Global Information Assurance Certification Paper

SANS Network Security 2000, GIAC Practical: Track 6, UNIX Security

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Executive Summary

The purpose of this audit was to identify & examine weaknesses in the configuration of our DHCP server, called *dhcp01* (SUN Enterprise Ultra 250 with Solaris 7 installed). The server is not a total show stopper for the company in case of break-down, but it is an extremely important server in our infrastructure.

All Windows machines and printers are depending on the DHCP service from it.

Even though the server is behind a coporate firewall and in that case is not directly accessible to outside hackers, the security level on the server *dhcp01* is below avarage. Therefore the issues in this audit should be addressed as soon as possible.

I have made some recommendations in order to bring security within acceptable limits. Some of the more common vulnerabilities are found within the configuration of the Operating System (OS) and in administrative working methods. I have used Nessus (a remote security scanner) to see if there were any security leaks on the server.

The company has some security policies, but these are not inforced. That is off course a problem. There are no written policies about backup, disaster recovery etc. In case of a emergency the server and the company

will be very vulnerability because the administrative practies are not well planned and tested.

The DHCP server *dhcp01* moved directly from test into operation. Not enough time for test and verification. That means that the server is not configured correctly. No unnecessary services has been disabled. No hardened programs has be run on the server. Another big problem, the personal was not trained to actually handle the DHCP server. Additional training is recommended.

In conclusion the server has too many open services and improperly trained administrators maintaining it, which adds up to a potensional high level of sercurity vulnerability.

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Introduction

During this audit I will identify & examine weaknesses in the configuration of our DHCP server, called *dhcp01* (SUN Enterprise Ultra 250 with Solaris 7 installed). After a brief history concerning the server in focus I will look upon physical- and system access security. Then I will go into details about an analysis of the operation system, network based services, third-party software, backup and file integrity.

In the light of the analysis, I will list a prioritized list of security vulnerabilities and recommendations.

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Brief History

Some time ago, we needed a DHCP solution. A SUN Enterprise Ultra 250 machine was bought for testing purposes. We chose Cisco Network Registrar (CNR) as the DHCP server software. Then after a while the CNR server *dhcp01* was directly moved from test into operation. This was never the intention. The test and verification was not completed. The server was still running on demo software and there was not any trained personal to actually handle the CNR. The DHCP server was not configured correctly and so on. But we needed the service here and now (a management decision) and at the time there was no alternative.

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Physical Access Security

All operators have access to the main server room, this is controlled by a smart-card lock. So everyone who enters the door will be logged. But that also means that operators without or very little knowledge have physical access to the various servers (NT/UNIX).

There is no "janitor" in the server room who knows information like how much power is used for each server, which network cables belongs to which machines etc. That could mean that operators are plugging in or unplugging servers and could cause a lot of harm (downtime etc.). A plan or a logbook would be a very

good idea as every change in that room should be logged.

The physical security could be improved if you limited the number of operators who have access to the server room. Or perhaps splitting the serverum up into more parts, one for NT and one for UNIX with locks on the doors. Therefore only people with the correct knowledge could enter the correct room to configure the servers!

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System Access Security

The DHCP server has the same root password as almost all of the servers, but because it is a very important server for our infrastructure, the password should be changed to something else. Only a few administrators should have access to the machine as root.

SSH is installed on the server, but still both 'rsh' and 'rlogin' are enabled in /etc/inetd.conf. These kind of services should be disabled. Only through SSH should it be allowed to login to the server.

Right now the only user that is allowed to login is root. But that has to be changed because as a result you would lose trace abillity. Use instead ssh as local user and su to root:

For example: `ssh dhcp01 -l root`

Then you are logging in as a local user with root privileges. Your public key has to be inserted in the authorized_keys file in the ssh directory on *dhcp01*. Everything you do will then be logged as you, therefore you have the trace-abillity. The login procedure can be done with out knowing the root password, so it could be disabled, but I would suggest keeping it for login as console.

We therefore make sure that the password is hard to break. For instance try running crack on root's account on *dhcp01*.

If sometime in the future another user other than 'root' needs to login on *dhcp01*, I would suggest using 'sudo' instead of enabling rlogin or telnet. Sudo is a program that allows non-root users to grant access to the administrative account and execute programs "as root".

The SUID (Set-UID) bit on the program 'su' should be removed, since it is not being used.

Another good thing is to prevent unauthorized people to just reboot the machine and then change the root password. A way to prevent that is to set the EEPROM security mode (firmware security level):

```
# eeprom security-mode=command
```

That means every time you make a normal reboot, or try to boot in single user mode, you will be prompted for a password. If you forget the password, you have to get a new EEPROM. There is no way to recover the password, you have to get a new EEPROM from Sun.

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Analysis of Operation System & Services

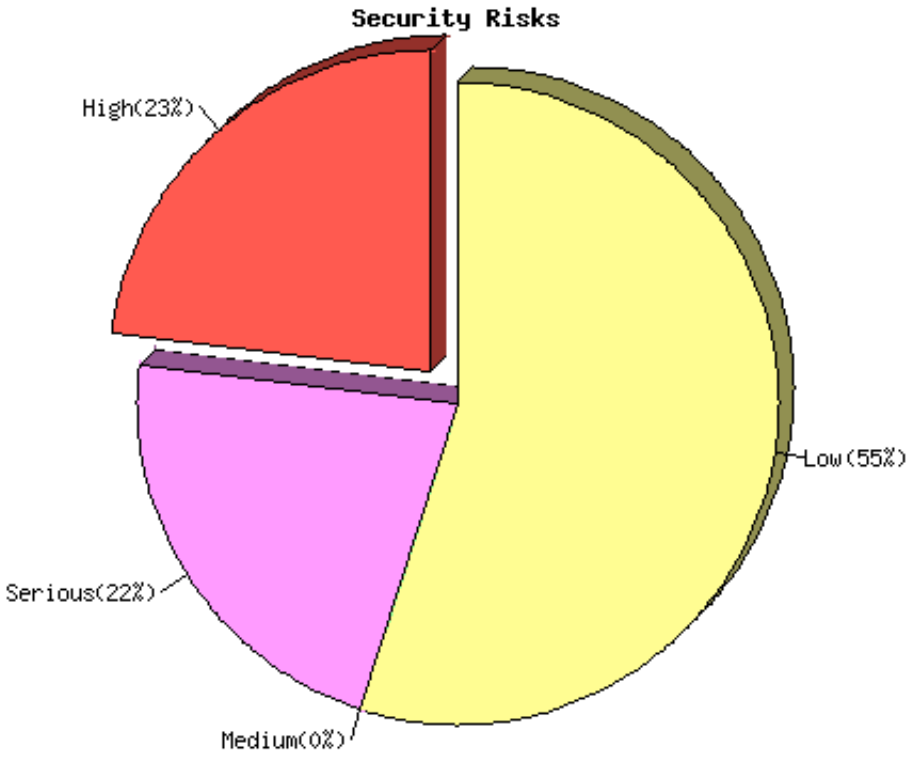
Background for the analysis.

Many of the vulnerabilities are found with Nessus version 1.0.6 and are described in details later in the report.

```
The Nessus Security Scanner was used to assess the security of 1 host

      7 security warnings have been found
      2 security notes have been found
```

Repartition of the level of the security problems (taking from Nessus) :



The DHCP server *dhcp01* is running on Sun Solaris 7. The server was installed in early in 1999. Since it went from test/demo to production, nothing has been done.

Potensional problems:
- No patches installed.
- No hardning script has be run.

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Patches

The output from 'showrev -p' on *dhcp01*

```
# showrev -p
No patches are installed
#
```

That means of course that you must do some patching immediately. I would install the latest 'Sun Recommended Patch Cluster' (from Sun) to start with. It is not always the latest patches that are in the Patch Cluster. So I advise to checkout Patch Report, that contains information about all patches available for a specific release.

It is not a good idea to just install brand new patches. It is better to wait a week or two to see if any updates are coming to the specific patch. Special patches should only be applied to system, if Sun specific ask you to do it.

Here is contents of the November Patch Cluster:

 # CLUSTER_README

NAME: Solaris 7 Recommended Patch Cluster
DATE: Nov/02/00

CLUSTER DESCRIPTION

These Solaris Recommended patches are considered the most important and highly recommended patches that avoid the most critical system, user, or security related bugs which have been reported and fixed to date. In most cases a Solaris security patch will be included in the recommended patch set. It is possible, however, that a security patch may not be included in the recommended set if it is determined to be a more obscure application specific issue and not generally applicable.

During initial installation of the Solaris product other patches or patch sets may be provided with the product and required with product installation. Refer to the Solaris product installation documentation to be sure that all the patches required at product installation are already installed. This patch cluster can then be used to update or augment the system with the recommended patches included.

PATCHES INCLUDED:

106960-01 SunOS 5.7: Manual Pages for patchadd.1m and patchrm.1m

107038-01 SunOS 5.7: apropos/catman/man/whatis patch
107171-06 SunOS 5.7: Fixes for patchadd and patchrm
106793-05 SunOS 5.7: ufsdump and ufsrestore patch
106934-03 CDE 1.3: libDtSvc Patch
106725-02 OpenWindows 3.6.1: mailtool vacation security patch
107544-03 SunOS 5.7: /usr/lib/fs/ufs/fsck patch
109104-04 SunOS 5.7: /kernel/fs/sockfs patch
106541-12 SunOS 5.7: Kernel update patch
107587-01 SunOS 5.7: /usr/lib/acct/lastlogin patch
107359-02 SunOS 5.7: Patch for SPARCompiler Binary Compatibility Libraries
107636-05 SunOS 5.7: X Input & Output Method patch
107887-10 CDE 1.3: Actions Patch
106944-03 SunOS 5.7: /kernel/fs/fifofs and /kernel/fs/sparcv9/fifofs patch
106952-01 SunOS 5.7: /usr/bin/uux patch
107456-01 SunOS 5.7: /etc/nsswitch.dns patch
106978-10 SunOS 5.7: sysid patch
107115-05 SunOS 5.7: LP patch
107259-01 SunOS 5.7: /usr/sbin/vold patch
107451-05 SunOS 5.7: /usr/sbin/cron patch
107454-05 SunOS 5.7: /usr/bin/ftp patch
107684-01 SunOS 5.7: Sendmail patch
107792-02 SunOS 5.7: /usr/bin/pax patch
107972-01 SunOS 5.7: /usr/sbin/static/rcp patch
108301-02 SunOS 5.7: /usr/sbin/in.tftpd patch
107337-01 OpenWindows 3.6.1: KCMS configure tool has a security vulnerability
107893-09 OpenWindows 3.6.1: Tooltalk patch
108219-01 CDE 1.3: dtaction Patch
108221-01 CDE 1.3: dtspcd Patch
107885-06 CDE 1.3: dtprintinfo Patch
108482-02 SunOS 5.7: /usr/sbin/snoop patch
108662-01 SunOS 5.7: Patch for sadmind
107709-07 SunOS 5.7: libssasnmp/libssagent/snmpdx/mibiisa patch
108484-01 SunOS 5.7: aset patch
108721-01 SunOS 5.7: admintool patch
106950-13 SunOS 5.7: Linker patch
106938-04 SunOS 5.7: libresolv patch
107018-02 SunOS 5.7: /usr/sbin/in.named patch
108376-16 OpenWindows 3.6.1: Xsun Patch
108331-01 SunOS 5.7: /usr/bin/uustat patch
108327-01 SunOS 5.7: /usr/bin/cu patch
109253-01 SunOS 5.7: /usr/bin/mail patch
109404-01 SunOS 5.7: /usr/vmsys/bin/chkperm patch
108798-01 SunOS 5.7: /usr/bin/tip patch
108838-02 SunOS 5.7: allocate/mkdevmaps/mkdevalloc patch
107650-08 OpenWindows 3.6.1 X11R6.4 Xprint Extension Patch
109949-01 SunOS 5.7: jserver buffer overflow
107794-01 SunOS 5.7: ASET patch
106942-07 SunOS 5.7: libnsl, rpc.nisd and nis_cachemgr patch
109744-01 SunOS 5.7: /usr/lib/nfs/nfsd patch
108374-04 CDE 1.3: libDtWidget Patch
106646-03 SNC 3.2: rpc.pcnfsd has security problem, also hangs and dumps core

106327-08 SunOS 5.7: Shared library patch for C++
106300-09 SunOS 5.7: Shared library patch for 64bit C++
107443-12 SunOS 5.7: packaging utilities patch
107022-06 CDE 1.3: Calendar Manager patch
107200-12 CDE 1.3: dtmail patch

There is a need for some Patch-policies to be created, as normally it is not a good idea just to install patches, this can cause damage on a running system or introduce old bugs etc

Therefore you have to divide the patches up into three different levels.

1. Major risk : The system become vulnerable. The necessary patches should be installed at once
2. Medium risk : The system can potentially crash etc. The necessary patches should be tested before installed.
3. Low risk : "Nice to have" etc. Wait for the next Recommended Patch Cluster.

Subscribing to different mailing lists to know which security problems can cause damage on your system is always a good idea, as well as trying to find the right patch to fit the problem. An example of these mailing lists could be BugTraq and Focus-sun.

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Stripping down OS

All SUID (Set-UID) bit programs should be "removed" from the system, since they are not being used. Only root is allowed to login.

Here is a script that will find all SUID programs on the system and remove the correct bits:

```
#! /bin/sh
echo "Disabling all suid/gid bits"
find / -perm -4000 -type f -exec chmod u-s {} \;
find / -perm -2000 -type f -exec chmod g-s {} \;
echo "Applying suid to (some) files"
chmod u+s /usr/bin/su
chmod u+s /sbin/passwd
echo "Securing writable dirs"
find / -type d -perm -0007 -exec chmod o-w {} \;
chmod 1777 /var/tmp /tmp
chmod 777 /usr/share/man/cat*.Z /var/preserve
#
```

Here is the list of all SUID programs on *dhcp01* that should be removed:

```
# find / -perm -4000 -type f -print | xargs ls -la
-r-sr-xr-x   1 lp       lp           203 Sep 11  1998
/etc/lp/alerts/printer
-r-s--x--x   1 root     sys       351872 Sep 11  1998
/usr/bin/admintool
```

```
-rwsr-xr-x   1 root     sys        35916 Oct  6  1998 /usr/bin/at
-rwsr-xr-x   1 root     sys        13996 Oct  6  1998 /usr/bin/atq
-rwsr-xr-x   1 root     sys        12704 Oct  6  1998 /usr/bin/atrm
-r-s--x--x   1 root     lp         10400 Sep  1  1998 /usr/bin/cancel
-r-sr-xr-x   1 root     sys        36684 Sep  1  1998 /usr/bin/chkey
-r-sr-xr-x   1 root     bin        17044 Oct  6  1998 /usr/bin/crontab
---s--x--x   1 root     uucp       71156 Sep  1  1998 /usr/bin/ct
---s--x--x   1 uucp     uucp       84588 Sep  1  1998 /usr/bin/cu
-r-sr-xr-x   1 root     bin        14352 Oct  6  1998 /usr/bin/eject
-r-sr-xr-x   1 root     bin        28776 Oct  6  1998
/usr/bin/fdformat
-r-sr-xr-x   1 root     bin        29292 Oct  6  1998 /usr/bin/login
-r-s--x--x   1 root     lp         22524 Sep  1  1998 /usr/bin/lp
-r-s--x--x   1 root     lp          6920 Sep  1  1998 /usr/bin/lpset
-r-s--x--x   1 root     lp         20884 Sep  1  1998 /usr/bin/lpstat
-rwsr-xr-x   1 root     sys         7736 Oct  6  1998 /usr/bin/newgrp
-r-sr-sr-x   3 root     sys        99640 Oct  6  1998
/usr/bin/nispasswd
-r-sr-sr-x   3 root     sys        99640 Oct  6  1998 /usr/bin/passwd
-r-sr-xr-x   1 root     bin        21368 Oct  6  1998 /usr/bin/rcp
-r-sr-xr-x   1 root     bin        56280 Oct  6  1998 /usr/bin/rdist
-r-sr-xr-x   1 root     bin        16772 Oct  6  1998 /usr/bin/rlogin
-r-sr-xr-x   1 root     bin         9332 Oct  6  1998 /usr/bin/rsh
-r-sr-xr-x   1 root     sys        27628 Oct  6  1998
/usr/bin/sparcv7/ps
-r-sr-xr-x   2 root     bin        11528 Oct  6  1998
/usr/bin/sparcv7/uptime
-r-sr-xr-x   2 root     bin        11528 Oct  6  1998
/usr/bin/sparcv7/w
-r-sr-xr-x   1 root     sys        36456 Sep  1  1998
/usr/bin/sparcv9/ps
-r-sr-xr-x   2 root     bin        15584 Sep  1  1998
/usr/bin/sparcv9/uptime
-r-sr-xr-x   2 root     bin        15584 Sep  1  1998
/usr/bin/sparcv9/w
-r-sr-xr-x   1 root     sys        17976 Oct  6  1998 /usr/bin/su
-rws--x--x   1 uucp     bin        56140 Oct  6  1998 /usr/bin/tip
---s--x--x   1 uucp     uucp       68584 Sep  1  1998 /usr/bin/uucp
---s--x--x   1 uucp     uucp       23612 Sep  1  1998 /usr/bin/uuglist
---s--x--x   1 uucp     uucp       20504 Sep  1  1998 /usr/bin/uuname
---s--x--x   1 uucp     uucp       63336 Sep  1  1998 /usr/bin/uustat
---s--x--x   1 uucp     uucp       72016 Sep  1  1998 /usr/bin/uux
-r-sr-xr-x   1 root     bin         6264 Sep  1  1998
/usr/bin/volcheck
-r-sr-xr-x   1 root     bin        11176 Sep  1  1998
/usr/bin/volrmmount
-r-sr-sr-x   3 root     sys        99640 Oct  6  1998
/usr/bin/yppasswd
-r-sr-sr-x   1 root     sys        24356 Sep 12  1998
```

```
/usr/dt/bin/dtaction
-r-sr-xr-x   1 root     bin        36180 Sep 12  1998
/usr/dt/bin/dtappgather
-r-sr-xr-x   1 root     bin       357220 Sep 12  1998
/usr/dt/bin/dtprintinfo
-r-sr-xr-x   1 root     bin       147876 Sep 12  1998
/usr/dt/bin/dtsession
-r-sr-sr-x   1 root     daemon    311576 Sep 12  1998
/usr/dt/bin/sdtcm_convert
-rwsr-xr-x   1 root     adm         5304 Sep  1  1998
/usr/lib/acct/accton
-r-sr-xr-x   1 root     bin        15260 Oct  6  1998
/usr/lib/fs/ufs/quota
-r-sr-sr-x   1 root     tty       163892 Oct  6  1998
/usr/lib/fs/ufs/ufsdump
-r-sr-xr-x   1 root     bin       848088 Oct  6  1998
/usr/lib/fs/ufs/ufsrestore
-r-s--x--x   1 root     bin        19564 Sep  1  1998
/usr/lib/lp/bin/netpr
---s--x--x   1 root     bin         4316 Oct  6  1998
/usr/lib/pt_chmod
-r-sr-xr-x   1 root     bin       643464 Sep  1  1998
/usr/lib/sendmail
-r-sr-xr-x   1 root     bin         8576 Oct  6  1998
/usr/lib/utmp_update
---s--x--x   1 uucp     uucp        6156 Sep  1  1998
/usr/lib/uucp/remote.unknown
---s--x--x   1 uucp     uucp      168020 Sep  1  1998
/usr/lib/uucp/uucico
---s--x--x   1 uucp     uucp       34408 Sep  1  1998
/usr/lib/uucp/uusched
---s--x--x   1 uucp     uucp       84904 Sep  1  1998
/usr/lib/uucp/uuxqt
-rws--x--x   1 root     15       1913780 Jun 12  1998
/usr/local/bin/ssh1
-r-sr-sr-x   1 root     bin        14908 Aug 14  1998
/usr/openwin/bin/ff.core
-rwsr-sr-x   1 root     bin        94044 Jul  9  1998
/usr/openwin/bin/kcms_calibrate
-rwsr-sr-x   1 root     bin        27752 Jul  9  1998
/usr/openwin/bin/kcms_configure
-rwsrwxr-x   1 root     bin        42904 Aug  4  1998
/usr/openwin/bin/sys-suspend
-rwsrwxr-x   1 root     bin        67920 Aug 27  1998
/usr/openwin/bin/xlock
-rwsr-xr-x   1 root     bin        24176 Aug 25  1998
/usr/openwin/lib/mkcookie
-r-sr-xr-x   1 root     bin        57124 Aug 11  1998
/usr/sbin/afbconfig
```

```
-rwsr-xr-x   3 root     bin        17584 Oct  6  1998
/usr/sbin/allocate
-rwsr-xr-x   3 root     bin        17584 Oct  6  1998
/usr/sbin/deallocate
-r-sr-xr-x   1 root     bin        56152 Aug 11  1998
/usr/sbin/ffbconfig
-rwsr-xr-x   3 root     bin        17584 Oct  6  1998
/usr/sbin/list_devices
-r-s--x--x   1 root     lp          6940 Sep  1  1998 /usr/sbin/lpmove
-r-sr-xr-x   1 root     bin        28592 Aug 11  1998
/usr/sbin/m64config
-rwsr-xr-x   1 root     bin         9992 Oct  6  1998
/usr/sbin/mkdevalloc
-rwsr-xr-x   1 root     bin        10244 Oct  6  1998
/usr/sbin/mkdevmaps
-r-sr-xr-x   1 root     bin        20404 Oct  6  1998 /usr/sbin/ping
-r-sr-xr-x   1 root     bin        14420 Sep  1  1998
/usr/sbin/pmconfig
-rwsr-xr-x   1 root     sys        23048 Oct  6  1998 /usr/sbin/sacadm
-r-sr-xr-x   1 root     bin        12948 Oct  6  1998
/usr/sbin/sparcv7/whodo
-r-sr-xr-x   1 root     bin        17472 Sep  1  1998
/usr/sbin/sparcv9/whodo
-r-sr-xr-x   1 root     bin       691620 Sep  1  1998
/usr/sbin/static/rcp
-r-sr-xr-x   1 root     bin        22056 Oct  6  1998
/usr/sbin/traceroute
-r-sr-xr-x   1 root     sys        23060 Sep  1  1998
/usr/ucb/sparcv7/ps
-r-sr-xr-x   1 root     sys        31624 Sep  1  1998
/usr/ucb/sparcv9/ps
-rwsr-sr-x   1 bin      bin        10080 Sep  1  1998
/usr/vmsys/bin/chkperm
#
```

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Hardening tools

As part of an installation of a very important server, I would suggest running YASSP (Yet Another Solaris Security Package) by Jean Chouanard. YASSP is a tool for automatically hardening a Solaris machine. This incorporates automatic fix-modes. Fix-modes is a script written by Casper Dik. It contains a huge number of file permission improvements for most Solaris versions.

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Stripping down services (Nessus)

As mentioned above, Nessus found 7 security warnings and 2 security notes. Here is the output with recommadations on the security warnings

List of open ports :

1. ssh (22/tcp) (Security warnings found
2. domain (53/tcp) (Security warnings found
3. login (513/tcp) (Security warnings found)
4. shell (514/tcp) (Security warnings found)
5. general/tcp (Security notes found)
6. general/udp (Security notes found)
7. unknown (32801/udp) (Security warnings found)
8. lockd (4045/udp) (Security warnings found)
9. general/icmp (Security warnings found)

1. Warning found on port ssh (22/tcp)

You are running a version of SSH which is older than (or as old as) version 1.2.27. If this version was compiled against the RSAREF library, then it is very likely to be vulnerable to a buffer overflow which may be exploited by a cracker to gain root on your system.

To determine if you compiled ssh against the RSAREF library, type 'ssh -V' on the remote host.

Risk factor : High
Solution : Use ssh 2.x, or do not compile ssh against the RSAREF library
CVE : CVE-1999-0834 (link to Common Vulnerabilities and Exposures)

Information found on port ssh (22/tcp)

Remote SSH version : ssh-1.5-1.2.25

Recommadation: Upgrade ssh v. 1.2.25 to a newer version at once. I would recommend Open ssh

2. Warning found on port domain (53/tcp)

The remote nameserver allows recursive queries to be performed by the host running nessusd.

If this is your internal nameserver, then forget this warning.

If you are probing a remote nameserver, then it allows anyone to use it to resolve third parties names (such as www.nessus.org).
This allows hackers to do cache poisoning attacks against this nameserver.

Risk factor : Serious
Solution : Restrict recursive queries to the hosts that should use this nameserver (such as those of the LAN connected to it).
If you are using bind 8, you can do this by using the instruction
'allow-recursive' in the 'options' section of your named.conf

If you are using another nameserver, consult its documentation.

Information found on port domain (53/tcp)

The remote bind version is : 8.2.2-P5-NOESW

Recommadation:

This is ok as the DHCP server is an internal nameserver. It is not a normal bind that is running, it is Cisco Network Registrar's bind. I would recommend to limit the numbers of nameservers that can do recursive queries this can be done within CNR.

3. Warning found on port login (513/tcp)

The rlogin service is running.
This service is dangerous in the sense that
it is not ciphered - that is, everyone can sniff
the data that passes between the rlogin client
and the rlogin server. This includes logins
and passwords.

You should disable this service and use openssh instead
(www.openssh.com)

Risk factor : Low
Solution : Comment out the 'rlogin' line in /etc/inetd.conf.
CVE : CAN-1999-0651 (link to Common Vulnerabilities and Exposures)

Recommadation: Comment out the 'login' line in /etc/inetd.conf. Use ssh instead.

4. Warning found on port shell (514/tcp)

The rsh service is running.
This service is dangerous in the sense that
it is not ciphered - that is, everyone can sniff
the data that passes between the rsh client
and the rsh server. This includes logins
and passwords.

You should disable this service and use ssh instead.

Risk factor : Low
Solution : Comment out the 'rsh' line in /etc/inetd.conf.
CVE : CAN-1999-0651 (link to Common Vulnerabilities and Exposures)

Recommadation: Comment out the 'shell' line in /etc/inetd.conf. Use ssh instead.

5. Information found on port general/tcp

Nmap found that this host is running Solaris 2.6 - 2.7 with tcp_strong_iss=2

6. Information found on port general/udp

For your information, here is the traceroute to 172.24.88.60 :?

7. Warning found on port unknown (32801/udp)

The statd RPC service is running.
This service has a long history of
security holes, so you should really
know what you are doing if you decide
to let it run.

* NO SECURITY HOLE REGARDING THIS
PROGRAM HAVE BEEN TESTED, SO
THIS MIGHT BE A FALSE POSITIVE *

We suggest you to disable this
service.

Risk factor : High
CVE : CVE-1999-0018 (link to Common Vulnerabilities and Exposures)

Recommadation: Comment out the start of 'statd' in /etc/init.d/nfs.client

8. Warning found on port lockd (4045/udp)

The nlockmgr RPC service is running.
If you do not use this service, then
disable it as it may become a security
threat in the future, if a vulnerability
is discovered.

Risk factor : Low
CVE : CAN-2000-0508 (link to Common Vulnerabilities and Exposures)

Recommadation: Comment out the start of 'lockd' in /etc/init.d/nfs.client

9. Warning found on port general/icmp

The remote host answers to an ICMP timestamp
request. This allows an attacker to know the
date which is set on your machine.

This may help him to defeat all your
time based authentifications protocols.

**Solution : filter out the icmp timestamp
requests (13), and the outgoing icmp
timestamp replies (14).**

Risk factor : Low
CVE : CAN-1999-0524 (link to Common Vulnerabilities and Exposures)

Warning found on port general/icmp

```
        The remote host answered to an ICMP_MASKREQ
        query and sent us its netmask.

        An attacker can use this information to
        understand how your network is set up
        and how the routing is done. This may
        help him to bypass your filters.

        Solutioin : reconfigure the remote host so
        that it does not answer to those requests.
        Set up filters that deny ICMP packets of
        type 17.

        Risk factor : Low
        CVE : CAN-1999-0524       (link to Common Vulnerabilities and
Exposures)
```

Recommadation:

Use ndd to filter out the above mentioned warnings. Append the following to the end of /etc/init.d/inetinit

ndd - set /dev/ip_respond_to_timestamp = 0
ndd - set /dev/ip_respond_to_timestamp_broadcast = 0

These settings need more verification and I was unable test them because in worst case it could mean downtime. *dhcp01* is an important infrastructure server that many users are dependent on so no "testing" is allowed in production time. To do this I would have to wait to the next maintanance time-slice. As an alternative, you could set up a new test server with all the needed parameters.

A nice script made by Andres Kroonmaa is used to list the ndd values of *dhcp01*.

```
#!/bin/ksh
#
# ndd.sh
#
PATH=/usr/sbin:$PATH
if [ -z "$1" ]; then
   echo "Usage: $0 [udp | tcp | ip | icmp | arp | ... ]"
   exit
fi

ndd /dev/$1 '?' | nawk -v c="ndd /dev/$1" '
/write/ {
  split($0,a,/[ \t(]/);
  n=c t " " a[1];
  printf "echo %s = ",a[1];
  printf "`%s`\n",n;

}' | sh
```

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Stripping down services in general

In our department we have a policy that on all servers only the services that are needed should run. The rest should be disabled.

Since there is no longer any services running from /etc/inetd.conf, it should be removed, or at least renamed so it would start up at boot time.

```
rm /etc/inet/inetd.conf
rm /etc/inetd.conf
mv /etc/rc.2d/S72inetsvc /etc/rc2.d/.NOS72inetsvc
```

Here there are a lot of unnecessary services running, these should be disabled. They are not needed and many of them are considered to be a high security risk.

- dtlogin
- powerd
- rpcbind
- keyserv
- automountd

The server is not running NIS and NFS. The services are down to a minimum.

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User access control

There are too many unnecessary users in the /etc/passwd and /etc/shaddow which must be deleted. All other accounts in those files should have their login shell changed to /dev/null.

The accounts that should be deleted:

- uucp
- nuucp
- listen

As a extra bonus install Titan and run the 'noshell' script. This script will log every failed attempt to login to the syslogd.

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Logning

There are some logging on *dhcp01* but there are still room for improvement.

Most log messages are written to /var/adm/messages and the rest are displayed on the console. No one person is actually looking at the console very often so therefore a lot of messages are lost. Some messages

were set up to mail to LOGHOST, which is a machine that does not exist anymore.

I would suggest setting up the following in /etc/syslog.conf to ensure that failed attempts to login, reboots and other security features are logged in a file. Also logging in remote to a secure log host in real time would be a good idea.

```
auth.info    /var/log/authlog
```

Create `/var/adm/loginlog` to capture failed logins

It is also a good idea to create the log files with 600 permissions owned by root, and then create a script to rotate the syslog files on a regular basis.

It is a good idea to get the program swatch. This is a program that can be configured to report any extraordinary events based on the information in the syslogd messages and then forward them to a central Log Host.

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Third-party software

dhcp01 is running a DHCP server Cisco Network Registrar (CNR). We are right now running on a old version v. 3.0. The new version is v. 5.0.

About patching, Cisco recomend:

```
CNR patch info:

System Requirements

For all OS platforms, Cisco recommends that you install the latest
recommended patch cluster (Solaris).
```

About logging:

CNR has some built in log-rolling facilities. If the server is very busy, log messages could be lost due to the log-rolling. Version 3 does not support a real time loggin to a remote client. I need to check up on the release notes in version 5 for that feature.

About failover:

The fact that the CNR is running on one server without failover capability makes it very vulnerable to spontaneous 'system break-downs'. I would suggest implementering a failover solution using 3 different architectures Hp, Sun and Windows NT. Then you would not be vulnerable to particular vendor problem. Those servers should be physical placed in different buildings. Most likely one or more server would always be up a running which increases overall availibility.

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Backup

'*dhcp01*' is backed up every day. Incremental Monday-Thursday and a level 0 dump on Friday using Solaris 'dump' command. The backup is a part of the big schdeuled backup pool. Here large StorageTek Library Storage Modules (Tape robot's) are used for the backup. That means that the tape is not being removed from the robot, before the tape is swapped out of circulation. The tapes are then stored in a local fire safe. At the end of the month the tapes are moved off site.

That's means that the backup tape when still in the robot is vulnerable to some kind of disaster before the swapping of tapes.

There is no verification of data after each backup. Because the backup is so big and is taking a very long time to complete.

Specifically the Cisco Network Registrar's database is a very important file. If that database is found to be corrupt the DHCP would not work. I suggest there should be established some kind of comparison of the backup to the original file.

There should be written a backup policy with incorporates an audit of the backup.

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File Integrity

Right now there is no integrity check on *dhcp01*. I would suggest Tripwire to be installed. Tripwire creates a database with all files on your system. In that database variant file attributes are stored. Then you can use these attributes to check your system (scripts) to see if anything has been changed. If a change has been made, an alarm can be sent.

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Vulnerabilities

Here is the vulnerability list, from most important to less important:

1. No patches are installed on *dhcp01*.
2. Hardening tools such as YASSP and fix-modes have not been run.
3. The current version of 'ssh' has a buffer overflow exploit.
4. A lot of unnecessary network services are running (rpc based, inetd.conf based etc.)
5. Many unnecessary users are in /etc/passwd and /etc/shadow
6. No one is looking in the logfiles for extraordinary events

7. The company is not enforcing there security policies.
8. All Operators have access to the server room.
9. The DHCP services is a single server with no failover facility.

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Recommendations

Here is the recommendations list, from most important to less important:

1. Create a patch policy for *dhcp01* and keep up to date with patches.
2. Install and run YASSP and fix-modes
3. Remove all SUID programs on the server.
4. Clean up unused users /etc/passwd and /etc/shadow. Install Titan.
5. Implement all suggested solutions in this report and try to run Nessus again.
6. Try serveral other security tools (commericial or none commericial products) to verify the vulnerabilities Nessus has found.
7. Set the EEPROM password (Firmware security level).
8. Install swatch to help to report any extraordinary events based on the information in the syslogd messages and forward them to a central Log Host.
9. Create a script to rotate the syslog files on a regular basis.
10. Install and run Tripwire.
11. Use a logbook every time changes happen. Use for trace-ability in case of emergency.
12. Create a backup policy with incorporates an audit of the backup.
13. Build a test environment to vefify all parameters mentioned in this audit, before installing them to the production server *dhcp01*.
14. Implement the DHCP services with failover on 3 different architectures (Hp, Sun and Win NT). Then you would not be vulnerable to particular vendor problem.

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Conclusion

To secure the *dhcp01* to an above avarage security level the above mentioned recommendations should be followed. It is possible to make a much more radical analysis, but I have chosen an anlysis level that gives me enough security benefits compared to the time, money and resources my company will spend on this project.

Tighten up security on servers is never a one-time asignment, it is an on-going process which demands resouces and time. You are never finish with security. Every time a additional functionality has been added to the system it is crucial for keeping the security level status quo or better, that the administrators have the necessary resouces and suffcient time to complete these tasks.

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Refence list

6.6 Solaris Practicum, Hal Pomeranz

Solaris Security, Step By Step version 1.0

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Created by : Claus Moerkhoej
Last Modified: 20 November 2000