp    filtered    unknown
942/tcp    filtered    unknown
943/tcp    filtered    unknown
951/tcp    filtered    unknown
953/tcp    filtered    rndc
955/tcp    filtered    unknown
959/tcp    filtered    unknown
960/tcp    filtered    unknown
963/tcp    filtered    unknown
968/tcp    filtered    unknown
975/tcp    filtered    securenetpro-sensor
976/tcp    filtered    unknown
983/tcp    filtered    unknown
994/tcp    filtered    ircs
995/tcp    filtered    pop3s
996/tcp    filtered    xtreelic
1006/tcp   filtered    unknown
1014/tcp   filtered    unknown
1016/tcp   filtered    unknown
1021/tcp   filtered    unknown
1022/tcp   filtered    unknown
1024/tcp   filtered    kdm
1025/tcp   filtered    NFS-or-IIS
1026/tcp   filtered    LSA-or-nterm
1029/tcp   filtered    ms-lsa
1030/tcp   filtered    iad1
1031/tcp   filtered    iad2
1032/tcp   filtered    iad3
1033/tcp   filtered    netinfo
1050/tcp   filtered    java-or-OTGfileshare
1084/tcp   filtered    ansoft-lm-2
1109/tcp   filtered    kpop
1110/tcp   filtered    nfsd-status
1112/tcp   filtered    msql
1127/tcp   filtered    supfiledbg
1212/tcp   filtered    lupa
1337/tcp   filtered    waste
1351/tcp   filtered    equationbuilder
1361/tcp   filtered    linx
1364/tcp   filtered    ndm-server
1369/tcp   filtered    gv-us
1372/tcp   filtered    fc-ser
1373/tcp   filtered    chromagrafx
1374/tcp   filtered    molly
1376/tcp   filtered    ibm-pps
1377/tcp   filtered    cichlid
1378/tcp   filtered    elan
1383/tcp   filtered    gwha
1385/tcp   filtered    atex_elmd
```

```
1388/tcp   filtered    objective-dbc
1393/tcp   filtered    iclpv-nls
1396/tcp   filtered    dvl-activemail
1398/tcp   filtered    video-activmail
1399/tcp   filtered    cadkey-licman
1400/tcp   filtered    cadkey-tablet
1401/tcp   filtered    goldleaf-licman
1404/tcp   filtered    igi-lm
1412/tcp   filtered    innosys
1424/tcp   filtered    hybrid
1425/tcp   filtered    zion-lm
1427/tcp   filtered    mloadd
1428/tcp   filtered    informatik-lm
1429/tcp   filtered    nms
1430/tcp   filtered    tpdu
1431/tcp   filtered    rgtp
1432/tcp   filtered    blueberry-lm
1433/tcp   filtered    ms-sql-s
1437/tcp   filtered    tabula
1438/tcp   filtered    eicon-server
1448/tcp   filtered    oc-lm
1456/tcp   filtered    dca
1458/tcp   filtered    nrcabq-lm
1461/tcp   filtered    ibm_wrless_lan
1462/tcp   filtered    world-lm
1463/tcp   filtered    nucleus
1464/tcp   filtered    msl_lmd
1466/tcp   filtered    oceansoft-lm
1472/tcp   filtered    csdm
1473/tcp   filtered    openmath
1476/tcp   filtered    clvm-cfg
1478/tcp   filtered    ms-sna-base
1479/tcp   filtered    dberegister
1483/tcp   filtered    afs
1486/tcp   filtered    nms_topo_serv
1490/tcp   filtered    insitu-conf
1493/tcp   filtered    netmap_lm
1496/tcp   filtered    liberty-lm
1500/tcp   filtered    vlsi-lm
1501/tcp   filtered    sas-3
1503/tcp   filtered    imtc-mcs
1504/tcp   filtered    evb-elm
1506/tcp   filtered    utcd
1507/tcp   filtered    symplex
1511/tcp   filtered    3l-l1
1515/tcp   filtered    ifor-protocol
1520/tcp   filtered    atm-zip-office
1523/tcp   filtered    cichild-lm
1526/tcp   filtered    pdap-np
1529/tcp   filtered    support
1535/tcp   filtered    ampr-info
1538/tcp   filtered    3ds-lm
1545/tcp   filtered    vistium-share
1548/tcp   filtered    axon-lm
1552/tcp   filtered    pciarray
1600/tcp   filtered    issd
1652/tcp   filtered    xnmp
```

```
1663/tcp   filtered    netview-aix-3
1665/tcp   filtered    netview-aix-5
1671/tcp   filtered    netview-aix-11
1680/tcp   filtered    CarbonCopy
1720/tcp   filtered    H.323/Q.931
1827/tcp   filtered    pcm
1900/tcp   filtered    UPnP
1984/tcp   filtered    bigbrother
1989/tcp   filtered    tr-rsrb-p3
1991/tcp   filtered    stun-p2
1992/tcp   filtered    stun-p3
1994/tcp   filtered    stun-port
1999/tcp   filtered    tcp-id-port
2002/tcp   filtered    globe
2003/tcp   filtered    cfingerd
2007/tcp   filtered    dectalk
2008/tcp   filtered    conf
2009/tcp   filtered    news
2011/tcp   filtered    raid-cc
2013/tcp   filtered    raid-am
2016/tcp   filtered    bootserver
2017/tcp   filtered    cypress-stat
2021/tcp   filtered    servexec
2023/tcp   filtered    xinuexpansion3
2027/tcp   filtered    shadowserver
2028/tcp   filtered    submitserver
2032/tcp   filtered    blackboard
2038/tcp   filtered    objectmanager
2040/tcp   filtered    lam
2048/tcp   filtered    dls-monitor
2068/tcp   filtered    advocentkvm
2106/tcp   filtered    ekshell
2201/tcp   filtered    ats
2307/tcp   filtered    pehelp
2401/tcp   filtered    cvspserver
2500/tcp   filtered    rtsserv
2564/tcp   filtered    hp-3000-telnet
2603/tcp   filtered    ripngd
2604/tcp   filtered    ospfd
2605/tcp   filtered    bgpd
2627/tcp   filtered    webster
2638/tcp   filtered    sybase
2784/tcp   filtered    www-dev
2998/tcp   filtered    iss-realsec
3006/tcp   filtered    deslogind
3052/tcp   filtered    PowerChute
3141/tcp   filtered    vmodem
3292/tcp   filtered    meetingmaker
3372/tcp   filtered    msdtc
3455/tcp   filtered    prsvp
3456/tcp   filtered    vat
3457/tcp   filtered    vat-control
3462/tcp   filtered    track
3689/tcp   filtered    rendezvous
3984/tcp   filtered    mapper-nodemgr
3985/tcp   filtered    mapper-mapethd
3986/tcp   filtered    mapper-ws_ethd
```

```
3999/tcp   filtered    remoteanything
4000/tcp   filtered    remoteanything
4008/tcp   filtered    netcheque
4045/tcp   filtered    lockd
4132/tcp   filtered    nuts_dem
4144/tcp   filtered    wincim
4321/tcp   filtered    rwhois
4343/tcp   filtered    unicall
4444/tcp   filtered    krb524
4899/tcp   filtered    radmin
5000/tcp   filtered    UPnP
5001/tcp   filtered    commplex-link
5003/tcp   filtered    filemaker
5010/tcp   filtered    telelpathstart
5011/tcp   filtered    telelpathattack
5101/tcp   filtered    admdog
5190/tcp   filtered    aol
5191/tcp   filtered    aol-1
5236/tcp   filtered    padl2sim
5304/tcp   filtered    hacl-local
5308/tcp   filtered    cfengine
5405/tcp   filtered    pcduo
5550/tcp   filtered    sdadmind
5631/tcp   filtered    pcanywheredata
5717/tcp   filtered    prosharenotify
5803/tcp   filtered    vnc-http-3
5901/tcp   filtered    vnc-1
5902/tcp   filtered    vnc-2
6001/tcp   filtered    X11:1
6007/tcp   filtered    X11:7
6009/tcp   filtered    X11:9
6101/tcp   filtered    VeritasBackupExec
6105/tcp   filtered    isdninfo
6110/tcp   filtered    softcm
6143/tcp   filtered    watershed-lm
6144/tcp   filtered    statsci1-lm
6146/tcp   filtered    lonewolf-lm
6148/tcp   filtered    ricardo-lm
6699/tcp   filtered    napster
6969/tcp   filtered    acmsoda
7005/tcp   filtered    afs3-volser
7007/tcp   filtered    afs3-bos
7201/tcp   filtered    dlip
7326/tcp   filtered    icb
7597/tcp   filtered    qaz
8000/tcp   filtered    http-alt
8888/tcp   filtered    sun-answerbook
9152/tcp   filtered    ms-sql2000
9876/tcp   filtered    sd
9991/tcp   filtered    issa
9992/tcp   filtered    issc
10000/tcp  filtered    snet-sensor-mgmt
11371/tcp  filtered    pksd
12346/tcp  filtered    NetBus
13701/tcp  filtered    VeritasNetbackup
13708/tcp  filtered    VeritasNetbackup
13713/tcp  filtered    VeritasNetbackup
```

```
13717/tcp  filtered    VeritasNetbackup
13718/tcp  filtered    VeritasNetbackup
13721/tcp  filtered    VeritasNetbackup
15126/tcp  filtered    swgps
17007/tcp  filtered    isode-dua
18181/tcp  filtered    opsec_cvp
18187/tcp  filtered    opsec_ela
22370/tcp  filtered    hpnpd
27004/tcp  filtered    flexlm4
27009/tcp  filtered    flexlm9
27665/tcp  filtered    Trinoo_Master
31337/tcp  filtered    Elite
32770/tcp  filtered    sometimes-rpc3
32772/tcp  filtered    sometimes-rpc7
32774/tcp  filtered    sometimes-rpc11
32776/tcp  filtered    sometimes-rpc15
32777/tcp  filtered    sometimes-rpc17
32779/tcp  filtered    sometimes-rpc21
44442/tcp  filtered    coldfusion-auth
54320/tcp  filtered    bo2k
65301/tcp  filtered    pcanywhere

Host host2.foo.com (<IP address censored>)appears to be up ... good.
Initiating SYN Stealth Scan against host2.foo.com (<IP address censored>)at
16:16
Adding open port 111/tcp
Adding open port 22/tcp
Adding open port 13722/tcp
Adding open port 53/tcp
Adding open port 32772/tcp
Adding open port 32771/tcp
Adding open port 4045/tcp
Adding open port 13783/tcp
Adding open port 13782/tcp
Adding open port 32776/tcp
The SYN Stealth Scan took 2 seconds to scan 1644 ports.
Interesting ports on host2.foo.com (<IP address censored>):
(The 1634 ports scanned but not shown below are in state: closed)
Port       State       Service
22/tcp     open        ssh
53/tcp     open        domain
111/tcp    open        sunrpc
4045/tcp   open        lockd
13722/tcp  open        VeritasNetbackup
13782/tcp  open        VeritasNetbackup
13783/tcp  open        VeritasNetbackup
32771/tcp  open        sometimes-rpc5
32772/tcp  open        sometimes-rpc7
32776/tcp  open        sometimes-rpc15

Host host3.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host3.foo.com (<IP address censored>) at
16:16
Adding open port 111/tcp
Adding open port 22/tcp
Adding open port 13722/tcp
Adding open port 53/tcp
Adding open port 32772/tcp
Adding open port 32771/tcp
Adding open port 4045/tcp
Adding open port 13783/tcp
Adding open port 13782/tcp
Adding open port 32773/tcp
The SYN Stealth Scan took 2 seconds to scan 1644 ports.
Interesting ports on host3.foo.com (<IP address censored>):
(The 1634 ports scanned but not shown below are in state: closed)
Port       State       Service
22/tcp     open        ssh
53/tcp     open        domain
111/tcp    open        sunrpc
4045/tcp   open        lockd
13722/tcp  open        VeritasNetbackup
13782/tcp  open        VeritasNetbackup
13783/tcp  open        VeritasNetbackup
32771/tcp  open        sometimes-rpc5
32772/tcp  open        sometimes-rpc7
32773/tcp  open        sometimes-rpc9

Host host4.foo.com (<IP address censored>)appears to be up ... good.
Initiating SYN Stealth Scan against host4.foo.com (<IP address censored>)at
16:16
Adding open port 111/tcp
Adding open port 22/tcp
Adding open port 927/tcp
Adding open port 820/tcp
Adding open port 800/tcp
The SYN Stealth Scan took 3 seconds to scan 1644 ports.
Interesting ports on host5.foo.com (<IP address censored>):
(The 1639 ports scanned but not shown below are in state: closed)
Port       State       Service
22/tcp     open        ssh
111/tcp    open        sunrpc
800/tcp    open        mdbs_daemon
820/tcp    open        unknown
927/tcp    open        unknown

Host host5.foo.com (<IP address censored>) appears to be up ... good.
Initiating SYN Stealth Scan against host5.foo.com (<IP address censored>) at
16:16
Adding open port 111/tcp
Adding open port 1521/tcp
Adding open port 22/tcp
Adding open port 13722/tcp
Adding open port 53/tcp
Adding open port 32772/tcp
Adding open port 80/tcp
Adding open port 32771/tcp
Adding open port 4045/tcp
Adding open port 13783/tcp
Adding open port 13782/tcp
The SYN Stealth Scan took 3 seconds to scan 1644 ports.
Interesting ports on host5.foo.com (<IP address censored>):
(The 1633 ports scanned but not shown below are in state: closed)
Port       State       Service
```

```
22/tcp     open        ssh
53/tcp     open        domain
80/tcp     open        http
111/tcp    open        sunrpc
1521/tcp   open        oracle
4045/tcp   open        lockd
13722/tcp  open        VeritasNetbackup
13782/tcp  open        VeritasNetbackup
13783/tcp  open        VeritasNetbackup
32771/tcp  open        sometimes-rpc5
32772/tcp  open        sometimes-rpc7

Nmap run completed -- 5 IP addresses (5 hosts up) scanned in 44.387 seconds

# nmap -v -g53 -P0 -sU -T Aggressive -iL dmz-hosts.txt -oN trust-to-dmz-
udp.txt
Reading target specifications from FILE: dmz-hosts.txt

Starting nmap 3.30 ( http://www.insecure.org/nmap/ ) at 2003-07-28 16:17 PDT
Host host1.foo.com (<IP address censored>)appears to be up ... good.
Initiating UDP Scan against host1.foo.com (<IP address censored>)at 16:17
The UDP Scan took 147 seconds to scan 1471 ports.
All 1471 scanned ports on host1.foo.com (<IP address censored>)are: closed

Host host2.foo.com (<IP address censored>)appears to be up ... good.
Initiating UDP Scan against host2.foo.com (<IP address censored>)at 16:19
The UDP Scan took 821 seconds to scan 1471 ports.
Adding open port 743/udp
Adding open port 4045/udp
Adding open port 111/udp
Adding open port 1019/udp
Adding open port 1021/udp
Adding open port 53/udp
Adding open port 514/udp
Adding open port 1020/udp
Adding open port 123/udp
Adding open port 1018/udp
Adding open port 161/udp
Interesting ports on host2.foo.com (<IP address censored>):
(The 1460 ports scanned but not shown below are in state: closed)
Port       State       Service
53/udp     open        domain
111/udp    open        sunrpc
123/udp    open        ntp
161/udp    open        snmp
514/udp    open        syslog
743/udp    open        unknown
1018/udp   open        unknown
1019/udp   open        unknown
1020/udp   open        unknown
1021/udp   open        unknown
4045/udp   open        lockd

Host host3.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host3.foo.com (<IP address censored>) at 16:33
The UDP Scan took 824 seconds to scan 1471 ports.
Adding open port 765/udp
Adding open port 161/udp
Adding open port 123/udp
Adding open port 32776/udp
Adding open port 32778/udp
Adding open port 32777/udp
Adding open port 514/udp
Adding open port 53/udp
Adding open port 111/udp
Adding open port 4045/udp
Interesting ports on host3.foo.com (<IP address censored>):
(The 1461 ports scanned but not shown below are in state: closed)
Port       State       Service
53/udp     open        domain
111/udp    open        sunrpc
123/udp    open        ntp
161/udp    open        snmp
514/udp    open        syslog
765/udp    open        webster
4045/udp   open        lockd
32776/udp  open        sometimes-rpc16
32777/udp  open        sometimes-rpc18
32778/udp  open        sometimes-rpc20

Host host4.foo.com (<IP address censored>)appears to be up ... good.
Initiating UDP Scan against host4.foo.com (<IP address censored>)at 16:47
The UDP Scan took 1456 seconds to scan 1471 ports.
Adding open port 1022/udp
Adding open port 797/udp
Adding open port 607/udp
Adding open port 800/udp
Adding open port 1023/udp
Adding open port 514/udp
Adding open port 733/udp
Adding open port 928/udp
Adding open port 817/udp
Adding open port 799/udp
Adding open port 111/udp
Adding open port 796/udp
Interesting ports on host5.foo.com (<IP address censored>):
(The 1459 ports scanned but not shown below are in state: closed)
Port       State       Service
111/udp    open        sunrpc
514/udp    open        syslog
607/udp    open        nqs
733/udp    open        unknown
796/udp    open        unknown
797/udp    open        unknown
799/udp    open        unknown
800/udp    open        mdbs_daemon
817/udp    open        unknown
928/udp    open        unknown
1022/udp   open        unknown
1023/udp   open        unknown

Host host5.foo.com (<IP address censored>) appears to be up ... good.
Initiating UDP Scan against host5.foo.com (<IP address censored>) at 17:11
The UDP Scan took 148 seconds to scan 1471 ports.
```

```
Adding open port 161/udp
Adding open port 32780/udp
Adding open port 1022/udp
Adding open port 123/udp
Adding open port 1023/udp
Adding open port 32776/udp
Adding open port 514/udp
Adding open port 53/udp
Adding open port 32775/udp
Adding open port 1021/udp
Adding open port 111/udp
Adding open port 4045/udp
Adding open port 32774/udp
Interesting ports on host5.foo.com (<IP address censored>):
(The 1458 ports scanned but not shown below are in state: closed)
Port       State       Service
53/udp     open        domain
111/udp    open        sunrpc
123/udp    open        ntp
161/udp    open        snmp
514/udp    open        syslog
1021/udp   open        unknown
1022/udp   open        unknown
1023/udp   open        unknown
4045/udp   open        lockd
32774/udp  open        sometimes-rpc12
32775/udp  open        sometimes-rpc14
32776/udp  open        sometimes-rpc16
32780/udp  open        sometimes-rpc24

Nmap run completed -- 5 IP addresses (5 hosts up) scanned in 3396.284 seconds
```

Results of the Nmap Scan Recorded with the Sniffer Snort

```
# clear; tail -f fast.alert
07/28/03-23:11:28.029164 {ICMP} <host14.foo.com IP address censored> ->
<host1.foo.com IP address censored>
[**] [1:469:1] ICMP PING NMAP [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS162]
------------------------------------------------------------------------
07/28/03-23:11:28.029235 {ICMP} <host14.foo.com IP address censored> ->
<host2.foo.com IP address censored>
[**] [1:469:1] ICMP PING NMAP [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS162]
------------------------------------------------------------------------
07/28/03-23:11:28.029288 {ICMP} <host14.foo.com IP address censored> ->
<host3.foo.com IP address censored>
[**] [1:469:1] ICMP PING NMAP [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS162]
------------------------------------------------------------------------
07/28/03-23:11:28.029341 {ICMP} <host14.foo.com IP address censored> ->
<host5.foo.com IP address censored>
[**] [1:469:1] ICMP PING NMAP [**]
```

```
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS162]
------------------------------------------------------------------------
07/28/03-23:11:28.029392 {ICMP} <host14.foo.com IP address censored> ->
<host4.foo.com IP address censored>
[**] [1:469:1] ICMP PING NMAP [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS162]
------------------------------------------------------------------------
07/28/03-23:12:26.564249 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
------------------------------------------------------------------------
07/28/03-23:12:26.971569 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
------------------------------------------------------------------------
07/28/03-23:12:27.291976 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
------------------------------------------------------------------------
07/28/03-23:12:38.820943 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
------------------------------------------------------------------------
07/28/03-23:12:39.140195 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
------------------------------------------------------------------------
07/28/03-23:12:49.059590 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
------------------------------------------------------------------------
07/28/03-23:12:49.379395 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
```

```
-----------------------------------------------------------------------
07/28/03-23:12:52.932743 {TCP} <host14.foo.com IP address censored>:22 ->
<host2.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-----------------------------------------------------------------------
07/28/03-23:12:54.630246 {TCP} <host14.foo.com IP address censored>:22 ->
<host2.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-----------------------------------------------------------------------
07/28/03-23:12:56.940293 {TCP} <host14.foo.com IP address censored>:22 ->
<host2.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-----------------------------------------------------------------------
07/28/03-23:12:57.941317 {TCP} <host14.foo.com IP address censored>:22 ->
<host3.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-----------------------------------------------------------------------
07/28/03-23:12:59.958001 {TCP} <host14.foo.com IP address censored>:22 ->
<host3.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-----------------------------------------------------------------------
07/28/03-23:13:01.939996 {TCP} <host14.foo.com IP address censored>:22 ->
<host3.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-----------------------------------------------------------------------
07/28/03-23:13:02.940395 {TCP} <host14.foo.com IP address censored>:22 ->
<host5.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-----------------------------------------------------------------------
07/28/03-23:13:04.629135 {TCP} <host14.foo.com IP address censored>:22 ->
<host5.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-----------------------------------------------------------------------
```

```
07/28/03-23:13:06.939169 {TCP} <host14.foo.com IP address censored>:22 ->
<host5.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:13:07.939544 {TCP} <host14.foo.com IP address censored>:22 ->
<host4.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:13:09.948585 {TCP} <host14.foo.com IP address censored>:22 ->
<host4.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:13:12.258474 {TCP} <host14.foo.com IP address censored>:22 ->
<host4.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:15:35.443196 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:15:36.414854 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:3128
[**] [1:618:4] SCAN Squid Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:15:36.731527 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:3128
[**] [1:618:4] SCAN Squid Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:15:49.413463 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:15:49.729944 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
```

```
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:15:50.049933 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:02.210363 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:8080
[**] [1:620:3] SCAN Proxy \(8080\) attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:16:05.728365 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:1080
[**] [1:615:4] SCAN SOCKS Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://help.undernet.org/proxyscan/]
-------------------------------------------------------------------------
07/28/03-23:16:06.048084 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:1080
[**] [1:615:4] SCAN SOCKS Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://help.undernet.org/proxyscan/]
-------------------------------------------------------------------------
07/28/03-23:16:08.609797 {TCP} <host14.foo.com IP address censored>:22 ->
<host1.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:09.915404 {TCP} <host14.foo.com IP address censored>:22 ->
<host2.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:09.928745 {TCP} <host14.foo.com IP address censored>:22 ->
<host2.foo.com IP address censored>:3128
[**] [1:618:4] SCAN Squid Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:16:10.651215 {TCP} <host14.foo.com IP address censored>:22 ->
<host2.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:11.693424 {TCP} <host14.foo.com IP address censored>:22 ->
<host2.foo.com IP address censored>:8080
[**] [1:620:3] SCAN Proxy \(8080\) attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
```

```
07/28/03-23:16:12.036551 {TCP} <host14.foo.com IP address censored>:22 ->
<host2.foo.com IP address censored>:1080
[**] [1:615:4] SCAN SOCKS Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://help.undernet.org/proxyscan/]
-------------------------------------------------------------------------
07/28/03-23:16:12.058734 {TCP} <host14.foo.com IP address censored>:22 ->
<host2.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:12.074729 {TCP} <host14.foo.com IP address censored>:22 ->
<host3.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:12.084489 {TCP} <host14.foo.com IP address censored>:22 ->
<host3.foo.com IP address censored>:3128
[**] [1:618:4] SCAN Squid Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:16:12.803403 {TCP} <host14.foo.com IP address censored>:22 ->
<host3.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:13.843441 {TCP} <host14.foo.com IP address censored>:22 ->
<host3.foo.com IP address censored>:8080
[**] [1:620:3] SCAN Proxy \(8080\) attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:16:14.497766 {TCP} <host14.foo.com IP address censored>:22 ->
<host3.foo.com IP address censored>:1080
[**] [1:615:4] SCAN SOCKS Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://help.undernet.org/proxyscan/]
-------------------------------------------------------------------------
07/28/03-23:16:14.518513 {TCP} <host14.foo.com IP address censored>:22 ->
<host3.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:14.539966 {TCP} <host14.foo.com IP address censored>:22 ->
<host5.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
```

```
07/28/03-23:16:14.550344 {TCP} <host14.foo.com IP address censored>:22 ->
<host5.foo.com IP address censored>:3128
[**] [1:618:4] SCAN Squid Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:16:15.271454 {TCP} <host14.foo.com IP address censored>:22 ->
<host5.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:16.628518 {TCP} <host14.foo.com IP address censored>:22 ->
<host5.foo.com IP address censored>:8080
[**] [1:620:3] SCAN Proxy \(8080\) attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:16:16.651389 {TCP} <host14.foo.com IP address censored>:22 ->
<host5.foo.com IP address censored>:1080
[**] [1:615:4] SCAN SOCKS Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://help.undernet.org/proxyscan/]
-------------------------------------------------------------------------
07/28/03-23:16:16.994190 {TCP} <host14.foo.com IP address censored>:22 ->
<host5.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:17.010825 {TCP} <host14.foo.com IP address censored>:22 ->
<host4.foo.com IP address censored>:705
[**] [1:1421:2] SNMP AgentX/tcp request [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:17.020663 {TCP} <host14.foo.com IP address censored>:22 ->
<host4.foo.com IP address censored>:3128
[**] [1:618:4] SCAN Squid Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:16:17.741299 {TCP} <host14.foo.com IP address censored>:22 ->
<host4.foo.com IP address censored>:162
[**] [1:1420:2] SNMP trap tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-------------------------------------------------------------------------
07/28/03-23:16:19.098429 {TCP} <host14.foo.com IP address censored>:22 ->
<host4.foo.com IP address censored>:8080
[**] [1:620:3] SCAN Proxy \(8080\) attempt [**]
[Classification: Attempted Information Leak] [Priority: 2]
-------------------------------------------------------------------------
07/28/03-23:16:19.120798 {TCP} <host14.foo.com IP address censored>:22 ->
<host4.foo.com IP address censored>:1080
[**] [1:615:4] SCAN SOCKS Proxy attempt [**]
```

```
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://help.undernet.org/proxyscan/]
-----------------------------------------------------------------------------
07/28/03-23:16:19.776737 {TCP} <host14.foo.com IP address censored>:22 ->
<host4.foo.com IP address censored>:161
[**] [1:1418:2] SNMP request tcp [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0013]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-0012]
-----------------------------------------------------------------------------
#
```

Assessment

The firewall clearly controls application and infrastructure management flows from the trusted interface to the DMZ interface. It denies by default any services not explicitly authorized. Moreover, the network-based intrusion detection system did not detect any network traffic on unauthorized ports. Therefore, the firewall is compliant with item C4 regarding trusted to DMZ traffic.

Overall Assessment for Checklist Item C4

Since clearly all ports have been disabled by default in both directions and only authorized ports have been opened, the firewall is compliant with checklist item C4.

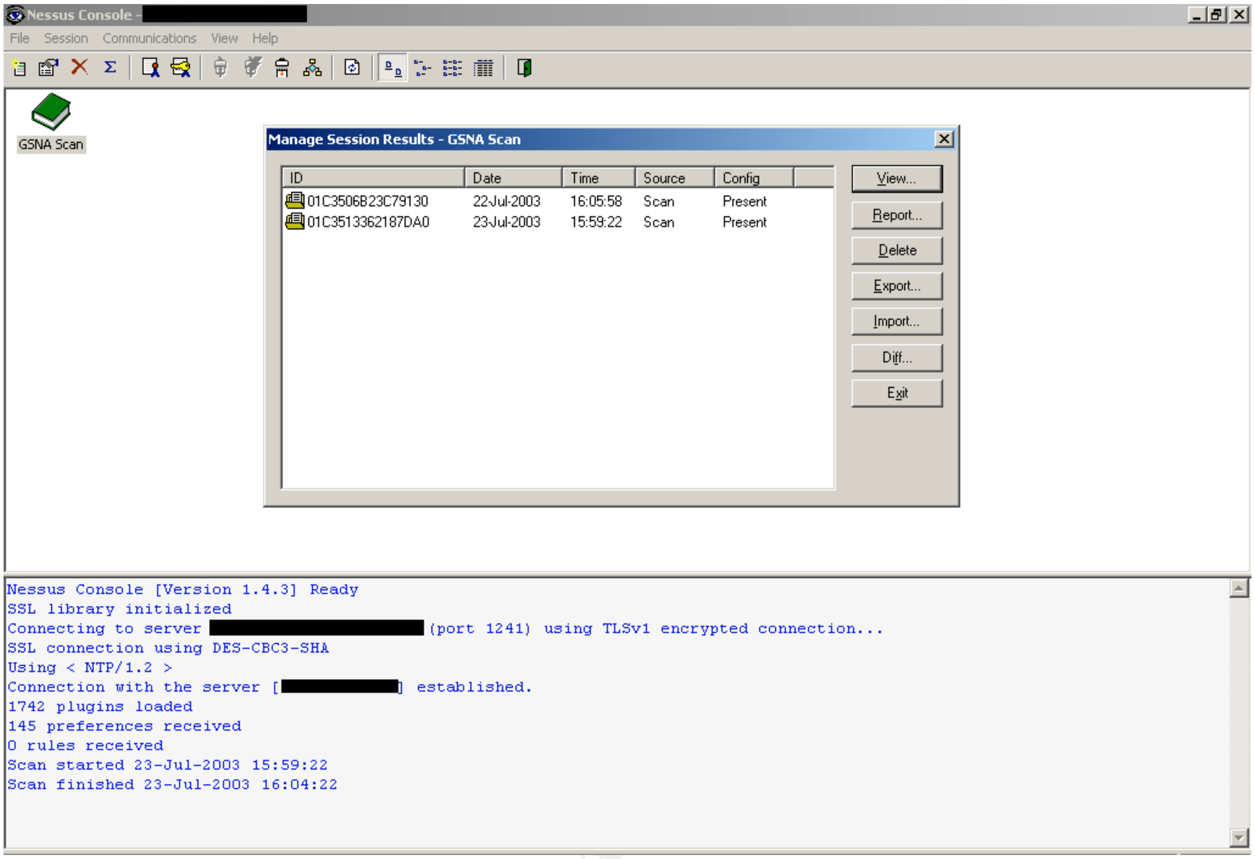
Checklist Item C9: FAIL

Objective: No vulnerable services should be accessible through the perimeter's countermeasures.

In order to determine if vulnerable services were accessible through the perimeter's countermeasures, I performed a vulnerability assessment using Nessus. I deliberately launched the scan from outside the firewall, since I wanted to identify vulnerable services *accessible through the perimeter's countermeasures.* Unfortunately, it is difficult to fully capture the Nessus configuration through a series of screen snapshots. Instead, I have provided a snapshot of the Nessus Console window after the scan, followed by a report on the scan results. The report includes a summary of the scan configuration.

Figure 4 shows the Nessus console window after completing the vulnerability scan.

Figure 4 – Nessus Console Window After Scan


Nessus Console - [redacted]
File Session Communications View Help
GSNA Scan
Manage Session Results - GSNA Scan
View...
Report...
Delete
Export...
Import...
Diff...
Exit

ID	Date	Time	Source	Config
01C3506B23C79130	22-Jul-2003	16:05:58	Scan	Present
01C3513362187DA0	23-Jul-2003	15:59:22	Scan	Present

```
Nessus Console [Version 1.4.3] Ready
SSL library initialized
Connecting to server [redacted] (port 1241) using TLSv1 encrypted connection...
SSL connection using DES-CBC3-SHA
Using < NTP/1.2 >
Connection with the server [[redacted]] established.
1742 plugins loaded
145 preferences received
0 rules received
Scan started 23-Jul-2003 15:59:22
Scan finished 23-Jul-2003 16:04:22
```

Nessus Vulnerability Scan: Configuration and Results

For the Nessus Vulnerability Scan, I enabled the following plug-ins: Backdoors, RPC, NIS, "Gain a shell remotely", "Remote file access", "Gain root remotely," and a handful of individual items from other plugins. Detailed configuration settings are provided below.

```
NESSUS SECURITY SCAN REPORT

Created 23.07.2003              Sorted by vulnerabilities

Session Name : GSNA Scan
Start Time   : 23.07.2003 15:59:22
Finish Time  : 23.07.2003 16:04:22
Elapsed Time : 0 day(s) 00:04:59


Plugins used in this scan:

  Id    Name
----------------------------------------------------------------------------
  10794 PC Anywhere TCP
  11198 BitKeeper remote command execution
  10996 JRun Sample Files
  10141 MetaInfo servers
```

```
11412 IIS : WebDAV Overflow (MS03-007)
10827 SysV /bin/login buffer overflow (telnet)
10727 Buffer overflow in Solaris in.lpd
11691 Desktop Orbiter Server Detection
10640 Kerberos PingPong attack
11356 Mountable NFS shares
10747 3Com Superstack II switch with default password
10221 nsed service
10787 tooltalk format string
10549 BIND vulnerable to ZXFR bug
11077 HTTP Cookie overflow
11114 Canna Overflow
10228 rusersd service
10918 Apache-SSL overflow
11032 Directory Scanner
10213 cmsd service
11645 wsmp3d command execution
10093 GateCrasher
10232 showfhd service
10054 Delegate overflow
11754 List of printers is available through CUPS
10463 vpopmail input validation bug
11418 Sun rpc.cmsd overflow
11028 IIS .HTR overflow
10169 OpenLink web config buffer overflow
10132 Kuang2 the Virus
11339 scp File Create/Overwrite
10229 sadmin service
10677 Apache /server-status accessible
10517 pam_smb / pam_ntdom overflow
11250 Unpassworded backdoor account
11241 Unpassworded EZsetup account
11535 SheerDNS directory traversal
11715 Header overflow against HTTP proxy
11113 Samba Buffer Overflow
10714 Default password router Zyxel
11254 Unpassworded friday account
10274 SyGate Backdoor
11390 rsync array overflow
10238 tfsd service
11386 Lotus Domino 6.0 vulnerabilities
10184 Various pop3 overflows
10961 AirConnect Default Password
10235 statd service
11244 Unpassworded OutOfBox account
11585 Sambar Transmits Passwords in PlainText
10883 OpenSSH Channel Code Off by 1
10917 SMB Scope
11054 fakeidentd overflow
11654 ShareMailPro Username Identification
10208 3270 mapper service
10522 LPRng malformed input
11246 Unpassworded lp account
11195 SSH Multiple Vulns
10088 Writeable FTP root
10325 Xtramail pop3 overflow
10680 Test Microsoft IIS Source Fragment Disclosure
```

```
10989 Nortel/Bay Networks default password
10322 Xitami Web Server buffer overflow
11121 xtel detection
10802 OpenSSH < 3.0.1
10237 sunlink mapper service
10536 Anaconda remote file retrieval
11058 rusersd output
10234 sprayd service
10217 keyserv service
10146 Tektronix /ncl_items.html
10316 WinSATAN
10024 BackOrifice
10223 RPC portmapper
11707 Bugbear.B web backdoor
10374 uw-imap buffer overflow after logon
11220 Netscape /.perf accessible
10683 iPlanet Certificate Management Traversal
11030 Apache chunked encoding
10622 PPTP detection and versioning
10045 Cisco 675 passwordless router
11245 Unpassworded root account
11586 FileMakerPro Detection
11120 xtelw detection
11243 Unpassworded 4Dgifts account
11510 BIND 4.x resolver overflow
11061 HTTP version number overflow
11167 Webserver4everyone too long URL
11523 Samba trans2open buffer overflow
10607 SSH1 CRC-32 compensation attack
10994 IPSwitch IMail SMTP Buffer Overflow
11408 Apache < 2.0.43
11251 Unpassworded tutor account
10954 OpenSSH AFS/Kerberos ticket/token passing
11136 /bin/login overflow exploitation
11755 CesarFTP multiple overflows
10438 Netwin's DMail ETRN overflow
11118 alya.cgi
11396 hp jetdirect vulnerabilities
10323 XTramail control denial
10029 BIND vulnerable
10472 SSH Kerberos issue
11353 NFS fsirand
11188 X Font Service Buffer Overflow
10752 Apache Auth Module SQL Insertion Attack
11060 OpenSSL overflow (generic test)
10685 IIS ISAPI Overflow
11263 Default password (lrkr0x) for gamez
10881 SSH protocol versions supported
10343 MySQLs accepts any password
10341 Pocsag password
10625 IMAP4rev1 buffer overflow after logon
10006 PC Anywhere
11403 iPlanet Application Server Buffer Overflow
11164 SOCKS4 username overflow
11704 icmp leak
10828 SysV /bin/login buffer overflow (rlogin)
10962 Cabletron Web View Administrative Access
```

```
  10243 ypupdated service
  11081 Oracle9iAS too long URL
  11299 MySQL double free()
  11192 multiple MySQL flaws
  11369 irix performance copilot
  11170 Alcatel OmniSwitch 7700/7800 switches backdoor
  11138 Citrix published applications
  11196 Cyrus IMAP pre-login buffer overrun
  10998 Shiva LanRover Blank Password
  10220 nlockmgr service
  10879 Shell Command Execution Vulnerability
  11742 Magic WinMail Format string
  10350 Shaft Detect
  11126 SOCKS4A hostname overflow
  10320 Too long URL
  10257 SmartServer pop3 overflow
  10713 CodeRed version X detection
  11340 SSH Secure-RPC Weak Encrypted Authentication
  11312 DHCP server overflow / format string bug
  10678 Apache /server-info accessible
  11420 Sun portmap xdrmem_getbytes() overflow
  11153 Identifies unknown services with 'HELP'
  10031 bootparamd service
  10116 IIS buffer overflow
  10424 NAI Management Agent leaks info
  10654 Oracle Application Server Overflow
  11265 Default password (satori) for rewt
  11210 Apache < 2.0.44 file reading on Win32
  10355 vqServer web traversal vulnerability
  10722 LDAP allows null bases
  11612 PXE server overflow
  10036 CDK Detect
  11259 Unpassworded StoogR account
  10407 X Server
  11354 Buffer overflow in FreeBSD 2.x lpd
  11204 Apache Tomcat Default Accounts
  10501 Trinity v3 Detect
  10242 yppasswd service
  10066 FakeBO buffer overflow
  10882 SSH protocol version 1 enabled
  11733 Bugbear.B worm
  10425 NAI Management Agent overflow
  10381 Piranha's RH6.2 default password
  10421 Rockliffe's MailSite overflow
  11031 OpenSSH <= 3.3
  11260 Default password (wank) for wank
  10200 RealServer G2 buffer overrun
  10214 database service
  10241 ypbind service
  10439 OpenSSH < 2.1.1 UseLogin feature
  11544 MonkeyWeb POST with too much data
  11279 Webmin Session ID Spoofing
  10580 netscape imap buffer overflow after logon
  10351 The ACC router shows configuration without authentication
  11338 Lotus Domino Vulnerabilities
  11005 LocalWeb2000 remote read
  10698 WebLogic Server /%00/ bug
```

```
11607 Apache < 2.0.46 on OS/2
10158 NIS server
11187 4553 Parasite Mothership Detect
10269 SSH Overflow
11327 Nortel Baystack switch password test
11151 Webserver 4D Cleartext Passwords
10219 nfsd service
11592 12Planet Chat Server Path Disclosure
11540 PPTP overflow
11314 Buffer overflow in Microsoft Telnet
10215 etherstatd service
10684 yppasswdd overflow
10708 SSH 3.0.0
11130 BrowseGate HTTP headers overflows
10240 walld service
11665 Apache < 2.0.46
10529 Nortel Networks  passwordless router (user level)
10786 Samba Remote Arbitrary File Creation
10212 automountd service
10454 sawmill password
11567 CommunigatePro Hijacking
10307 Trin00 for Windows Detect
10230 sched service
11137 Apache < 1.3.27
10596 Tinyproxy heap overflow
11409 ePolicy orchestrator format string
11634 Proxy Web Server Cross Site Scripting
10646 Lion worm
11783 Multiple IRC daemons format string attack
11235 Too long OPTIONS parameter
11003 IIS Possible Compromise
10544 format string attack against statd
10288 Trin00 Detect
10226 rquotad service
10283 TFN Detect
11563 Oracle LINK overflow
11341 SSH1 SSH Daemon Logging Failure
11266 Unpassworded jill account
11481 mod_auth_any command execution
11357 NFS cd ..
11075 dwhttpd format string
10440 Check for Apache Multiple / vulnerability
10411 klogind overflow
11484 apcupsd overflows
11716 Misconfigured Gnutella
10109 SCO i2odialogd buffer overrun
10559 XMail APOP Overflow
10699 IIS FrontPage DoS II
11633 lovgate virus is installed
10342 Check for VNC
11000 MPEi/X Default Accounts
11242 Unpassworded demos account
11201 Nortel/Bay Networks/Xylogics Annex default password
10008 WebSite 1.0 buffer overflow
10172 Passwordless HP LaserJet
10626 MySQL various flaws
10538 iWS shtml overflow
```

```
  11262 Default password (D13hh[) for root
  11311 shtml.exe overflow
  11554 BadBlue Administrative Actions Vulnerability
  11419 Office files list
  10149 NetBeans Java IDE
  10225 rje mapper service
  10605 BIND vulnerable to overflows
  10244 ypxfrd service
  10063 Eserv traversal
  11268 OS fingerprint
  10705 SimpleServer remote execution
  10515 Too long authorization
  10453 sawmill allows the reading of the first line of any file
  11123 radmin detection
  11006 RedHat 6.2 inetd
  11261 Default password (D13HH[) for root
  10423 qpopper euidl problem
  11197 Etherleak
  10523 thttpd ssi file retrieval
  11598 MailMax IMAP overflows
  10832 Kcms Profile Server
  10186 Portal of Doom
  10554 RealServer Memory Content Disclosure
  10233 snmp service
  10498 Test HTTP dangerous methods
  11152 BIND vulnerable to cached RR overflow
  11337 mountd overflow
  10687 Too long POST command
  11480 3com RAS 1500 configuration disclosure
  11552 mod_ntlm overflow / format string bug
  10211 amd service
  10659 snmpXdmid overflow
  11651 Batalla Naval Overflow
  11134 QMTP
  11442 Samba TNG multiple flaws
  11218 Tomcat /status information disclosure
  11257 Default password (manager) for system
  10224 rexd service
  10760 Alcatel ADSL modem with firewalling off
  11111 rpcinfo -p
  11264 Default password (wh00t!) for root
  10469 ipop2d reads arbitrary files
  10420 Gauntlet overflow
  10333 Linux TFTP get file
  11240 Unpassworded guest account
  11514 Netgear ProSafe Router password disclosure
  10481 Unpassworded MySQL
  10123 Imail's imap buffer overflow
  11023 lpd, dvips and remote command execution
  11127 HTTP 1.0 header overflow
  11082 Boozt index.cgi overflow
  10657 NT IIS 5.0 Malformed HTTP Printer Request Header Buffer Overflow
Vulnerability
  11736 gnocatan multiple buffer overflows
  10527 Boa file retrieval
  11388 l2tpd < 0.68 overflow
  10057 Lotus Domino ?open Vulnerability
```

```
11157 Trojan horses
10410 ICEcap default password
10379 LCDproc server detection
10231 selection service
10697 WebLogic Server DoS
10125 Imap buffer overflow
10790 rwhois format string attack
11203 Motorola Vanguard with No Password
10530 Passwordless Alcatel ADSL Modem
10380 rsh on finger output
10161 rlogin -froot
10330 Services
10239 tooltalk service
10950 rpc.walld format string
11699 URLScan Detection
11228 Unreal Engine flaws
11628 WebLogic Certificates Spoofing
10251 rpc.nisd overflow
11267 OpenSSL password interception
11642 Helix RealServer Buffer Overrun
11019 Alcatel PABX 4400 detection
11435 ActiveSync packet overflow
10812 libgtop_daemon format string
10378 LCDproc buffer overflow
10647 ntpd overflow
10436 INN version check (2)
10012 Alibaba 2.0 buffer overflow
10709 TESO in.telnetd buffer overflow
10010 AliBaba path climbing
10329 BIND iquery overflow
10437 NFS export
11406 Buffer overflow in BSD in.lpd
10723 LDAP allows anonymous binds
10833 dtspcd overflow
11376 qpopper Qvsnprintf buffer overflow
10600 ICECast Format String
11456 PostgreSQL multiple flaws
10222 nsemntd service
10104 HP LaserJet direct print
11389 rsync modules
10965 SSH 3 AllowedAuthentication
10345 Passwordless Cayman DSL router
10540 NSM format strings vulnerability
10368 Dansie Shopping Cart backdoor
10339 TFTP get file
11591 12Planet Chat Server ClearText Password
10287 Traceroute
10920 RemotelyAnywhere WWW detection
11504 MultiTech Proxy Server Default Password
11606 WebLogic Server hostname disclosure
10578 Oops buffer overflow
10382 Atrium Mercur Mailserver
11318 BIND 9 overflow
10815 Web Server Cross Site Scripting
11278 Quicktime/Darwin Remote Admin Exploit
10124 Imail's imonitor buffer overflow
10532 eXtropia Web Store remote file retrieval
```

```
10094 GirlFriend
10053 DeepThroat
10005 NetSphere Backdoor
10218 llockmgr service
10070 Finger backdoor
10390 mstream agent Detect
10909 Brute force login (Hydra)
10209 X25 service
11355 Buffer overflow in AIX lpd
11252 Unpassworded toor account
10691 Netscape Enterprise INDEX request problem
11513 Solaris lpd remote command execution
10129 INN version check
11358 The remote portmapper forwards NFS requests
11256 Default password (guest) for guest
10771 OpenSSH 2.5.x -> 2.9.x adv.option
11637 MailMax IMAP overflows (2)
10608 OpenSSH 2.3.1 authentication bypass vulnerability
10210 alis service
10206 Rover pop3 overflow
11656 Eserv Directory Index
11763 Kerio WebMail interface flaws
10681 Netscape Messenging Server User List
10292 uw-imap buffer overflow
11108 Omron WorldView Wnn Overflow
10502 Axis Camera Default Password
11405 dmisd service
11576 thttpd directory traversal thru Host:
11154 Unknown services banners
10018 Knox Arkeia buffer overflow
10286 thttpd flaw
11168 Samba Unicode Buffer Overflow
10110 iChat
10666 AppleShare IP Server status query
10409 SubSeven
10091 FTPGate traversal
10935 IIS ASP ISAPI filter Overflow
10103 HP LaserJet display hack
10951 cachefsd overflow
11673 Remote PC Access Server Detection
10197 qpopper LIST buffer overflow
10196 qpopper buffer overflow
11133 Generic format string
11135 Bugbear worm
10384 IRIX Objectserver
10268 SSH Insertion Attack
10391 mstream handler Detect
10422 MDBMS overflow
10889 NIDS evasion
10048 Communigate Pro overflow
10966 IMAP4buffer overflow in the BODY command
10823 OpenSSH UseLogin Environment Variables
10483 Unpassworded PostgreSQL
11574 Portable OpenSSH PAM timing attack
11169 SSH setsid() vulnerability
11342 PKCS #1 Version 1.5 Session Key Retrieval
11343 OpenSSH Client Unauthorized Remote Forwarding
```

```
  10724 Cayman DSL router one char login
  10227 rstatd service
  11712 OpenSSH Reverse DNS Lookup bypass
  10202 remwatch
  11199 Multiple vulnerabilities in CUPS
  11378 MySQL mysqld Privilege Escalation Vulnerability
  11313 MCMS : Buffer overflow in Profile Service
  10216 fam service
  11248 Unpassworded date account
  11249 Unpassworded jack account
  10804 rwhois format string attack (2)
  10658 Oracle tnslsnr version query
  10766 Apache UserDir Sensitive Information Disclosure
  10928 EFTP buffer overflow
  10130 ipop2d buffer overflow
  11069 HTTP User-Agent overflow
  11493 Sambar Default Accounts
  10758 Check for VNC HTTP
  10919 Check open ports
  11255 Default password (root) for root
  10660 Oracle tnslsnr security
  11577 MDaemon IMAP CREATE overflow
  11183 HTTP negative Content-Length buffer overflow
  11253 Unpassworded hax0r account
  11620 Airport Administrative Port
  11258 Default password (glftpd) for glftpd
  11021 irix rpc.passwd overflow
  11209 Apache < 2.0.44 DOS device name
  10270 Stacheldraht Detect
  11247 Unpassworded sync account
  10096 rsh with null username
  11078 HTTP header overflow
  10236 statmon service
  10151 NetBus 1.x
  11784 Abyss httpd overflow
  11068 iPlanet chunked encoding
  10285 thttpd 2.04 buffer overflow
  11522 Linksys Router default password
  10500 Shiva Integrator Default Password
  11495 tanned format string vulnerability
  10276 TCP Chorusing
  10816 Webalizer Cross Site Scripting Vulnerability
  10923 Squid overflows
  11280 Usermin Session ID Spoofing
  10921 RemotelyAnywhere SSH detection
  10528 Nortel Networks passwordless router (manager level)
  10152 NetBus 2.x
  11335 mibiisa overflow
  11641 BadBlue Remote Administrative Interface Access
  11507 Apache < 2.0.45
  10805 Informix traversal
  11096 Avirt gateway insecure telnet proxy
  10389 Cart32 ChangeAdminPassword
  11129 HTTP 1.1 header overflow
  10267 SSH Server type and version
  10408 Insecure Napster clone
  10154 Netscape Enterprise 'Accept' buffer overflow
  10533 Web Shopper remote file retrieval
  11398 Samba Fragment Reassembly Overflow
  10706 McAfee myCIO Directory Traversal
  10948 qpopper options buffer overflow

Preferences settings for this scan:

  max_hosts                                = 16
  max_checks                               = 10
  log_whole_attack                         = yes
  cgi_path                                 = /cgi-bin
  port_range                               = 1-65535
  optimize_test                            = yes
  language                                 = english
  checks_read_timeout                      = 5
  non_simult_ports                         = 139, 445
  plugins_timeout                          = 320
  safe_checks                              = yes
  auto_enable_dependencies                 = yes
  use_mac_addr                             = no
  save_knowledge_base                      = yes
  kb_restore                               = no
  only_test_hosts_whose_kb_we_dont_have    = no
  only_test_hosts_whose_kb_we_have         = no
  kb_dont_replay_scanners                  = no
  kb_dont_replay_info_gathering            = no
  kb_dont_replay_attacks                   = no
  kb_dont_replay_denials                   = no
  kb_max_age                               = 864000
  plugin_upload                            = no
  plugin_upload_suffixes                   = .nasl, .inc
  slice_network_addresses                  = no
  ntp_save_sessions                        = yes
  ntp_detached_sessions                    = yes
  server_info_nessusd_version              = 2.0.7
  server_info_libnasl_version              = 2.0.7
  server_info_libnessus_version            = 2.0.7
  server_info_thread_manager               = fork
  server_info_os                           = SunOS
  server_info_os_version                   = 5.7
  reverse_lookup                           = no
  ntp_keep_communication_alive             = yes
  ntp_opt_show_end                         = yes
  save_session                             = yes
  detached_scan                            = no
  continuous_scan                          = no


Total security holes found : 55
             high severity : 16
              low severity : 39
             informational : 0


Scanned hosts:

Name                                High  Low   Info
```

```
------------------------------------------------
host12.foo.com                  0     0     0
host4.foo.com                   4     13    0
host5.foo.com                   3     5     0
host13.foo.com                  0     0     0
host2.foo.com                   3     8     0
host15.foo.com                  0     0     0
host14.foo.com                  0     0     0
host3.foo.com                   3     8     0
host1.foo.com                   3     5     0


Service: oracle (1521/tcp)
Severity: High


The remote Oracle Database, according to its version number,
is vulnerable to a buffer overflow in the query CREATE DATABASE LINK.

An attacker with a database account may use this flaw to gain the control
on the whole database, or even to obtain a shell on this host.

Solution : See http://otn.oracle.com/deploy/security/pdf/2003alert54.pdf
Risk Factor : High
BID : 7453


Vulnerable hosts:
   host4.foo.com
--------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: High


You are running a version of OpenSSH older than OpenSSH 3.2.1

A buffer overflow exists in the daemon if AFS is enabled on
your system, or if the options KerberosTgtPassing or
AFSTokenPassing are enabled.  Even in this scenario, the
vulnerability may be avoided by enabling UsePrivilegeSeparation.

Versions prior to 2.9.9 are vulnerable to a remote root
exploit. Versions prior to 3.2.1 are vulnerable to a local
root exploit.

Solution :
Upgrade to the latest version of OpenSSH

Risk factor : High
CVE : CVE-2002-0575
BID : 4560


Vulnerable hosts:
   host2.foo.com
   host1.foo.com
   host3.foo.com
   host4.foo.com
   host5.foo.com

--------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: High


You are running a version of OpenSSH which is older than 3.1.

Versions prior than 3.1 are vulnerable to an off by one error
that allows local users to gain root access, and it may be
possible for remote users to similarly compromise the daemon
for remote access.

In addition, a vulnerable SSH client may be compromised by
connecting to a malicious SSH daemon that exploits this
vulnerability in the client code, thus compromising the
client system.

Solution : Upgrade to OpenSSH 3.1 or apply the patch for
prior versions. (See: http://www.openssh.org)

Risk factor : High
CVE : CVE-2002-0083
BID : 4241


Vulnerable hosts:
   host5.foo.com
   host4.foo.com
   host3.foo.com
   host1.foo.com
   host2.foo.com

--------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: High


You are running a version of OpenSSH which is older than 3.4

There is a flaw in this version that can be exploited remotely to
give an attacker a shell on this host.

Note that several distribution patched this hole without changing
the version number of OpenSSH. Since Nessus solely relied on the
banner of the remote SSH server to perform this check, this might
be a false positive.
```

```
If you are running a RedHat host, make sure that the command :
          rpm -q openssh-server

Returns :
 openssh-server-3.1p1-6


Solution : Upgrade to OpenSSH 3.4 or contact your vendor for a patch
Risk factor : High
CVE : CVE-2002-0639, CVE-2002-0640
BID : 5093


Vulnerable hosts:
   host4.foo.com
   host5.foo.com
   host1.foo.com
   host3.foo.com
   host2.foo.com

---------------------------------------------------------------------------


Service: domain (53/tcp)
Severity: Low


A DNS server is running on this port. If you
do not use it, disable it.

Risk factor : Low


Vulnerable hosts:
   host3.foo.com
   host2.foo.com
   host4.foo.com

---------------------------------------------------------------------------


Service: domain (53/tcp)
Severity: Low

The remote bind version is : 12.1.1-udbd


Vulnerable hosts:
   host4.foo.com
   host2.foo.com
   host3.foo.com

---------------------------------------------------------------------------


Service: domain (53/udp)
Severity: Low
```

```
A DNS server is running on this port. If you
do not use it, disable it.

Risk factor : Low


Vulnerable hosts:
   host2.foo.com
   host4.foo.com
   host3.foo.com

---------------------------------------------------------------------------


Service: general/udp
Severity: Low

For your information, here is the traceroute to <host4 IP> :
?
<host4 IP>



Vulnerable hosts:
   host4.foo.com

---------------------------------------------------------------------------


Service: http (80/tcp)
Severity: Low


The remote  web servers is [mis]configured in that it
does not return '404 Not Found' error codes when
a non-existent file is requested, perhaps returning
a site map or search page instead.

Nessus enabled some counter measures for that, however
they might be insufficient. If a great number of security
holes are produced for this port, they might not all be accurate


Vulnerable hosts:
   host4.foo.com

---------------------------------------------------------------------------


Service: http (80/tcp)
Severity: Low


The remote host appears to be running a version of
Apache which is older than 1.3.27
```

```
There are several flaws in this version, you should
upgrade to 1.3.27 or newer.

*** Note that Nessus solely relied on the version number
*** of the remote server to issue this warning. This might
*** be a false positive

Solution : Upgrade to version 1.3.27
See also : http://www.apache.org/dist/httpd/Announcement.html
Risk factor : Medium
CVE : CAN-2002-0839, CAN-2002-0840, CAN-2002-0843
BID : 5847, 5884, 5995, 5996


Vulnerable hosts:
   host4.foo.com

--------------------------------------------------------------------------


Service: http (80/tcp)
Severity: Low

The remote web server type is :

Apache/1.3.26 (Unix) PHP/4.2.1



Solution : You can set the directive 'ServerTokens Prod' to limit
the information emanating from the server in its response headers.


Vulnerable hosts:
   host4.foo.com

--------------------------------------------------------------------------


Service: oracle (1521/tcp)
Severity: Low

This host is running the Oracle tnslsnr: TNSLSNR for Solaris: Version
8.1.7.4.0 - Production
CVE : CVE-2000-0818
BID : 1853


Vulnerable hosts:
   host4.foo.com

--------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: Low
```

```
The remote SSH daemon supports connections made
using the version 1.33 and/or 1.5 of the SSH protocol.

These protocols are not completely cryptographically
safe so they should not be used.

Solution :
 If you use OpenSSH, set the option 'Protocol' to '2'
 If you use SSH.com's set the option 'Ssh1Compatibility' to 'no'

Risk factor : Low


Vulnerable hosts:
   host2.foo.com
   host3.foo.com
   host5.foo.com
   host1.foo.com
   host4.foo.com

--------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: Low


You are running OpenSSH-portable 3.6.1 or older.

There is a flaw in this version which may allow an attacker to
bypass the access controls set by the administrator of this server.

OpenSSH features a mecanism which can restrict the list of
hosts a given user can log from by specifying a pattern
in the user key file (ie: *.mynetwork.com would let a user
connect only from the local network).

However there is a flaw in the way OpenSSH does reverse DNS lookups.
If an attacker configures his DNS server to send a numeric IP address
when a reverse lookup is performed, he may be able to circumvent
this mecanism.

Solution : Upgrade to OpenSSH 3.6.2 when it comes out
Risk Factor : Low
CVE : CAN-2003-0386
BID : 7831


Vulnerable hosts:
   host3.foo.com
   host5.foo.com
   host1.foo.com
   host2.foo.com
   host4.foo.com
```

```
---------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: Low


You are running OpenSSH-portable 3.6.1p1 or older.

If PAM support is enabled, an attacker may use a flaw in this version
to determine the existence or a given login name by comparing the times
the remote sshd daemon takes to refuse a bad password for a non-existant
login compared to the time it takes to refuse a bad password for an
existant login.

An attacker may use this flaw to set up  a brute force attack against
the remote host.

*** Nessus did not check whether the remote SSH daemon is actually
*** using PAM or not, so this might be a false positive

Solution : Upgrade to OpenSSH-portable 3.6.1p2 or newer
Risk Factor : Low
CVE : CAN-2003-0190
BID : 7482


Vulnerable hosts:
   host2.foo.com
   host1.foo.com
   host4.foo.com
   host3.foo.com
   host5.foo.com

---------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: Low

Remote SSH version : SSH-1.5-OpenSSH_3.0.2p1



Vulnerable hosts:
   host4.foo.com
   host5.foo.com
   host3.foo.com
   host2.foo.com

---------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: Low

Remote SSH version : SSH-1.99-OpenSSH_3.0.2p1
```

```
Vulnerable hosts:
   host1.foo.com

--------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: Low

The remote SSH daemon supports the following versions of the
SSH protocol :

  . 1.33
  . 1.5



Vulnerable hosts:
   host2.foo.com
   host3.foo.com
   host5.foo.com
   host4.foo.com

--------------------------------------------------------------------------


Service: ssh (22/tcp)
Severity: Low

The remote SSH daemon supports the following versions of the
SSH protocol :

  . 1.33
  . 1.5
  . 1.99
  . 2.0



Vulnerable hosts:
   host1.foo.com
```

Results of the Nessus Scan Recorded with the Sniffer Snort

Since we are running the Snort Intrusion Detection System in the e-commerce system, I checked the Snort logs to learn how much of my Nessus scan was detected by Snort. Snort monitors network traffic on both the DMZ and Trust interfaces of the Netscreen-100 firewall. When it detects traffic that matches an enabled signature, it writes data in a binary format into the appropriate directory tree: dmz for DMZ interface traffic and trust for Trust interface traffic. Barnyard is a separate Snort process that converts the raw, binary data into a human-readable text format. Barnyard creates two files: `fast.alert` and `dump.log`. The `fast.alert` file is an executive summary of the day's alerts, while the `dump.log` file contains both the alerts and the raw data dump of that alert.

Although my Nessus scan ran between approximately 4:00 and 4:05 p.m. PDT, Barnyard converts the timestamps on all log entries to UTC/GMT. Therefore, any scan traffic should be identified between 2300 and 2305 GMT. I used the `grep` the `fast.alert` file for any entries that matches the IP address of my Nessus server. Since there are separate logs for each network interface, I had to run the command twice, once for each interface. The output of each command is included below.

DMZ Interface

```
[root@<censored> 072303]# zcat dump.log.072303.gz | more

(snip)

[**] [1:1852:3] WEB-MISC robots.txt access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=10302]
Event ID: 292     Event Reference: 292
07/22/03-23:07:10.609717 <scanner IP>:51849 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:37914 IpLen:20 DgmLen:68 DF
***AP*** Seq: 0x8C4637FB  Ack: 0xF534B610  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 72 6F 62 6F 74 73 2E 74 78 74 20  GET /robots.txt
48 54 54 50 2F 31 2E 30 0D 0A 0D 0A              HTTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1551:3] WEB-MISC /CVS/Entries access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
Event ID: 294     Event Reference: 294
07/22/03-23:07:10.651137 <scanner IP>:51850 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:37920 IpLen:20 DgmLen:69 DF
***AP*** Seq: 0x8C467E49  Ack: 0xDA59CA7B  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 43 56 53 2F 45 6E 74 72 69 65 73  GET /CVS/Entries
20 48 54 54 50 2F 31 2E 30 0D 0A 0D 0A            HTTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1212:4] WEB-MISC Admin_files access [**]
[Classification: Attempted Information Leak] [Priority: 2]
Event ID: 296     Event Reference: 296
07/22/03-23:07:11.214516 <scanner IP>:51867 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:38012 IpLen:20 DgmLen:70 DF
***AP*** Seq: 0x8C599C9E  Ack: 0xAF5AE621  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 41 64 6D 69 6E 5F 66 69 6C 65 73  GET /Admin_files
2F 20 48 54 54 50 2F 31 2E 30 0D 0A 0D 0A        / HTTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+
[**] [1:1385:7] WEB-MISC mod-plsql administration access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://www.securityfocus.com/bid/3727]
[Xref => http://www.securityfocus.com/bid/3726]
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=10849]
Event ID: 298     Event Reference: 298
07/22/03-23:07:14.112678 <scanner IP>:51945 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:38474 IpLen:20 DgmLen:65 DF
***AP*** Seq: 0x8CA724C4  Ack: 0x1DE339A2  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 61 64 6D 69 6E 5F 2F 20 48 54 54  GET /admin_/ HTT
50 2F 31 2E 30 0D 0A 0D 0A                       P/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+
[**] [1:1213:4] WEB-MISC backup access [**]
[Classification: Attempted Information Leak] [Priority: 2]
Event ID: 300     Event Reference: 300
07/22/03-23:07:15.240086 <scanner IP>:51983 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:38645 IpLen:20 DgmLen:65 DF
***AP*** Seq: 0x8CD6719E  Ack: 0xE5C98804  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 62 61 63 6B 75 70 2F 20 48 54 54  GET /backup/ HTT
50 2F 31 2E 30 0D 0A 0D 0A                       P/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1213:4] WEB-MISC backup access [**]
[Classification: Attempted Information Leak] [Priority: 2]
Event ID: 302     Event Reference: 302
07/22/03-23:07:15.278755 <scanner IP>:51987 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:38651 IpLen:20 DgmLen:66 DF
***AP*** Seq: 0x8CDBEBC9  Ack: 0xE192D3F7  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 62 61 63 6B 75 70 73 2F 20 48 54  GET /backups/ HT
54 50 2F 31 2E 30 0D 0A 0D 0A                    TP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1668:5] WEB-CGI /cgi-bin/ access [**]
[Classification: Web Application Attack] [Priority: 1]
Event ID: 304     Event Reference: 304
07/22/03-23:07:17.109337 <scanner IP>:52041 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:38948 IpLen:20 DgmLen:66 DF
***AP*** Seq: 0x8D168A61  Ack: 0xE8B1DAC9  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 63 67 69 2D 62 69 6E 2F 20 48 54  GET /cgi-bin/ HT
54 50 2F 31 2E 30 0D 0A 0D 0A                    TP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1872:1] WEB-MISC Oracle Dynamic Monitoring Services (dms) access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=10848]
Event ID: 306     Event Reference: 306
07/22/03-23:07:20.029642 <scanner IP>:52128 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:39436 IpLen:20 DgmLen:63 DF
***AP*** Seq: 0x8D6F0D49  Ack: 0xE3F850A1  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 64 6D 73 30 2F 20 48 54 54 50 2F  GET /dms0/ HTTP/
31 2E 30 0D 0A 0D 0A                             1.0....
```

```
=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1560:4] WEB-MISC /doc/ access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://www.securityfocus.com/bid/318]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-1999-0678]
Event ID: 308     Event Reference: 308
07/22/03-23:07:20.111527 <scanner IP>:52133 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:39448 IpLen:20 DgmLen:62 DF
***AP*** Seq: 0x8D71DEE3  Ack: 0xDC9FE5A1  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 64 6F 63 2F 20 48 54 54 50 2F 31  GET /doc/ HTTP/1
2E 30 0D 0A 0D 0A                                .0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1214:4] WEB-MISC intranet access [**]
[Classification: Attempted Information Leak] [Priority: 2]
Event ID: 310     Event Reference: 310
07/22/03-23:07:24.025280 <scanner IP>:52254 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:40095 IpLen:20 DgmLen:67 DF
***AP*** Seq: 0x8DF61995  Ack: 0x3910DC8A  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 69 6E 74 72 61 6E 65 74 2F 20 48  GET /intranet/ H
54 54 50 2F 31 2E 30 0D 0A 0D 0A                 TTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1874:1] WEB-MISC Oracle Java Process Manager access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=10851]
Event ID: 312     Event Reference: 312
07/22/03-23:07:26.910684 <scanner IP>:52365 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:40575 IpLen:20 DgmLen:74 DF
***AP*** Seq: 0x8E70C60C  Ack: 0x26AD14B2  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 6F 70 72 6F 63 6D 67 72 2D 73 74  GET /oprocmgr-st
61 74 75 73 2F 20 48 54 54 50 2F 31 2E 30 0D 0A  atus/ HTTP/1.0..
0D 0A                                            ..

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1520:6] WEB-MISC server-info access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://httpd.apache.org/docs/mod/mod_info.html]
Event ID: 314     Event Reference: 314
07/22/03-23:07:29.772928 <scanner IP>:52443 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:41046 IpLen:20 DgmLen:70 DF
***AP*** Seq: 0x8EC47C71  Ack: 0x21EE3D6  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 73 65 72 76 65 72 2D 69 6E 66 6F  GET /server-info
2F 20 48 54 54 50 2F 31 2E 30 0D 0A 0D 0A        / HTTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1521:6] WEB-MISC server-status access [**]
```

```
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://httpd.apache.org/docs/mod/mod_info.html]
Event ID: 316     Event Reference: 316
07/22/03-23:07:29.808560 <scanner IP>:52444 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:41052 IpLen:20 DgmLen:72 DF
***AP*** Seq: 0x8EC61578  Ack: 0x65A16411  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 73 65 72 76 65 72 2D 73 74 61 74  GET /server-stat
75 73 2F 20 48 54 54 50 2F 31 2E 30 0D 0A 0D 0A  us/ HTTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:835:5] WEB-CGI test-cgi access [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-1999-0070]
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=10282]
Event ID: 318     Event Reference: 318
07/22/03-23:07:32.905866 <scanner IP>:52550 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:41547 IpLen:20 DgmLen:67 DF
***AP*** Seq: 0x8F35E46A  Ack: 0xEA51A56D  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 74 65 73 74 2D 63 67 69 2F 20 48  GET /test-cgi/ H
54 54 50 2F 31 2E 30 0D 0A 0D 0A                 TTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:896:7] WEB-CGI way-board access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=10610]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2001-0214]
[Xref => http://www.securityfocus.com/bid/2370]
Event ID: 320     Event Reference: 320
07/22/03-23:07:34.053749 <scanner IP>:52581 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:41736 IpLen:20 DgmLen:68 DF
***AP*** Seq: 0x8F58F171  Ack: 0x8FF49786  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 77 61 79 2D 62 6F 61 72 64 2F 20  GET /way-board/
48 54 54 50 2F 31 2E 30 0D 0A 0D 0A              HTTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1847:3] WEB-MISC webalizer access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-1999-0643]
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=10816]
Event ID: 322     Event Reference: 322
07/22/03-23:07:34.313270 <scanner IP>:52589 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:41781 IpLen:20 DgmLen:68 DF
***AP*** Seq: 0x8F62B90B  Ack: 0x64042D9B  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 77 65 62 61 6C 69 7A 65 72 2F 20  GET /webalizer/
48 54 54 50 2F 31 2E 30 0D 0A 0D 0A              HTTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1125:6] WEB-MISC webcart access [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-1999-0610]
```

```
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=10298]
Event ID: 324     Event Reference: 324
07/22/03-23:07:34.421958 <scanner IP>:52592 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:41800 IpLen:20 DgmLen:66 DF
***AP*** Seq: 0x8F65E7B3  Ack: 0x637F90DF  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 77 65 62 63 61 72 74 2F 20 48 54  GET /webcart/ HT
54 50 2F 31 2E 30 0D 0A 0D 0A                    TP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1848:2] WEB-MISC webcart-lite access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=10298]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-1999-0610]
Event ID: 326     Event Reference: 326
07/22/03-23:07:34.459067 <scanner IP>:52593 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:41806 IpLen:20 DgmLen:71 DF
***AP*** Seq: 0x8F65FBFB  Ack: 0xB10E82AC  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 77 65 62 63 61 72 74 2D 6C 69 74  GET /webcart-lit
65 2F 20 48 54 54 50 2F 31 2E 30 0D 0A 0D 0A     e/ HTTP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:887:5] WEB-CGI www-sql access [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://marc.theaimsgroup.com/?l=bugtraq&m=88704258804054&w=2]
Event ID: 328     Event Reference: 328
07/22/03-23:07:35.488937 <scanner IP>:52630 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:41965 IpLen:20 DgmLen:66 DF
***AP*** Seq: 0x8F8C2C25  Ack: 0x9AC1DE3F  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 77 77 77 2D 73 71 6C 2F 20 48 54  GET /www-sql/ HT
54 50 2F 31 2E 30 0D 0A 0D 0A                    TP/1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1145:6] WEB-MISC /~root access [**]
[Classification: Attempted Information Leak] [Priority: 2]
Event ID: 330     Event Reference: 330
07/22/03-23:07:36.069705 <scanner IP>:52659 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:42056 IpLen:20 DgmLen:64 DF
***AP*** Seq: 0x8FADF12A  Ack: 0x1C00B716  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 7E 72 6F 6F 74 2F 20 48 54 54 50  GET /~root/ HTTP
2F 31 2E 30 0D 0A 0D 0A                          /1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1162:5] WEB-MISC cart 32 AdminPwd access [**]
[Classification: Attempted Information Leak] [Priority: 2]
[Xref => http://www.securityfocus.com/bid/1153]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2000-0429]
Event ID: 332     Event Reference: 332
07/22/03-23:07:41.057575 <scanner IP>:52713 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:42212 IpLen:20 DgmLen:96 DF
***AP*** Seq: 0x8FE94735  Ack: 0xBA5312CC  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 63 67 69 2D 62 69 6E 2F 63 33 32  GET /cgi-bin/c32
77 65 62 2E 65 78 65 2F 43 68 61 6E 67 65 41 64  web.exe/ChangeAd
```

```
6D 69 6E 50 61 73 73 77 6F 72 64 20 48 54 54 50  minPassword HTTP
2F 31 2E 30 0D 0A 0D 0A                          /1.0....

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:1553:4] WEB-CGI /cart/cart.cgi access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-0252]
Event ID: 334     Event Reference: 334
07/22/03-23:07:41.481522 <scanner IP>:52716 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:42228 IpLen:20 DgmLen:71 DF
***AP*** Seq: 0x8FEE987D  Ack: 0x353156FF  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 63 61 72 74 2F 63 61 72 74 2E 63  GET /cart/cart.c
67 69 20 48 54 54 50 2F 31 2E 30 0D 0A 0D 0A     gi HTTP/1.0....

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[**] [1:1995:1] WEB-CGI alya.cgi access [**]
[Classification: access to a potentially vulnerable web application]
[Priority: 2]
[Xref => http://cgi.nessus.org/plugins/dump.php3?id=11118]
Event ID: 336     Event Reference: 336
07/22/03-23:07:50.925621 <scanner IP>:52800 -> <host4 IP>:80
TCP TTL:253 TOS:0x0 ID:42326 IpLen:20 DgmLen:74 DF
***AP*** Seq: 0x905CB492  Ack: 0x76F4791E  Win: 0x2238  TcpLen: 20
47 45 54 20 2F 63 67 69 2D 62 69 6E 2F 61 6C 79  GET /cgi-bin/aly
61 2E 63 67 69 20 48 54 54 50 2F 31 2E 30 0D 0A  a.cgi HTTP/1.0..
0D 0A                                            ..

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[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 338     Event Reference: 338
07/23/03-02:40:13.784431 <host8.foo.com IP address censored>:48831 ->
<host3.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:38945 IpLen:20 DgmLen:84 DF
Len: 64
3F 1F AE 2D 00 00 00 00 00 00 00 02 00 01 86 A0  ?..-............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
```

```
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 340     Event Reference: 340
07/23/03-02:40:30.437302 <host8.foo.com IP address censored>:49586 -> <host4
IP>:111
UDP TTL:250 TOS:0x0 ID:55595 IpLen:20 DgmLen:84 DF
Len: 64
3F 11 D0 27 00 00 00 00 00 00 00 02 00 01 86 A0  ?..'............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 342     Event Reference: 342
07/23/03-02:40:38.531858 <host8.foo.com IP address censored>:49914 ->
<host2.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:63695 IpLen:20 DgmLen:84 DF
Len: 64
3F 10 6E C5 00 00 00 00 00 00 00 02 00 01 86 A0  ?.n.............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 344     Event Reference: 344
07/23/03-02:41:54.546151 <host8.foo.com IP address censored>:52587 ->
<host3.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:8653 IpLen:20 DgmLen:84 DF
Len: 64
3F 13 F7 5F 00 00 00 00 00 00 00 02 00 01 86 A0  ?.._............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
```

```
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 346     Event Reference: 346
07/23/03-02:42:16.526793 <host8.foo.com IP address censored>:53385 -> <host4
IP>:111
UDP TTL:250 TOS:0x0 ID:30633 IpLen:20 DgmLen:84 DF
Len: 64
3F 13 BE D9 00 00 00 00 00 00 00 02 00 01 86 A0  ?...............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 348     Event Reference: 348
07/23/03-02:42:26.438000 <host8.foo.com IP address censored>:53743 ->
<host2.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:40553 IpLen:20 DgmLen:84 DF
Len: 64
3F 11 0B 60 00 00 00 00 00 00 00 02 00 01 86 A0  ?..`............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

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[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 350     Event Reference: 350
07/23/03-02:43:20.395914 <host8.foo.com IP address censored>:56369 ->
<host3.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:28977 IpLen:20 DgmLen:84 DF
Len: 64
3F 11 84 0F 00 00 00 00 00 00 00 02 00 01 86 A0  ?...............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

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[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 352     Event Reference: 352
07/23/03-02:43:33.817934 <host8.foo.com IP address censored>:57047 -> <host4
IP>:111
UDP TTL:250 TOS:0x0 ID:42407 IpLen:20 DgmLen:84 DF
Len: 64
3F 1E CF 5E 00 00 00 00 00 00 00 02 00 01 86 A0  ?..^............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

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[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 354     Event Reference: 354
07/23/03-02:43:39.915872 <host8.foo.com IP address censored>:57422 ->
<host2.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:48507 IpLen:20 DgmLen:84 DF
Len: 64
3F 19 49 D9 00 00 00 00 00 00 00 02 00 01 86 A0  ?.I.............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

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[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 356     Event Reference: 356
07/23/03-02:45:47.973584 <host8.foo.com IP address censored>:60687 ->
<host3.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:45515 IpLen:20 DgmLen:84 DF
Len: 64
3F 1B 8B FC 00 00 00 00 00 00 00 02 00 01 86 A0  ?...............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
```

```
00 00 00 11 00 00 00 00                          ........

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[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 358     Event Reference: 358
07/23/03-02:46:22.743378 <host8.foo.com IP address censored>:61624 -> <host4
IP>:111
UDP TTL:250 TOS:0x0 ID:14749 IpLen:20 DgmLen:84 DF
Len: 64
3F 1F 62 9C 00 00 00 00 00 00 00 02 00 01 86 A0  ?.b.............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

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[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 360     Event Reference: 360
07/23/03-02:46:41.975698 <host8.foo.com IP address censored>:62074 ->
<host2.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:33989 IpLen:20 DgmLen:84 DF
Len: 64
3F 1B F9 4A 00 00 00 00 00 00 00 02 00 01 86 A0  ?..J............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 356     Event Reference: 356
07/23/03-02:45:47.973584 <host8.foo.com IP address censored>:60687 ->
<host3.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:45515 IpLen:20 DgmLen:84 DF
Len: 64
3F 1B 8B FC 00 00 00 00 00 00 00 02 00 01 86 A0  ?...............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

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[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
```

```
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 358     Event Reference: 358
07/23/03-02:46:22.743378 <host8.foo.com IP address censored>:61624 -> <host4
IP>:111
UDP TTL:250 TOS:0x0 ID:14749 IpLen:20 DgmLen:84 DF
Len: 64
3F 1F 62 9C 00 00 00 00 00 00 00 02 00 01 86 A0  ?.b.............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
00 00 00 11 00 00 00 00                          ........

=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

[**] [1:590:8] RPC portmap ypserv request UDP [**]
[Classification: Decode of an RPC Query] [Priority: 2]
[Xref => http://www.whitehats.com/info/IDS12]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1043]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2000-1042]
[Xref => http://cve.mitre.org/cgi-bin/cvename.cgi?name=CAN-2002-1232]
[Xref => http://www.securityfocus.com/bid/5914]
[Xref => http://www.securityfocus.com/bid/6016]
Event ID: 360     Event Reference: 360
07/23/03-02:46:41.975698 <host8.foo.com IP address censored>:62074 ->
<host2.foo.com IP address censored>:111
UDP TTL:250 TOS:0x0 ID:33989 IpLen:20 DgmLen:84 DF
Len: 64
3F 1B F9 4A 00 00 00 00 00 00 00 02 00 01 86 A0  ?..J............
00 00 00 02 00 00 00 03 00 00 00 00 00 00 00 00  ................
00 00 00 00 00 00 00 00 00 01 86 A4 00 00 00 02  ................
[root@<censored> 072303]#
```

Trust Interface

```
[root@<censored> 072303]# zcat fast* | <scanner IP> | more
[root@<censored> 072303]#
```

Thus, it appears that Snort did detect some of the Nessus packets destined for the DMZ interface, but none of the packets destined for the Trust interface. This corresponds nicely with the Nessus output, which detected no vulnerabilities at all for the hosts behind the Netscreen-100's Trust interface: host12, host13, host14, and host15. Given that (1) Snort detected no packets from the Nessus server to the Trust interface, (2) Nessus reported no issues for Trust machines, and (3) Nessus finished its scan of Trust machines in a matter of seconds whereas the DMZ machines took minutes, I conclude that the Netscreen-100 firewall effectively blocked the Nessus scan.

Checklist Item E3: PASS

Objective: Firewall management sessions are extremely sensitive and must be encrypted. HA traffic must be authenticated and encrypted.

```
Remote Management Console

ns100(M)-> get ha
version:1.2.2
state:  master(0.0.62)
group id:1  priority:1  ha interface:DMZ/trust
ha mac: <censored>   virtual mac: <censored>
encryption:     enable   password: <censored>
authentication: enable   password: <censored>
arp count: 5    time ratio:     8
monitor ports: Trust Untrust
ha mode: normal
session sync: on
slave linkup: on
ns100(M)->
```

Checklist Item F1: PASS

Objective: The firewall(s) must provide an audit trail or log of all attempted and successful network connections.

```
ns100(M)-> get policy
total policies 44, default deny
 pid   direction  source       destination  service    action     state    stlc
    18 todmz      <censored>   <censored>   <censored> <censored> enabled  --X-
    23 todmz      <censored>   <censored>   <censored> <censored> enabled  --X-
    63 todmz      <censored>   <censored>   <censored> <censored> enabled  --XX
     2 todmz      <censored>   <censored>   <censored> <censored> enabled  --X-
    17 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --X-
    72 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    57 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    76 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    80 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    58 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    54 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    71 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    88 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    90 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    46 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    51 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    70 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    87 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    62 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    42 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    44 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    85 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    89 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    61 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    86 fromdmz    <censored>   <censored>   <censored> <censored> enabled  --XX
    19 outgoing   <censored>   <censored>   <censored> <censored> enabled  --XX
    25 outgoing   <censored>   <censored>   <censored> <censored> enabled  --XX
    91 outgoing   <censored>   <censored>   <censored> <censored> enabled  --XX
    65 outgoing   <censored>   <censored>   <censored> <censored> enabled  --XX
    20 incoming   <censored>   <censored>   <censored> <censored> enabled  --XX
    74 incoming   <censored>   <censored>   <censored> <censored> enabled  --XX
    67 incoming   <censored>   <censored>   <censored> <censored> enabled  --XX
    78 incoming   <censored>   <censored>   <censored> <censored> enabled  --XX
    82 incoming   <censored>   <censored>   <censored> <censored> enabled  --XX
    84 incoming   <censored>   <censored>   <censored> <censored> enabled  --XX
    48 todmz      <censored>   <censored>   <censored> <censored> enabled  --XX
    43 todmz      <censored>   <censored>   <censored> <censored> enabled  --XX
    66 todmz      <censored>   <censored>   <censored> <censored> enabled  --XX
    39 todmz      <censored>   <censored>   <censored> <censored> enabled  --XX
    55 todmz      <censored>   <censored>   <censored> <censored> enabled  --XX
    59 todmz      <censored>   <censored>   <censored> <censored> enabled  --XX
    47 todmz      <censored>   <censored>   <censored> <censored> enabled  --XX
    21 todmz      <censored>   <censored>   <censored> <censored> enabled  --X-
    45 incoming   <censored>   <censored>   <censored> <censored> enabled  --XX
ns100(M)->
```

Checklist Item F2: PASS

Objective: The audit trail or log must include action taken by administrators, including user IDs; login date/time; log-out date/time; changes to policies; changes or additions to user privileges; and system start-ups and shut-downs.

```
ns100(M)-> get log event
2003-07-17 00:21:01 system warn  00515 Admin <backup> has logged out via SCS
from <IP address censored>:49547
2003-07-17 00:21:01 system warn  00515 Admin <backup> has logged on via SCS
from <IP address censored>:49547
2003-07-17 00:21:00 system notif 00528 SCS: SSH user <backup> has been
authenticated using password from <IP address censored>:49547.
2003-07-16 14:32:07 system info  00767 <user1>: System Config saved from host
<IP address censored>
2003-07-16 14:32:17 system notif 00018 <user1>: Policy 91 has been moved
before 65
2003-07-16 14:32:07 system notif 00018 <user1>: Policy (91, <censored>) has
been added from host <IP address censored>
2003-07-16 14:29:24 system warn  00515 <user1>: Admin "<user1>" has logged on
via the WebUI(http) to port 80 from <IP address censored>:23751.
```

Checklist Item F3: PASS

Objective: Firewall logs must be stored on a dedicated syslog server.

```
Remote Management Console

ns100(M)-> get syslog config
Syslog Configuration:
        Host Name: syslog.foo.com
        Security Facility: local5
        Facility: local5
        Max Send Level: debug
        module=system:  emer, alert, crit, error, warn, notif, info, debug
        Host Port: 514
        VPN Encryption: disabled
Syslog is enabled
ns100(M)->
```

Checklist Item G1: FAIL

Objective: Procedures for backing up and restoring the firewall configuration must be documented.

As the firewall administrator, I was not aware of a documented procedure for backing up and restoring the firewall configuration. Moreover, I interviewed other members of my company's security team, who were equally unaware of such documentation. Therefore, we are out of compliance with checklist item G1.

Measure Residual Risk

In Assignment 1, I conducted a pre-audit risk assessment. In that risk-assessment, I compiled a list of assets, a list of threats (events) to each asset, and a list of potential vulnerabilities (conditions) that could allow each threat to be exploited. Because the audit had not yet been conducted, I had to use my background knowledge as a system administrator to determine the degree of risk for each of the vulnerabilities. Now that I have completed the audit, however, I have much more complete knowledge of the effectiveness of the controls. In other words, I am in a position to measure the residual risk. Table 5 summarizes my post-audit or residual risk analysis. Much of the table is copied from Table 3, Pre-Audit Risk Analysis. There are two important differences, though. First, I have deleted the rows corresponding to the Netscreen-100 physical appliance, since physical security controls were outside the scope of my audit. Second, I have added two new columns to the table: mitigating controls and residual risk. Mitigating controls is a brief summary of the controls that decrease the asset's vulnerability, along with a brief reference to the relevant audit results. Residual risk is a qualitative assessment of the risk, in light of the mitigating controls.

Table 5. Post-Audit Residual Risk Analysis

Asset	Threat	Vulnerability	Degree of Risk	Impact	Mitigating Controls	Residual Risk
Access to SSN or Internal Network	Unauthorized network access to SSN (Screened Service Network) or internal network	Existing (authorized) firewall policy allows an attacker to gain access to resources on either the SSN or internal network.	High	Greater probability of an attacker successfully compromising the security of servers in the SSN or internal network.	The firewall controls application flows in both directions. It denies by default any services not explicitly authorized.	Low

Asset	**Threat**	**Vulnerability**	**Degree of Risk**	**Impact**	**Mitigating Controls**	**Residual Risk**
Access to SSN or Internal Network	Denial of Service attack	Denial of Service attacks are a well-known problem. Given the lack of an approved security policy, it seemed likely that security vulnerabilities were not being updated in a timely manner, if at all.	High	A prolonged disruption of firewall availability would be a customer-visible outage and have a direct impact on revenue.	The firewall is kept current with the latest vendor upgrades, security patches, and security problem fix software.	Low
Details of our internal network architecture.	Unauthorized disclosure of internal network architecture	Although controls are in place to prevent the unauthorized disclosure of the architecture by an employee, it is not known if an outsider would be able to gain knowledge of our internal architecture.	Un-known	Greater probability of an attacker successfully compromising the security of the network.	The current firewall configuration allows an attacker to discover hosts in the SSN ("DMZ" interface), but not hosts on the back-end network segment ("trust" interface).	Medium

Asset	Threat	Vulnerability	Degree of Risk	Impact	Mitigating Controls	Residu al Risk
Netscreen 100 Policies and Configuration	Unauthorized access to policies or configuration	Netscreen 100s offer two methods of administrative access: command-line (via SSH) and web-based (via SSL). An exploit in the Netscreen's implementation of either service could result in an intruder gaining unauthorized access.	Un-known	An intruder with unauthorized administrative access could deliberately bring the firewall down, disrupting network availability. The intruder could also modify the firewall configuration to make it easier to compromise the other machines on the network. A compromise of the e-commerce server could lead to theft of sensitive customer data, which would be a disaster for the business.	1. Command-line interface (CLI) management sessions are encrypted using Secure Shell (SSH). Nevertheless, web-based management sessions are not encrypted using Secure Sockets Layer (SSL). Instead, web-based sessions use unencrypted HTTP. 2. There are multiple layers of firewalls before the firewall that is the subject of this audit,	Low

Asset	Threat	Vulnerability	Degree of Risk	Impact	Mitigating Controls	Residual Risk
	Unauthorized modification of policies or configuration	An attacker with unauthorized access could make unauthorized changes to the firewall policies or configuration.	Un-known	Greater probability of an attacker successfully compromising the security of the network. Disruption or degradation of service.	1. CLI management sessions use SSH, not Telnet. 2. Multiple layers of firewalls.	Low
	Unauthorized disclosure of policies or configuration	An attacker with unauthorized access would be able to view the firewall policies and configuration, which would be an unauthorized disclosure of sensitive information.	Un-known	Greater probability of an attacker successfully compromising the security of the network.	1. CLI management sessions use SSH, not Telnet. 2. Multiple layers of firewalls.	Low
	Destruction of policies or configuration	An attacker with unauthorized access could delete the policies or configuration.	Un-known	Partial or total disruption of service.	1. CLI management sessions use SSH, not Telnet. 2. Multiple layers of firewalls.	Low
Financial information	Unauthorized access to (confidential) corporate financial data	Given that the firewall sees all connections between the batch processing server and the e-commerce database, it might be	Un-known	Using that information, the intruder could make educated guesses about some of the company's financial	While theoretically possible, it is unlikely that an intruder could	Low

Asset	Threat	Vulnerability	Degree of Risk	Impact	Mitigating Controls	Residual Risk
		possible for an intruder with access to the firewall to determine aggregate information about the number of transactions between the two systems.		data. This could be useful to a competitor.	aggregate financial information from the firewall logs. My audit revealed that the logs provide no *contextual* information about e-commerce transactions. For example, it is unclear how many transactions correspond to one network connection.	

Asset	Threat	Vulnerability	Degree of Risk	Impact	Mitigating Controls	Residual Risk
Potential forensic data	Unauthorized access to forensic data	Unauthorized access to forensic data might allow an intruder to learn confidential information about the company's financial condition, internal network architecture, usernames of authorized firewall administrators, as well as the contents of the forensic data.	Medium	The knowledge gained from this information could help an attacker compromise the SSN or internal networks.	The lack of encryption of web-based management sessions makes it possible for an attacker to eavesdrop an administrator's username and password, gain access to the system, and read the logs.	Medium
	Unauthorized modification of forensic data	An attacker with administrative access on the firewall might be able to modify the firewall logs.	Medium	Unauthorized modifications to forensic data might hamper investigations into security incidents. It would also disrupt the chain of custody of evidence. The data might not be usable in court.	My audit did not identify any way for an attacker to modify firewall logs. (I assess the risk of log deletion below.)	Low

Asset	Threat	Vulnerability	Degree of Risk	Impact	Mitigating Controls	Residu al Risk
	Unauthorized disclosure of forensic data	Unauthorized access to forensic data might allow an intruder to learn confidential information about the company's financial condition, internal network architecture, usernames of authorized firewall administrators, as well as the contents of the forensic data.	Medium	The knowledge gained from this information could help an attacker successfully compromise security.	The lack of encryption of web-based management sessions makes it possible for an attacker to eavesdrop an administrator's username and password, gain access to the system, and read the logs.	Medium

Asset	Threat	Vulnerability	Degree of Risk	Impact	Mitigating Controls	Residual Risk
	Unauthorized destruction of forensic data	An attacker with administrative access on the firewall might be able to delete the firewall logs.	Medium	Destruction of the firewall logs could hamper security incident investigations.	The lack of encryption of web-based management sessions makes it possible for an attacker to eavesdrop an administrator's username and password, gain access to the system, and delete the logs.	Medium
Company reputation	Damage to reputation	A security compromise could lead to public embarrassment.	Medium	Public embarrassment can cause loss of customer and shareholder confidence.	Overall, the firewall appears to be a well-maintained and reasonable secure system.	Low

Overall, the residual risk is well within acceptable limits. Moreover, it would be very inexpensive to implement additional controls, which would further decrease the risk. These controls include the following:

- *Encrypt all administrative management sessions.* The organization can choose to either disable web-based management sessions or use SSL to encrypt them. Either option is very inexpensive to implement.
- *Document procedures for backup and restoration of firewall configuration and policies.* Only a very small amount of employee time would be needed to create the documentation.

The system successfully achieved most, but not all, of the control objectives. The unachieved control objectives are listed below.

Table 6. Unfulfilled Control Objectives

No.	**Control Objective**
CO7	All ports on the firewall itself should be disabled by default; only ports that have been specifically authorized should be open.
CO9	No vulnerable services should be accessible through the perimeter's countermeasures.
CO14	Firewall management sessions are extremely sensitive and must be encrypted.
CO22	Firewall configuration back up and restore procedures must be documented.

Is the system auditable?

I was unable to audit one portion of the firewall: the HA link failure detection. In order to audit that feature of the firewall, one would have to unplug interface cables from a production system. The owner of the e-commerce system that sits behind the firewall was rightfully concerned about the potential for disruption. Unfortunately, I had to delay this test until well after the timeframe for this audit.

Assignment 4 – Risk Assessment

Executive Summary

The e-commerce system owner recently requested an audit of the Netscreen-100 firewalls that protect the e-commerce environment. As the administrator of those firewalls, I set out to measure their compliance with organizational policies and procedures. The audit was conducted from July 7 to July 25, 2003.

Unfortunately, no approved security policy was in place at the time of my audit, so I was forced to audit the system against recognized best practices instead. Audit activity included interviews of network personnel, review of existing documentation, network mapping, vulnerability analysis, and development of high-level procedural and operational recommendations. However, I did not review physical security controls or the designs of future network security improvements.

As of July 25, 2003, it appears that the firewall does not meet all of its control objectives. While no high-risk vulnerabilities were discovered during the course of this audit, a few control objectives are not currently being met. The primary conclusions of the audit follow.

- Web-based firewall management sessions are not encrypted.
- An unauthorized service was running on the firewall's management interface.
- The firewall allowed access to vulnerable services running on internal hosts.
- Firewall configuration back up and restore procedures are not documented.

FINDINGS

After compiling my list of findings, I presented my recommendations to management for fixing the vulnerabilities. For some of the findings, I was actually able to correct the problem and then re-audit the system. For completed changes, I will summarize the corrective actions taken and then repeat the relevant item from the audit checklist to demonstrate that the vulnerability has been corrected. For some other findings, however, I was not able to correct the problem prior to the completion of this practical. While management agreed with me about the need to fix these "other" findings, management decided that other operational projects were a higher priority than the pending system changes. For pending system changes, I will simply indicate the implementation plan for removing vulnerabilities.

B8: Web-based firewall management sessions are not encrypted.

C2: An unauthorized service was running on the firewall's management interface.

Background / Risk

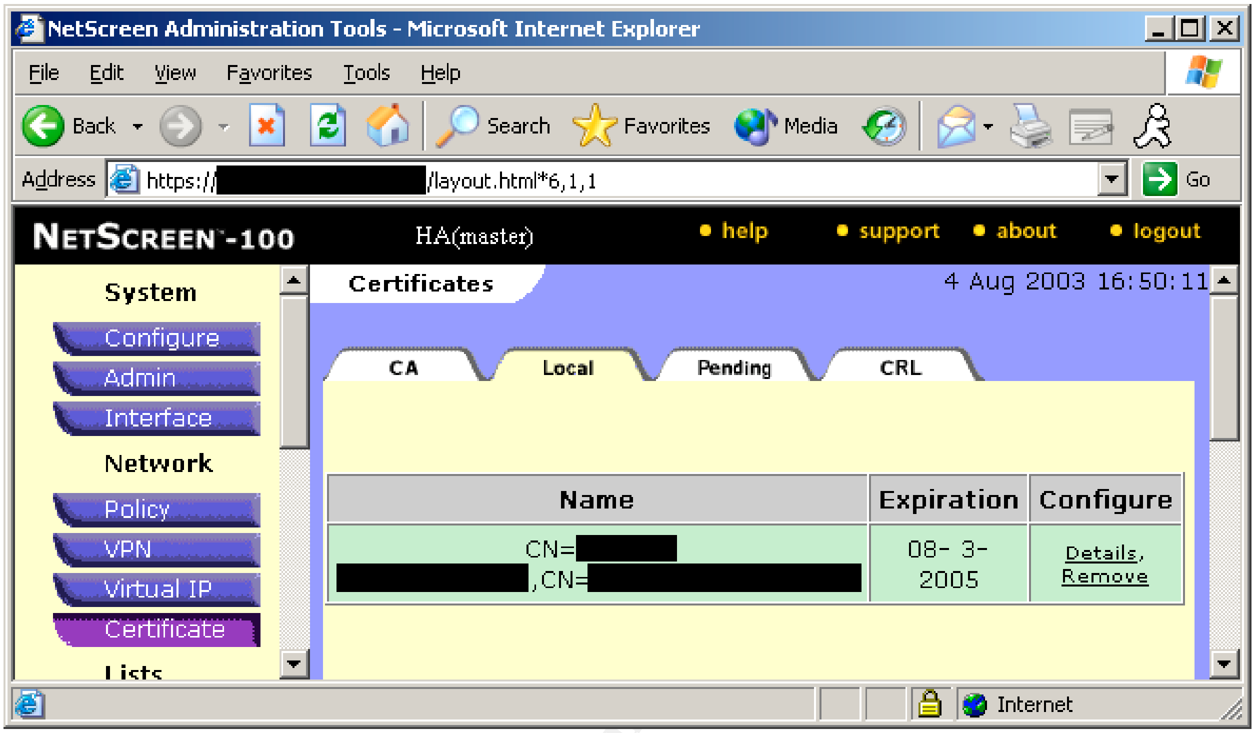
When a Netscreen-100 administrator wishes to administer the firewall using the web interface, the administrator must authenticate with his or her username and password. If the web session is not encrypted, then the administrator's username and password, along with all of the sensitive information contained within the firewall's configuration and policies, are transmitted as clear text. An attacker running a sniffer on the local network segment could capture and analyze any traffic that passes through that network segment. Moreover, since sniffers are passive by their very nature, they are difficult to detect. Because of eavesdropping on a firewall management session, an attacker would learn the administrator's username and password, making it possible for the attacker to create, modify, or delete firewall policies. That, in turn, places at risk the confidentiality, integrity, and availability of the systems behind the firewall. The attacker could disrupt network connectivity to the internal machines. The attacker could also expose the internal machines to attacks by opening ports that are currently closed.

Since the lack of encryption meant that the firewall management interface was running unencrypted HTTP and not HTTPS/SSL, which is encrypted, I have grouped together finding B8 with finding C2.

System Changes and Further Testing

To correct these related findings, I generated and downloaded to my PC an SSL certificate. I also downloaded to my PC a Certificate Authority (CA) certificate. (The details of how to generate and download a digital certificate are beyond the scope of this paper.) Once both certificates were downloaded to my PC, I then uploaded them to the firewall. (See Figure 5.) I next opened a web-based firewall management session and clicked on "Admin" and then "Web." I kept the default value of 443 for the "HTTPS (SSL) Port:" setting. I then clicked on the drop-down list next to "Certificate:" and selected the new SSL certificate I just uploaded, along with the correct Cipher. I clicked "Apply." (See Figure 6.) I then logged out and logged back in to verify that my implementation of SSL was effective. I then disabled unencrypted HTTP by clicking on "Interface," selecting the untrust interface, clicking "edit," and then unchecking the "Web equals HTTP" box. (See Figure 7.)

Figure 5 – Local Certificates Configuration on Netscreen-100

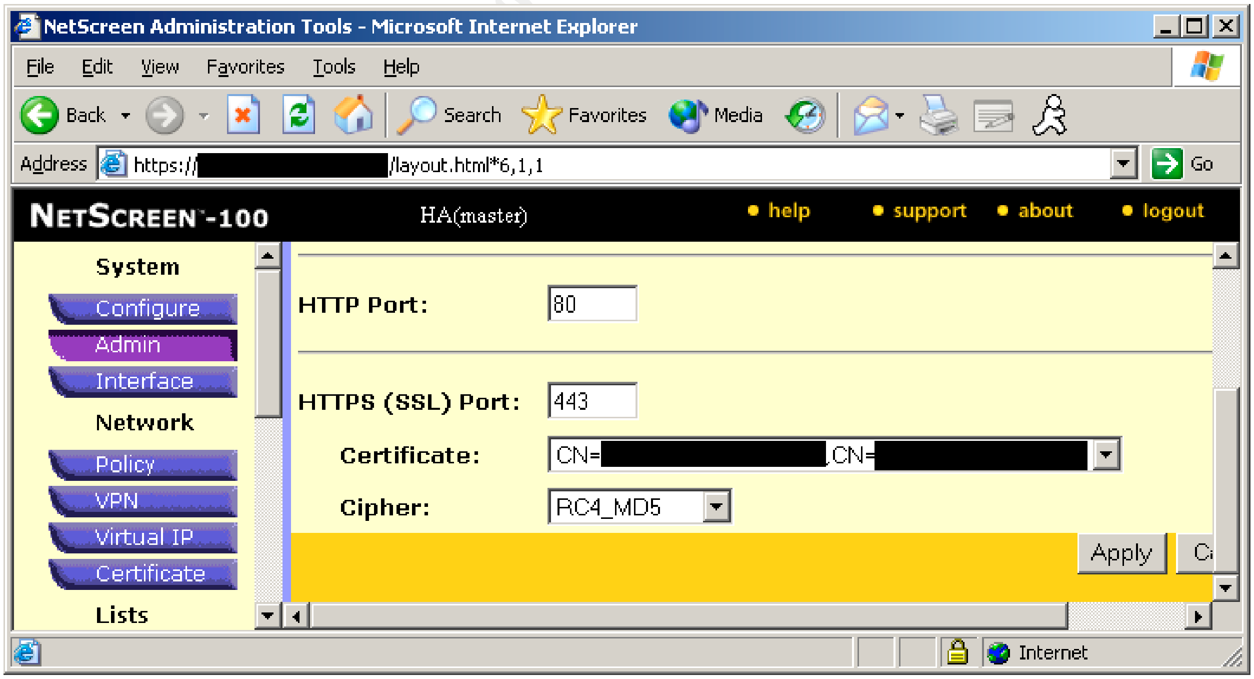

NetScreen Administration Tools - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address Go
NETSCREEN-100
HA(master)
help support about logout
System
Configure
Admin
Interface
Network
Policy
VPN
Virtual IP
Certificate
Lists
Certificates
CA Local Pending CRL
Internet

Address: https://[redacted]/layout.html*6,1,1

4 Aug 2003 16:50:11

Name	Expiration	Configure
CN=[redacted] [redacted],CN=[redacted]	08- 3- 2005	Details, Remove

Figure 6 – Web Administration Settings on Netscreen-100


NetScreen Administration Tools - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address Go
NETSCREEN-100
HA(master)
help support about logout
System
Configure
Admin
Interface
Network
Policy
VPN
Virtual IP
Certificate
Lists
Apply
Ca
Internet

Address: https://[redacted]/layout.html*6,1,1

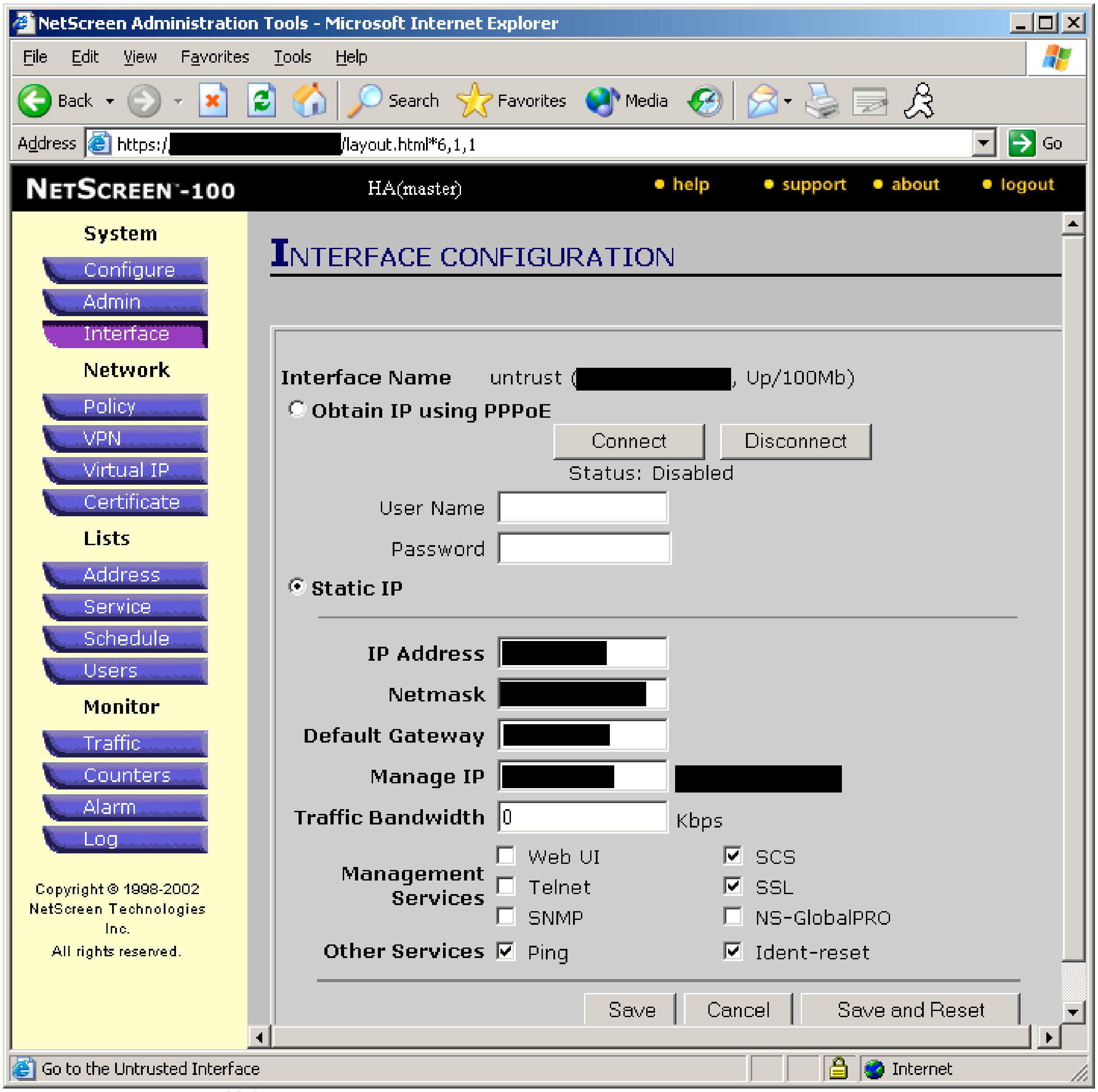
HTTP Port: 80

HTTPS (SSL) Port: 443

Certificate: CN=[redacted],CN=[redacted]

Cipher: RC4_MD5

Figure 7 – Interface Configuration for Untrust Interface



NetScreen Administration Tools - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Go
NETSCREEN-100
HA(master)
help support about logout
System
Configure
Admin
Interface
Network
Policy
VPN
Virtual IP
Certificate
Lists
Address
Service
Schedule
Users
Monitor
Traffic
Counters
Alarm
Log
Copyright © 1998-2002 NetScreen Technologies Inc. All rights reserved.
Connect
Disconnect
Save
Cancel
Save and Reset
Go to the Untrusted Interface
Internet

Address https://[redacted]/layout.html*6,1,1

INTERFACE CONFIGURATION

Interface Name untrust ([redacted], Up/100Mb)

○ Obtain IP using PPPoE

Status: Disabled

User Name

Password

● Static IP

IP Address [redacted]

Netmask [redacted]

Default Gateway [redacted]

Manage IP [redacted] [redacted]

Traffic Bandwidth 0 Kbps

Management Services ☐ Web UI ☑ SCS ☐ Telnet ☑ SSL ☐ SNMP ☐ NS-GlobalPRO

Other Services ☑ Ping ☑ Ident-reset

C9: The firewall allowed access to vulnerable services running on internal hosts.

If it is possible to access vulnerable services running on internal hosts, then an attacker who knows how to exploit a vulnerable service will be able to successfully attack the system. A successful attack may allow the attacker to view sensitive data, modify data, or make the system unavailable to users.

Since this finding consists of multiple specific vulnerabilities, I provide below a brief summary of the risk posed by each of the vulnerabilities. In order to correlate each vulnerability with the Nessus output, whenever possible I will cross-reference each vulnerability with the Nessus "plug-in ID" responsible for discovering the vulnerability. Also whenever possible, I will list the Common Vulnerabilities and Exposures (CVE) or Bugtraq ID (BID) number associated with each vulnerability.

The vulnerabilities may be divided into two groups: true positives and false positives. True positives are accurate findings; the vulnerabilities really do exist in the audited systems. False positives are inaccurate; the vulnerabilities are not applicable. Of the eleven specific vulnerabilities reported by Nessus, five turned out to be true positives. All of the true positives present a low degree of risk. The remaining six vulnerabilities reported by Nessus were false positives. After investigating all of the false positives, it appears that most of the false positives were due to the implementation of patches or fix-actions that Nessus is unable to detect. For example, in at least one instance, Nessus relied on the version number reported by the OpenSSH software. Unknown to Nessus, however, the vulnerability had been patched in a way that did not change the version number of the software. Thus, the false positives are understandable, even if inaccurate.

Web Server Advertising Version Number

Nessus plug-in ID: none provided in report
CVE: none

BACKGROUND / RISK

Knowing the version number of any software package running on a server, including web server software, can be very helpful to an attacker. Such information can allow the attacker to identify specific exploits that will provide unauthorized access. While the 'security-through-obscurity' approach is unwise when it is one's *only* layer of security, it can be useful as an *extra* layer of security since it can slow an attacker down.[14]

SYSTEM JUSTIFICATION

This vulnerability is accurate; the web server on host4.foo.com does advertise the version number of the Apache web server software. On the other hand, as I will show below, there are no other known vulnerabilities in our Apache implementation. Moreover, the Apache web server is not accessible from the Internet. Therefore, I recommended to management that this should be addressed, but be viewed as a low priority. Management agreed with me. Unfortunately, this prevents me from demonstrating the effectiveness of the recommended change prior to the completion of this practical.

Oracle Net Services Link Buffer Overflow Vulnerability

Nessus plug-in ID: 11563
BID: 7453

BACKGROUND / RISK

A buffer overflow vulnerability is a special kind of bug or defect in computer software. A buffer overflow vulnerability exists whenever computer software allocates and uses a "buffer" or section of computer memory, but the software fails to verify that the amount of information it wants to store in that buffer actually fits. If the stored information exceeds the buffer size, then the software may behave in unexpected ways. If a sophisticated attacker learns that a particular software application has a buffer overflow vulnerability, the attacker can send specially crafted packets to the application that exceed the buffer size. Since the specially crafted packets include instructions for the machine to follow, the attacker can actually trick the victim machine into executing virtually any instructions, including a set of instructions that gives the attacker access to the machine.

The Oracle Net Services Link Buffer Overflow Vulnerability is a perfect example of a buffer overflow vulnerability. This particular buffer overflow vulnerability requires that the attacker already have a valid account on the Oracle database. If the attacker sends a special type of query to the database (CREATE DATABASE LINK) and overflows the buffer with specially crafted packets, the attacker may be able to gain complete control over the database or even get a Unix account on the database machine.[15]

SYSTEM JUSTIFICATION

Nessus reported that this vulnerability was applicable to host4.foo.com. Upon further investigation, however, I learned that this item was a "false positive." This vulnerability had been removed by removing users' privilege to execute the "create database link" command.

```
setenv ORACLE_HOME /censored/oracle/product/8.1.7
setenv ORACLE_SID <censored>
$ORACLE_HOME/bin/sqlplus /NOLOG
>connect / as sysdba
>select * from dba_sys_privs
where privilege = 'CREATE DATABASE LINK'

GRANTEE     PRIVILEGE   ADMIN_OPTION
<censored>  CREATE DATABASE LINK    NO
DBA   CREATE DATABASE LINK    YES
<censored> DATABASE LINK      NO
<censored> CREATE DATABASE LINK     NO
```

Thus, the only Oracle user with privileges to execute the "create database link" command is the "dba" user. The "connect" role, which is assigned to every user in Oracle, is not listed as a grantee of the "create database link" privilege. Therefore, the only user who could successfully exploit the Oracle Net Services Link Buffer Overflow Vulnerability is the "dba" user. Since the "dba" user is a privileged account, an attacker with control of the "dba" user wouldn't need to exploit that vulnerability. The attacker would already "own" the database and could do whatever he or she pleased.[16]

Therefore, there is no compelling business reason to apply a patch to fix this vulnerability.

Buffer Overflow in OpenSSH

Nessus plug-in ID: 10954
CVE: CVE-2002-0575

BACKGROUND / RISK

OpenSSH is an application that is designed to provide authorized users with secure access to an interactive command prompt on a remote machine. Unfortunately, certain versions of the OpenSSH have a buffer overflow vulnerability. If an attacker successfully exploits this vulnerability, the attacker can gain privileges on the target system.[17] Moreover, the attacker need not have pre-existing access on the target system in order to exploit this vulnerability; the vulnerability is remotely exploitable.

SYSTEM JUSTIFICATION

This vulnerability only applies to OpenSSH versions before 2.9.9 and versions 3.x before 3.2.1, if either Kerberos or AFS is supported. If those conditions are met, then the vulnerability applies.[18]

SecurityFocus.com clarifies the risk posed by this vulnerability. The degree of risk posed by this vulnerability depends upon the version of OpenSSH. For OpenSSH versions prior to 2.9.9, an attacker does not even "require valid user credentials" in order to exploit the vulnerability, whereas valid user credentials are required for versions 2.9.9 and higher.[19]

Since all of the Unix machines in my environment are running OpenSSH 3.0.2p1, this vulnerability is not remotely exploitable. An attacker must already have valid user credentials in order to exploit this vulnerability. Even with valid user credentials, however, the attacker still cannot exploit this vulnerability unless two conditions apply:

(a) Kerberos/AFS is supported, and
(b) KerberosTgtPassing or AFSTokenPassing is enabled[20]

Nevertheless, neither condition applies. Regarding (a), we did not configure OpenSSH with Kerberos support enabled. As for (b), that condition does not apply to hosts1-5, as demonstrated by the following command line output.

```
host1$ grep AFSTokenPassing /usr/local/etc/sshd_config
#AFSTokenPassing no
host1$ grep KerberosTgtPassing /usr/local/etc/sshd_config
#KerberosTgtPassing yes

host2$ grep AFSTokenPassing /etc/sshd_config
```

```
host2$ grep KerberosTgtPassing /etc/sshd_config
host2$

host3$ grep AFSTokenPassing /etc/sshd_config
host3$ grep KerberosTgtPassing /etc/sshd_config
host3$

host4$ grep AFSTokenPassing /etc/sshd_config
host4$ grep KerberosTgtPassing /etc/sshd_config
host4$

host5$ grep AFSTokenPassing /usr/local/etc/sshd_config
#AFSTokenPassing no
host5$ grep KerberosTgtPassing sshd_config
#KerberosTgtPassing yes
```

Since both lines had been commented out on both host1 and host5, this means that OpenSSH resorts to defaults. Likewise, on hosts2-4, since there were no entries in sshd_config for AFSTokenPassing or KerberosTgtPassing, those machines also operate according to defaults. As the OpenSSH.com security advisory states, "Ticket and token passing is not enabled by default."[21] Thus, this vulnerability was a false positive.

Off-by-One Error in the Channel Code of OpenSSH 2.0 through 3.0.2

Nessus plug-in ID: 10883
CVE: CVE-2002-0083

Background / Risk

OpenSSH uses channels "to segregate differing traffic between the client and the server."[22] OpenSSH versions 2.0 through 3.0.2 have an overflow vulnerability "in the code that handles channels."[23] This vulnerability makes two different kinds of attacks possible: (1) attacks against the OpenSSH server; and (2) attacks against the client.[24] I will briefly summarize each attack in turn.

Regarding (1), in order to successfully attack an OpenSSH server using this vulnerability, the attacker must have valid authentication credentials (e.g., username and password).[25] If successful, the attacker may be able to get the victim server to execute arbitrary code, which in turn may allow the attacker to take control of the victim machine. The attacker could view sensitive information, disrupt service to authorized users, or modify important files.

As for (2), this attack method requires that a client initiate a connection to an OpenSSH server. If successful, the malicious server is able to execute arbitrary code on the vulnerable client's machine with the privileges of the current user.[26] This means, for example, that an attacker could gain access on employee PCs used to run the SSH client software.

Thus, the off-by-one vulnerability is a serious vulnerability that may allow remote compromise of the root account.

System Justification

According to the advisory at www.openbsd.org,[27] the solution for this vulnerability is to either upgrade to OpenSSH 3.1 or apply a patch to the source code. I checked the source code repository on the machine that was used to compile the OpenSSH binary. I confirmed that the source code had been patched.

```
$ more channels.c

[snip]

channel_lookup(int id)
{
        Channel *c;

        if (id < 0 || id >= channels_alloc) {
                log("channel_lookup: %d: bad id", id);
                return NULL;
        }
        c = channels[id];

[snip]
```

Thus, this was a false positive. Nessus reported the item as a vulnerability since there is no way to determine from the OpenSSH version number if the source code has been patched.

OpenSSH Challenge-Response Buffer Overflow Vulnerabilities

Nessus plug-in ID: 11031
CVE: CVE-2002-0639 and CVE-2002-0640

Background / Risk

There are multiple vulnerabilities in OpenSSH's authentication process, specifically how OpenSSH handles challenge-response. After receiving the authentication challenge from a vulnerable OpenSSH server, an attacker could exploit a buffer overflow condition and trick the target machine into executing specially crafted instructions. Those instructions could allow the attacker to gain "root" privileges and effectively take over the machine.

System Justification

As the SecurityFocus advisory points out, this vulnerability only applies to instances of OpenSSH that have been "configured at compile-time to support BSD_AUTH or SKEY."[28] Since I am the firewall administrator but not the Unix system administrator, I interviewed the Unix system administrator. He stated that my organization did not compile OpenSSH with either BSD_AUTH or SKEY support enabled. I confirmed his remarks by consulting the script used to compile OpenSSH. The following is an excerpt of that script.

```
cd openssh-3.0.2p1
./configure --sysconfdir=/etc
make
make install
```

Since the --with-bsd-auth option was not used at compile time, this vulnerability does not apply to our systems.

Domain Name Server (DNS) is Running

Nessus plug-in ID: none provided in report
CVE: none

Background / Risk

DNS software is the software that helps translate web site "domain names" or address (e.g., www.microsoft.com) into numerical addresses the machine understands (e.g., 10.1.1.25). When I ran Nessus it did not complain about any bugs in the version of DNS software that we run on our machines. Instead, the Nessus report simply stated, "A DNS server is running on this port. If you do not use it, disable it." Thus this warning seems to be an application of the general principle that software and services should not be run by default; only those software packages and services that are actually necessary should be run. Although no specific vulnerability is known at this time, there is always the possibility that a vulnerability could be identified in the future, increasing the organization's exposure. Clearly, this is a low-risk finding.

System Justification

"named" is the name of the DNS server software that we use. Although it is not necessary that named run on each server, we run named on each server for three reasons. First, we get better load balancing on each server by running DNS locally. Second, running DNS on each host provides better resiliency, which is critical for many of our applications. Third, named provides more intelligent caching than what was built into Solaris by default.

Web Server does not return '404 Not Found' Error Code for Non-Existent Files

Nessus plug-in ID: 10386
CVE: none

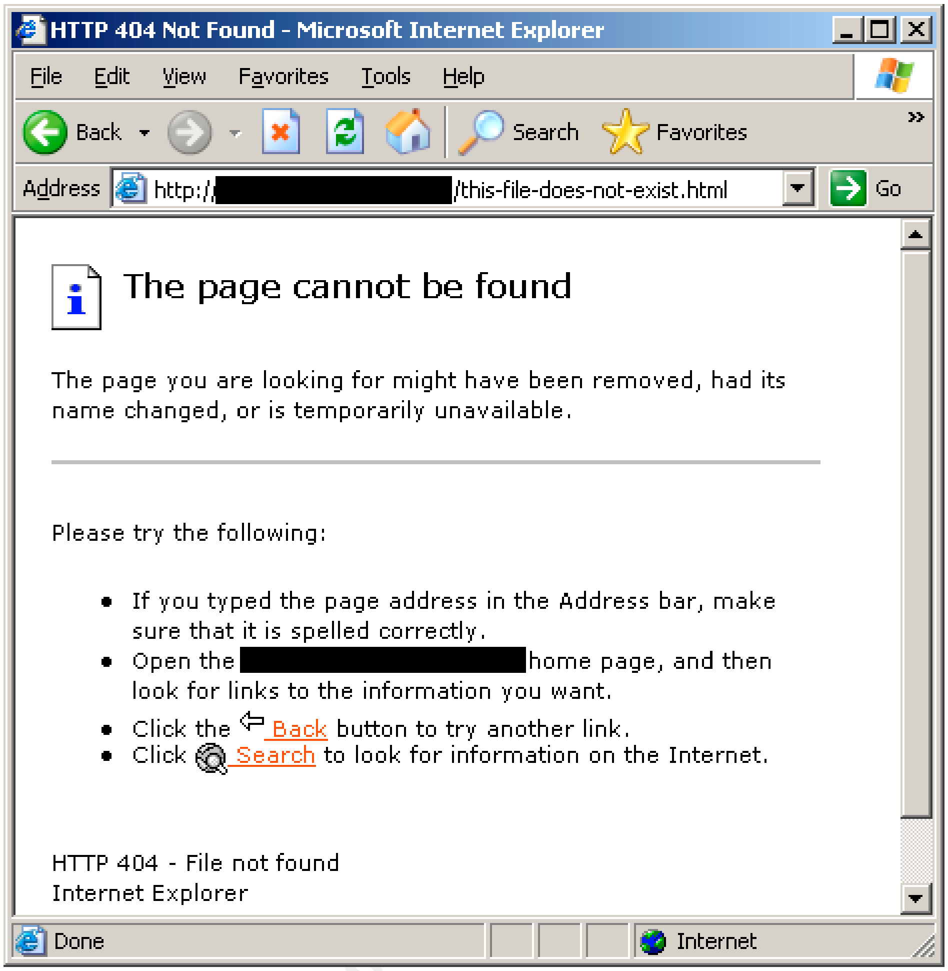
Background / Risk

Normally, when one requests a non-existent "page" or file from a web site, the remote web server will return a "404 Not Found" error message. Nessus claims that our web server fails to do this; that is, Nessus claims that our web server fails to return a "404 Not Found" error message for non-existent pages. Yet it is unclear why Nessus considers this item a low-risk security vulnerability. The Nessus report states that this item may indicate a misconfiguration. Even if that were true, however, the misconfiguration would not be a threat to the confidentiality, integrity, or availability of the web server. Therefore, I do not consider this item to be a security vulnerability (even if it is a misconfiguration).

System Justification

This vulnerability also turned out to be a false positive. I tried accessing multiple pages that do not exist on the web server; each time I received a page with the title "HTTP 404 Not Found". The snapshot below provides an example.

Figure 8 – Attempt to Download a Non-Existent HTML Page


HTTP 404 Not Found - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address
Go
Done
Internet

Address: http://[redacted]/this-file-does-not-exist.html

The page cannot be found

The page you are looking for might have been removed, had its name changed, or is temporarily unavailable.

Please try the following:

- If you typed the page address in the Address bar, make sure that it is spelled correctly.
- Open the [redacted] home page, and then look for links to the information you want.
- Click the ⇦ Back button to try another link.
- Click Search to look for information on the Internet.

HTTP 404 - File not found
Internet Explorer

Running Version of Apache Older than 1.3.27

Nessus plug-in ID: 11137

We use Apache as our web server software. Nessus reported that we are running an older version of the software, a version that has multiple security vulnerabilities. The Nessus output listed three specific vulnerabilities that applied to host4.foo.com since that host is running a version of Apache older than 1.3.27. I explain the vulnerabilities below.

(1) Apache Web Server Scoreboard Memory Segment Overwriting SIGUSR1S Ending Vulnerability

CVE: CAN-2002-0839

Background / Risk

Apache web servers with this vulnerability are susceptible to a local exploit allowing an authorized user to escalate privileges and possibly take over the system by gaining access to the "root" account.

SYSTEM JUSTIFICATION

The vulnerability only affects apache servers that are started as root. (Most apache servers are started as the root user because they need to bind a privileged port.) The Apache server on host4.foo.com, however, is started with only the credentials of the 'web' user. Thus, host4 is not vulnerable.

(2) APACHE SERVER SIDE INCLUDE CROSS SITE SCRIPTING VULNERABILITY

CVE: CAN-2002-0840

BACKGROUND / RISK

Attacks that exploit this vulnerability target *users,* not web servers. This vulnerability allows an attacker to execute arbitrary code in the web browser of the victim user. As a result, attackers may be able to display content in the victim user's web browser that differs from the content you intend for them to see. (For example, the attacker could display pornography or a form that asks users for their credit card numbers and sends the information to the attacker.) This vulnerability may also allow an attacker to steal the user's "cookie" or credentials, and gain access to whatever restricted web page the victim user had been authorized to access.[29]

SYSTEM JUSTIFICATION

This vulnerability only affects Apache web servers that support Server Side Include (SSI). According to the Apache Tutorial on SSI,[30] even if Apache is compiled with SSI support, it is not active unless the following directive appears either in the httpd.conf file or in a .htaccess file:

```
Options +Includes
```

The following grep command verified that the directive does not appear in the httpd.conf file:

```
host4$ grep "Options \+Includes" /var/httpd/conf/httpd.conf
host4$
```

I next verified that the directive does not appear in any .htaccess files on host4.foo.com. To do so, I first identified the document root directory from the httpd.conf file:

```
host4$ grep DocumentRoot httpd.conf
```

```
      DocumentRoot /censored/htdocs
```

I then searched all subdirectories under /censored/htdocs for .htaccess files:

```
      host4$ cd /censored/htdocs
      host4$ find . -name ".htaccess" –print
      ./censored1/.htaccess
      ./censored2/.htaccess
```

Finally, I confirmed that the directive does not appear in either .htaccess file:

```
      host4$ grep "Options \+Includes" ./censored1/.htaccess
      host4$ grep "Options \+Includes" ./censored2/.htaccess
      host4$
```

Since neither .htaccess file contained the "Options +Includes" directive, I conclude that host4.foo.com is not affected by this vulnerability.

(3) APACHE AB.C WEB BENCHMARKING BUFFER OVERFLOW VULNERABILITY

CVE: CAN-2002-0843

BACKGROUND / RISK

As the Apache HTTP Server Project explains, "ab is a tool for benchmarking your Apache Hypertext Transfer Protocol (HTTP) server."[31] Attackers can cause vulnerable Apache web servers running this tool to possibly execute arbitrary code and gain control of the machine. Attackers may also be able to cause denial-of-service, making the web server unavailable to legitimate users.[32]

SYSTEM JUSTIFICATION

I interviewed the system administrator of the Apache web server, who informed me that we do not use the ab benchmarking tool. I also checked the list of current processes to see if ab was running.

```
$ ps -ef | grep ab
 jlowder 26255 24340  0 01:16:06 pts/3    0:00 grep ab
```

I conclude that we are not affected by this vulnerability.

<u>Remote SSH Daemon Supports Connections using Versions 1.33 or 1.5 of SSH Protocol</u>

Nessus plug-in ID: 10881 and 10882

BACKGROUND / RISK

Recall that OpenSSH is an application that is designed to provide authorized users with secure access to an interactive command prompt on a remote machine. OpenSSH sends encrypted packets over a network using a special communications protocol, the SSH protocol. There are different versions of the SSH protocol; our machines support version 1.5 of the protocol. Unfortunately, there are multiple security vulnerabilities in that version.[33] These vulnerabilities include the following.

(1) SSH CRC32 COMPENSATION ATTACK DETECTOR VULNERABILITY

CVE: CAN-2001-0144

The first vulnerability is yet another example of a buffer overflow vulnerability.[34] By attacking vulnerable instances of the SSH software, sophisticated attackers can remotely execute arbitrary code on the system. Although such an attack is difficult to execute,[35] successful execution of the attack could allow an attacker to gain control of the victim machine.

(2) SSH PROTOCOL 1.5 UNAUTHORIZED SESSION KEY RECOVERY

CVE: CVE-2001-0361

This vulnerability is both complicated to explain and complicated to exploit. Without going into complex details of cryptography that are outside the scope of this paper, the vulnerability may be summarized as follows. SSH communications are encrypted. Nevertheless, a sophisticated attacker may be able to decrypt SSH connections involving vulnerable servers.[36] If an attacker is able to decrypt SSH connections, the attacker will be able to learn sensitive information, including the logon credentials of legitimate users, which in turn could allow the attacker to gain unauthorized access to the system.

SYSTEM JUSTIFICATION

This vulnerability finding is, in fact, accurate. Nevertheless, an upgrade will be an ambitious and time-consuming project; management decided that other current and pending projects are a higher priority. This decision was based upon several factors, including (a) other projects were deemed more critical; (b) the affected servers are not Internet-facing; (c) the affected servers are segmented from the rest of the production network; (d) the difficulty of successfully exploiting the vulnerabilities in the protocol; and (e) management has dictated that the system support version 1.5 of the SSH protocol.

OpenSSH Reverse DNS Lookup Access Control Bypass Vulnerability

CVE: CAN-2003-0386

BACKGROUND / RISK

An optional feature of the OpenSSH software is the ability to limit SSH connections to authorized source addresses. If a person tries to initiate an SSH connection from an unauthorized address, the SSH server will block the connection. Regrettably, there is a vulnerability in this feature of OpenSSH. This vulnerability could allow an attacker to establish an SSH connection with a company server, in spite of any restrictions placed by the server on the source address of incoming connections.[37]

SYSTEM JUSTIFICATION

This is a false positive. The vulnerability only applies to older versions of OpenSSH servers that restrict access to specific hosts based on certain hostnames or IP addresses.[38] Nevertheless, the sshd_config file has not been configured to restrict certain users to logging from certain hosts.

```
host1$ grep \@ sshd_config
host1$
```

(The command output was the same on all five hosts. I have omitted the output from the other four hosts for the sake of brevity.)

OpenSSH-portable Enabled PAM Delay Information Disclosure Vulnerability

CVE: CAN-2003-0190

BACKGROUND / RISK

The OpenSSH software authenticates users before granting them access to the system. As part of the authentication process, all users are required to identify themselves by supplying their username. Unfortunately, some versions of OpenSSH send "an error message when a user does not exist, which allows remote attackers to determine valid usernames."[39] Once an attacker learns valid usernames, he could then try a brute-force password guessing attack against those accounts until he successfully guesses a password and gains access to an account on the system.

SYSTEM JUSTIFICATION

While we are undeniably vulnerable to this, we do not plan to upgrade OpenSSH just to fix this vulnerability. The affected servers are internal machines that are not connected to the Internet. Indeed, they are located behind multiple layers of firewalls. Moreover, the affected servers use RSA key authentication, not password authentication. One of the primary benefits of using RSA key authentication is protection against brute-force password guessing attacks. RSA key authentication provides this protection by requiring that users *both* know a passphrase *and* have the correct RSA private key on the client machine.[40] Even if an attacker were to learn valid usernames by exploiting this vulnerability, and even if the attacker were then able to guess the passphrase through brute force, the attacker would still lack the user's private key and thus be unable to log into the user's account.

G1: Firewall configuration back up and restore procedures are not documented.

Background / Risk

If the procedures for backing up and restoring firewall configuration are not documented, the configuration may not be properly backed up or restored. A change in personnel could mean that a firewall administrator might be unfamiliar with the procedure. Alternatively, in a crisis, even the regular administrator might skip steps because of the urgency or excitement of the situation. Having documented procedures available increases the likelihood that the backup or restoration is done correctly.

System Changes and Further Testing

Because of this audit, I ensured that these procedures were documented. Both procedures are quite simple and are summarized below.

1. Backup Procedure

From the Command Line Interface (CLI), type, "get config." Copy the output, paste to a text editor, and then save as a text file. Upload the file to <machine name and file path censored>.

2. Restore Procedure

From the CLI, copy and paste the contents of the text file into the command prompt.

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