GCIA 2.9

Intrusion Detection In Depth
SANS Parliament Square
London 2001

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1 Assignment #1 - Detects

1.1 Detect #1 - "Code Red Worm" to Linux Apache Server

1.1.1 Trace Data

1.1.1.1 Snort Alert Log

```
[**] WEB-IIS ISAPI .ida attempt [**]
08/01-06:37:23.420000 61.113.0.16:10027 -> badger:80
TCP TTL:240 TOS:0x10 ID:0 IpLen:20 DgmLen:1504
***AP*** Seq: 0x4A3730BD  Ack: 0xCA348D2E  Win: 0x7FE0  TcpLen: 20
0x0000: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0010: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0020: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0030: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0040: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0050: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0060: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0070: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0080: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0090: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x00A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x00B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x00C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x00D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x00E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x00F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0100: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0110: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0120: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0130: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0140: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0150: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0160: 27 2B 00 50 4A 37 30 BD CA 34 8D 2E 50 18 7F E0  '+.PJ70..4..P...
0x0170: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0180: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0190: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x01A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x01B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x01C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x01D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x01E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x01F0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0200: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0210: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0220: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0230: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0240: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0250: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0260: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0270: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0280: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x0290: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x02A0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x02B0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x02C0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x02D0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x02E0: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  ................
0x02F0: 47 45 54 20 2F 64 65 66 61 75 6C 74 2E 69 64 61  GET /default.ida
0x0300: 3F 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  ?NNNNNNNNNNNNNNN
0x0310: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x0320: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x0330: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x0340: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x0350: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x0360: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x0370: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x0380: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x0390: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x03A0: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x03B0: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
```

```
0x03C0: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x03D0: 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E 4E  NNNNNNNNNNNNNNNN
0x03E0: 4E 25 75 39 30 39 30 25 75 36 38 35 38 25 75 63  N%u9090%u6858%uc
0x03F0: 62 64 33 25 75 37 38 30 31 25 75 39 30 39 30 25  bd3%u7801%u9090%
0x0400: 75 36 38 35 38 25 75 63 62 64 33 25 75 37 38 30  u6858%ucbd3%u780
0x0410: 31 25 75 39 30 39 30 25 75 36 38 35 38 25 75 63  1%u9090%u6858%uc
0x0420: 62 64 33 25 75 37 38 30 31 25 75 39 30 39 30 25  bd3%u7801%u9090%
0x0430: 75 39 30 39 30 25 75 38 31 39 30 25 75 30 30 63  u9090%u8190%u00c
0x0440: 33 25 75 30 30 30 33 25 75 38 62 30 30 25 75 35  3%u0003%u8b00%u5
0x0450: 33 31 62 25 75 35 33 66 66 25 75 30 30 37 38 25  31b%u53ff%u0078%
0x0460: 75 30 30 30 30 25 75 30 30 3D 61 20 20 48 54 54  u0000%u00=a  HTT
0x0470: 50 2F 31 2E 30 0D 0A 43 6F 6E 74 65 6E 74 2D 74  P/1.0..Content-t
0x0480: 79 70 65 3A 20 74 65 78 74 2F 78 6D 6C 0A 48 4F  ype: text/xml.HO
0x0490: 53 54 3A 77 77 77 2E 77 6F 72 6D 2E 63 6F 6D 0A  ST:www.worm.com.
0x04A0: 20 41 63 63 65 70 74 3A 20 2A 2F 2A 0A 43 6F 6E   Accept: */*.Con
0x04B0: 74 65 6E 74 2D 6C 65 6E 67 74 68 3A 20 33 35 36  tent-length: 356
0x04C0: 39 20 0D 0A 0D 0A 55 8B EC 81 EC 18 02 00 00 53  9 ....U........S
0x04D0: 56 57 8D BD E8 FD FF FF B9 86 00 00 00 B8 CC CC  VW..............
0x04E0: CC CC F3 AB C7 85 70 FE FF FF 00 00 00 00 E9 0A  ......p.........
0x04F0: 0B 00 00 8F 85 68 FE FF FF 8D BD F0 FE FF FF 64  .....h.........d
0x0500: A1 00 00 00 00 89 47 08 64 89 3D 00 00 00 00 E9  ......G.d.=.....
0x0510: 6F 0A 00 00 8F 85 60 FE FF FF C7 85 F0 FE FF FF  o.....`.........
0x0520: FF FF FF FF 8B 85 68 FE FF FF 83 E8 07 89 85 F4  ......h.........
0x0530: FE FF FF C7 85 58 FE FF FF 00 00 E0 77 E8 9B 0A  .....X......w...
0x0540: 00 00 83 BD 70 FE FF FF 00 0F 85 DD 01 00 00 8B  ....p...........
0x0550: 8D 58 FE FF FF 81 C1 00 00 01 00 89 8D 58 FE FF  .X...........X..
0x0560: FF 81 BD 58 FE FF FF 00 00 00 78 75 0A C7 85 58  ...X......xu...X
0x0570: FE FF FF 00 00 F0 BF 8B 95 58 FE FF FF 33 C0 66  .........X...3.f
0x0580: 8B 02 3D 4D 5A 00 00 0F 85 9A 01 00 00 8B 8D 58  ..=MZ..........X
0x0590: FE FF FF 8B 51 3C 8B 85 58 FE FF FF 33 C9 66 8B  ....Q<..X...3.f.
0x05A0: 0C 10 81 F9 50 45 00 00 0F 85 79 01 00 00 8B 95  ....PE....y.....
0x05B0: 58 FE FF FF 8B 42 3C 8B 8D 58 FE FF FF 8B 54 01  X....B<..X....T.
0x05C0: 78 03 95 58 FE FF FF 89 95 54 FE FF FF 8B 85 54  x..X.....T.....T
0x05D0: FE FF FF 8B 48 0C 03 8D 58 FE FF FF 89 8D 4C FE  ....H...X.....L.
0x05E0: FF FF 8B 95 4C FE FF FF 81 3A 4B 45 52 4E        ....L....:KERN

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

1.1.2 Location Of Trace

Home internet connection – an ADSL connection providing a fixed /28 address range.

1.1.3 Source Of Trace

Snort 1.8 (build 43). I have a low end Cisco Catalyst switch and use the SPAN port functionality to copy frames from the port attached to the ADSL router to a second 10BaseT switch port. This is attached to a dedicated interface monitored by Snort. To minimize risk, this interface has no IP configuration associated with it (as shown below).

```
[devlinse@grunt /]$ ifconfig eth1
eth1      Link encap:Ethernet  HWaddr 00:01:02:F3:7B:B4
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:1019468 errors:0 dropped:0 overruns:1 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          Interrupt:3 Base address:0xc800

[devlinse@grunt /]$
```

To make it clear, the frames are copied to Sno rt prior to them hitting the Firewall.

Given that the internet connection is DSL with an upper limit of 512kbps and that the machines performing IDS duties are dedicated to this task, the chances of missing packets through network loading are low.

1.1.4 Likelihood Of Address Spoofing?

Low. This attack is directed at HTTP servers and so requires that a valid TCP 3 way handshake be completed.

1.1.5 Description Of Attack

This would appear to be an encounter with the now famous "Code Red Worm".

An advisory was posted on June 18th detailing a buffer overflow condition that exists in ida.dll, an ISAPI filter providing access to indexing services on Microsoft IIS 4 & 5 webservers, allowing code to run in the SYSTEM context.

http://www.eeye.com/html/Research/Advisories/AD20010618.html
http://www.microsoft.com/technet/treeview/default.asp?url=/technet/security/bulletin/MS01-033.asp

1.1.6 Attack Mechanism

Some weeks after the original discovery, this explo it was wrapped into transportation code and introduced to the internet, where it subsequently infected several hundred thousand unpatched servers. Once infected, a webserver spawns many process threads, each of which attempt connections to port 80 on a ra ndomly generated IP addresses in order to try and continue propagation.

Second order behaviour includes a DOS attack against an IP address that formerly hosted the official USA Whitehouse site (via bandwidth saturation techniques), and a modification of in-memory request handling code to return the page "Hacked by Chinese" to clients connecting to an infected IIS server.

A period of dormancy followed, with a resurgence of connection attempts expected starting August 1st. I believe that this is one of them.

I am not clear why there appears to be a significant amount of null padding prior to the payload beginning at 0x02F0. Previous examples of this that I have observed do not seem to include this.

1.1.7 Correlations

An excerpt of the /var/log/httpd/access_lo g shows a match with the snort signature at the same time.

```
61.113.0.16        -         -         [01/Aug/2001:06:37:24        +0000]        "GET
/default.ida?NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN
NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN
NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN
NNNNNNNNNNNNNNNNNNNNNNN%u9090%u6858%ucbd3%u7801%u9090%u6858%ucbd3%u7801%u9090%u6858%uc
bd3%u7801%u9090%u9090%u8190%u00c3%u0003%u8b00%
u531b%u53ff%u0078%u0000%u00=a  HTTP/1.0" 404 205
```

In addition the http://www.incidents.org/ "Code Red" status page below shows a general increase of "Code Red" connection attempts in line with expectations (that is, the exponential growth curve observed in mid July) .

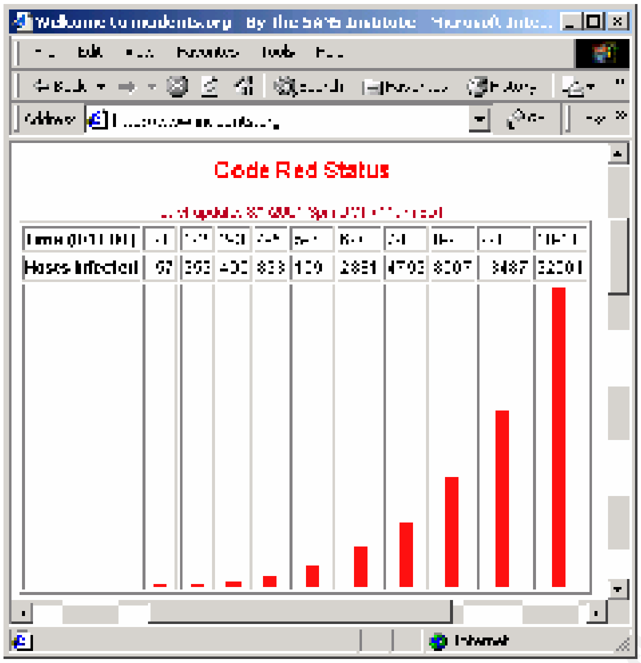


Figure 1 - incidents.org August 1st Code Red progress

1.1.8 Evidence Of Active Targeting

None. The webserver (badger) that was the target is a Unix based Apache server and not susceptible to the worm.

1.1.9 Severity

	Criticality	4	Target is a webserver
+	Lethality	1	Target is wrong platform / operating system for attack to succeed.
-			
	System Countermeasures	3	Old Redhat box
+	Network Countermeasures	1	No firewall.
	Total	**1**	**Low**

1.1.10 Defensive Recommendations

The severity value above is adversely affected by the results for the System and Network countermeasure components. For reference, this server was specifically built with Redhat 5.2, a number of exposed services (such as RPC) and placed outside of a firewall to act as a kind of ho ney-pot. The fact that it picked up “Code Red” was just a side effect.

Given that this particular attack cannot succeed against an Apache webserver, there are no real defensive recommendations to be made regarding this example.

1.1.11 Test Question

Given the contents of the Snort log, what can we say about this request?

a) It is likely to be CodeRed V1
b) It is likely to be CodeRed V2

c) The host being attacked is www.host.com
d) This is a variation using HTTP1.1 as a transport.

Answer
a. A major part of the payload chan ged from N's to X's on the 2nd release.

1.2 Detect #2 - Web services portscan against address space.

1.2.1 Trace Data

The data below is repeated for every address in the /28 range, but is omitted for brevity. Please note that destination address have been replaced by the relevant hostname in packet dumps.

1.2.1.1 Snort Alert Log

```
[**] [1:618:1] INFO - Possible Squid Scan [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:40:55.510000 158.152.26.39:55440 -> weasel:3128
TCP TTL:41 TOS:0x0 ID:59984 IpLen:20 DgmLen:44
******S* Seq: 0xF35D32EB  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [1:620:1] SCAN Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:40:55.530000 158.152.26.39:55440 -> weasel:8080
TCP TTL:41 TOS:0x0 ID:19637 IpLen:20 DgmLen:44
******S* Seq: 0xF35D32EB  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [100:2:1] spp_portscan: portscan status from 158.152.26.39: 8 connections across
2 hosts: TCP(8), UDP(0) [**]
08/01-17:45:26.199604

[**] [1:618:1] INFO - Possible Squid Scan [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:40:57.300000 158.152.26.39:55441 -> weasel:3128
TCP TTL:41 TOS:0x0 ID:32099 IpLen:20 DgmLen:44
******S* Seq: 0x2F2FC691  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [1:620:1] SCAN Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:40:57.310000 158.152.26.39:55441 -> weasel:8080
TCP TTL:41 TOS:0x0 ID:8613 IpLen:20 DgmLen:44
******S* Seq: 0x2F2FC691  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [1:618:1] INFO - Possible Squid Scan [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:40:59.300000 158.152.26.39:55442 -> weasel:3128
TCP TTL:41 TOS:0x0 ID:61351 IpLen:20 DgmLen:44
******S* Seq: 0xAC3B8FBF  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [1:620:1] SCAN Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:40:59.310000 158.152.26.39:55442 -> weasel:8080
TCP TTL:41 TOS:0x0 ID:18009 IpLen:20 DgmLen:44
******S* Seq: 0xAC3B8FBF  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [100:2:1] spp_portscan: portscan status from 158.152.26.39: 4 connections across
1 hosts: TCP(4), UDP(0) [**]
08/01-17:45:26.205409

[**] [1:620:1] SCAN Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 3]
```

```
08/01-17:41:01.330000 158.152.26.39:55443 -> weasel:8080
TCP TTL:41 TOS:0x0 ID:37213 IpLen:20 DgmLen:44
******S* Seq: 0xF35D32EB  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [1:618:1] INFO - Possible Squid Scan [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:41:01.390000 158.152.26.39:55443 -> weasel:3128
TCP TTL:41 TOS:0x0 ID:63901 IpLen:20 DgmLen:44
******S* Seq: 0xF35D32EB  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [1:620:1] SCAN Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:41:03.310000 158.152.26.39:55444 -> weasel:8080
TCP TTL:41 TOS:0x0 ID:2605 IpLen:20 DgmLen:44
******S* Seq: 0x2F2FC691  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [1:618:1] INFO - Possible Squid Scan [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:41:03.380000 158.152.26.39:55444 -> weasel:3128
TCP TTL:41 TOS:0x0 ID:64725 IpLen:20 DgmLen:44
******S* Seq: 0x2F2FC691  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [100:2:1] spp_portscan: portscan status from 158.152.26.39: 4 connections across
1 hosts: TCP(4), UDP(0) [**]
08/01-17:45:26.224249

[**] [1:620:1] SCAN Proxy attempt [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:41:05.330000 158.152.26.39:55445 -> weasel:8080
TCP TTL:41 TOS:0x0 ID:56856 IpLen:20 DgmLen:44
******S* Seq: 0xAC3B8FBF  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536

[**] [1:618:1] INFO - Possible Squid Scan [**]
[Classification: Attempted Information Leak] [Priority: 3]
08/01-17:41:05.390000 158.152.26.39:55445 -> weasel:3128
TCP TTL:41 TOS:0x0 ID:24947 IpLen:20 DgmLen:44
******S* Seq: 0xAC3B8FBF  Ack: 0x0  Win: 0xC00  TcpLen: 24
TCP Options (1) => MSS: 536
```

1.2.1.2 Snort Portscan Log

```
Aug  1 17:40:55 158.152.26.39:55440 -> weasel:8080 SYN ******S*
Aug  1 17:40:55 158.152.26.39:55440 -> weasel:443 SYN ******S*
Aug  1 17:40:55 158.152.26.39:55440 -> weasel:80 SYN ******S*
Aug  1 17:40:59 158.152.26.39:55442 -> weasel:8080 SYN ******S*
Aug  1 17:40:59 158.152.26.39:55442 -> weasel:443 SYN ******S*
Aug  1 17:41:01 158.152.26.39:55443 -> weasel:80 SYN ******S*
Aug  1 17:40:59 158.152.26.39:55442 -> weasel:3128 SYN ******S*
Aug  1 17:41:03 158.152.26.39:55444 -> weasel:443 SYN ******S*
Aug  1 17:41:03 158.152.26.39:55444 -> weasel:8080 SYN ******S*
Aug  1 17:41:03 158.152.26.39:55444 -> weasel:3128 SYN ******S*
Aug  1 17:41:05 158.152.26.39:55445 -> weasel:80 SYN ******S*
```

1.2.1.3 Tcpdump “full fidelity trace”

```
17:40:55.510000 P 158.152.26.39.55440 > weasel.squid: S 4082971371:4082971371(0) win
3072 <mss 536> (ttl 41, id 59984)
                         4500 002c ea50 0000 2906 eacd 9e98 1a27
                         .... .... d890 0c38 f35d 32eb 0000 0000
                         6002 0c00 c802 0000 0204 0218 0000
17:40:55.530000 P 158.152.26.39.55440 > weasel.webcache: S 4082971371:4082971371(0)
win 3072 <mss 536> (ttl 41, id 19637)
                         4500 002c 4cb5 0000 2906 8869 9e98 1a27
                         .... .... d890 1f90 f35d 32eb 0000 0000
                         6002 0c00 b4aa 0000 0204 0218 0000
17:40:55.530000 P 158.152.26.39.55440 > weasel.https: S 4082971371:4082971371(0) win
3072 <mss 536> (ttl 41, id 58435)
                         4500 002c e443 0000 2906 f0da 9e98 1a27
                         .... .... d890 01bb f35d 32eb 0000 0000
                         6002 0c00 d27f 0000 0204 0218 0000
```

```
17:40:55.530000 P 158.152.26.39.55440 > weasel.http: S 4082971371:4082971371(0) win
3072 <mss 536> (ttl 41, id 43646)
                         4500 002c aa7e 0000 2906 2aa0 9e98 1a27
                         .... .... d890 0050 f35d 32eb 0000 0000
                         6002 0c00 d3ea 0000 0204 0218 0000
17:40:57.300000 P 158.152.26.39.55441 > weasel.squid: S 791660177:791660177(0) win
3072 <mss 536> (ttl 41, id 32099)
                         4500 002c 7d63 0000 2906 57bb 9e98 1a27
                         .... .... d891 0c38 2f2f c691 0000 0000
                         6002 0c00 f889 0000 0204 0218 0000
17:40:57.310000 P 158.152.26.39.55441 > weasel.webcache: S 791660177:791660177(0) win
3072 <mss 536> (ttl 41, id 8613)
                         4500 002c 21a5 0000 2906 b379 9e98 1a27
                         .... .... d891 1f90 2f2f c691 0000 0000
                         6002 0c00 e531 0000 0204 0218 0000
17:40:57.320000 P 158.152.26.39.55441 > weasel.https: S 791660177:791660177(0) win
3072 <mss 536> (ttl 41, id 36641)
                         4500 002c 8f21 0000 2906 45fd 9e98 1a27
                         .... .... d891 01bb 2f2f c691 0000 0000
                         6002 0c00 0307 0000 0204 0218 0000
17:40:57.370000 P 158.152.26.39.55441 > weasel.http: S 791660177:791660177(0) win 3072
<mss 536> (ttl 41, id 30087)
                         4500 002c 7587 0000 2906 5f97 9e98 1a27
                         .... .... d891 0050 2f2f c691 0000 0000
                         6002 0c00 0472 0000 0204 0218 0000
17:40:59.300000 P 158.152.26.39.55442 > weasel.squid: S 2889584575:2889584575(0) win
3072 <mss 536> (ttl 41, id 61351)
                         4500 002c efa7 0000 2906 e576 9e98 1a27
                         .... .... d892 0c38 ac3b 8fbf 0000 0000
                         6002 0c00 b24e 0000 0204 0218 0000
17:40:59.310000 P 158.152.26.39.55442 > weasel.webcache: S 2889584575:2889584575(0)
win 3072 <mss 536> (ttl 41, id 18009)
                         4500 002c 4659 0000 2906 8ec5 9e98 1a27
                         .... .... d892 1f90 ac3b 8fbf 0000 0000
                         6002 0c00 9ef6 0000 0204 0218 0000
17:40:59.310000 P 158.152.26.39.55442 > weasel.https: S 2889584575:2889584575(0) win
3072 <mss 536> (ttl 41, id 63363)
                         4500 002c f783 0000 2906 dd9a 9e98 1a27
                         .... .... d892 01bb ac3b 8fbf 0000 0000
                         6002 0c00 bccb 0000 0204 0218 0000
17:40:59.370000 P 158.152.26.39.55442 > weasel.http: S 2889584575:2889584575(0) win
3072 <mss 536> (ttl 41, id 26845)
                         4500 002c 68dd 0000 2906 6c41 9e98 1a27
                         .... .... d892 0050 ac3b 8fbf 0000 0000
                         6002 0c00 be36 0000 0204 0218 0000
17:41:01.310000 P 158.152.26.39.55443 > weasel.http: S 4082971371:4082971371(0) win
3072 <mss 536> (ttl 41, id 5877)
                         4500 002c 16f5 0000 2906 be29 9e98 1a27
                         .... .... d893 0050 f35d 32eb 0000 0000
                         6002 0c00 d3e7 0000 0204 0218 0000
17:41:01.320000 P 158.152.26.39.55443 > weasel.https: S 4082971371:4082971371(0) win
3072 <mss 536> (ttl 41, id 16096)
                         4500 002c 3ee0 0000 2906 963e 9e98 1a27
                         .... .... d893 01bb f35d 32eb 0000 0000
                         6002 0c00 d27c 0000 0204 0218 0000
17:41:01.330000 P 158.152.26.39.55443 > weasel.webcache: S 4082971371:4082971371(0)
win 3072 <mss 536> (ttl 41, id 37213)
                         4500 002c 915d 0000 2906 43c1 9e98 1a27
                         .... .... d893 1f90 f35d 32eb 0000 0000
                         6002 0c00 b4a7 0000 0204 0218 0000
17:41:01.390000 P 158.152.26.39.55443 > weasel.squid: S 4082971371:4082971371(0) win
3072 <mss 536> (ttl 41, id 63901)
                         4500 002c f99d 0000 2906 db80 9e98 1a27
                         .... .... d893 0c38 f35d 32eb 0000 0000
                         6002 0c00 c7ff 0000 0204 0218 0000
17:41:03.300000 P 158.152.26.39.55444 > weasel.http: S 791660177:791660177(0) win 3072
<mss 536> (ttl 41, id 20378)
                         4500 002c 4f9a 0000 2906 8584 9e98 1a27
                         .... .... d894 0050 2f2f c691 0000 0000
                         6002 0c00 046f 0000 0204 0218 0000
17:41:03.310000 P 158.152.26.39.55444 > weasel.https: S 791660177:791660177(0) win
3072 <mss 536> (ttl 41, id 37743)
                         4500 002c 936f 0000 2906 41af 9e98 1a27
                         .... .... d894 01bb 2f2f c691 0000 0000
                         6002 0c00 0304 0000 0204 0218 0000
17:41:03.310000 P 158.152.26.39.55444 > weasel.webcache: S 791660177:791660177(0) win
3072 <mss 536> (ttl 41, id 2605)
```

```
                         4500 002c 0a2d 0000 2906 caf1 9e98 1a27
                         .... .... d894 1f90 2f2f c691 0000 0000
                         6002 0c00 e52e 0000 0204 0218 0000
17:41:03.380000 P 158.152.26.39.55444 > weasel.squid: S 791660177:791660177(0) win
3072 <mss 536> (ttl 41, id 64725)
                         4500 002c fcd5 0000 2906 d848 9e98 1a27
                         .... .... d894 0c38 2f2f c691 0000 0000
                         6002 0c00 f886 0000 0204 0218 0000
17:41:05.310000 P 158.152.26.39.55445 > weasel.http: S 2889584575:2889584575(0) win
3072 <mss 536> (ttl 41, id 38784)
                         4500 002c 9780 0000 2906 3d9e 9e98 1a27
                         .... .... d895 0050 ac3b 8fbf 0000 0000
                         6002 0c00 be33 0000 0204 0218 0000
17:41:05.320000 P 158.152.26.39.55445 > weasel.https: S 2889584575:2889584575(0) win
3072 <mss 536> (ttl 41, id 40893)
                         4500 002c 9fbd 0000 2906 3561 9e98 1a27
                         .... .... d895 01bb ac3b 8fbf 0000 0000
                         6002 0c00 bcc8 0000 0204 0218 0000
17:41:05.330000 P 158.152.26.39.55445 > weasel.webcache: S 2889584575:2889584575(0)
win 3072 <mss 536> (ttl 41, id 56856)
                         4500 002c de18 0000 2906 f705 9e98 1a27
                         .... .... d895 1f90 ac3b 8fbf 0000 0000
                         6002 0c00 9ef3 0000 0204 0218 0000
17:41:05.390000 P 158.152.26.39.55445 > weasel.squid: S 2889584575:2889584575(0) win
3072 <mss 536> (ttl 41, id 24947)
                         4500 002c 6173 0000 2906 73ab 9e98 1a27
                         .... .... d895 0c38 ac3b 8fbf 0000 0000
                         6002 0c00 b24b 0000 0204 0218 0000
```

1.2.2 Location Of Trace

Home internet connection. See Detect #1 for further details.

1.2.3 Source Of Trace

As Detect #1.

1.2.4 Likelihood Of Address Spoofing?

Low. This attack is directed at HTTP servers and so requires that a valid TCP 3-way handshake be completed.

1.2.5 Description Of Attack

This attack is searching for open ports usually associated with Web services. Common web orientated ports are tested using SYN packets for a response.

1.2.6 Attack Mechanism

This does not class as an attack itself, but certainly counts as reconnaissance. All the ports scanned offer web services in one form or another (either as end-servers or as proxies). I would not be surprised to find HTTP specific probes directed at the servers that did actually respond at some stage in the (near) future - though to this date this has not occurred.

1. Of the servers which are running standard port 80 bound web-servers, those that did respond with the expected ACK never received the final stage of the handshake, prompting the belief that this a form of "half-open" SYN scan.
2. The ports targeted make the scan look like a RingZero probe, except for the addition of TCP 443 (and the fact that it's a really old scan).
3. There is evidence of TCP's typical retry behavior (identical sequence numbers, but differing fragment ID's)

4. The ISN's are widely spaced, which could indicate a very busy source machine, but I would have thought t hat such a busy machine would be likely to space subsequent scans more than the timestamps tend to illustrate.
5. Using the document "RPC and NMAP Patterrns " from SANS highlights a number of points that are suggestive of an NMAP scan – namely;

    - Very random IPID's
    - A fixed window size of 3072 (one of the candidate sizes)
    - TTL fits within expected range of 37 -59

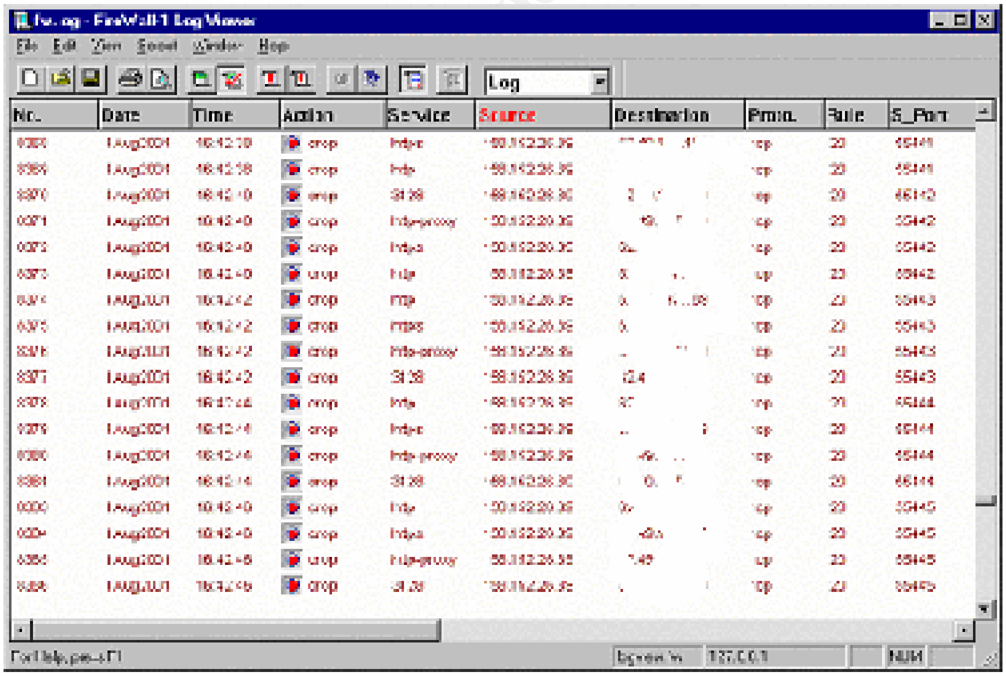
    See http://www.sans.org/newlook/resources/IDFAQ/NMAP.htm

6. MSS values are quite small, perhaps indicating a dialup connection (on checking the source address is found to belong to Demon Internet, a large UK based dial-up ISP)

1.2.7 Correlations

If these scans actually are of the "half open" type, then you would not expect to see entries in the webserver logs. None of the systems are running HIDS software, so that rules out another avenue of correlation.

For systems inside the firewall, its log does offer confirmation of the Snort logs. Please note obscured destination addresses.


fw.log - FireWall-1 Log Viewer
File Edit View Select Window Help
Log

No.	Date	Time	Action	Service	Source	Destination	Proto.	Rule	S_Port
8368	1Aug2001	16:42:38	drop	https	[illegible]		tcp	20	65441
8369	1Aug2001	16:42:38	drop	http	[illegible]		tcp	20	65441
8370	1Aug2001	16:42:40	drop	3128	[illegible]		tcp	20	65442
8371	1Aug2001	16:42:40	drop	http-proxy	[illegible]		tcp	20	65442
8372	1Aug2001	16:42:40	drop	https	[illegible]		tcp	20	65442
8373	1Aug2001	16:42:40	drop	http	[illegible]		tcp	20	65442
8374	1Aug2001	16:42:42	drop	http	[illegible]		tcp	20	65443
8375	1Aug2001	16:42:42	drop	https	[illegible]		tcp	20	65443
8376	1Aug2001	16:42:42	drop	http-proxy	[illegible]		tcp	20	65443
8377	1Aug2001	16:42:42	drop	3128	[illegible]		tcp	20	65443
8378	1Aug2001	16:42:44	drop	http	[illegible]		tcp	20	65444
8379	1Aug2001	16:42:44	drop	https	[illegible]		tcp	20	65444
8380	1Aug2001	16:42:44	drop	http-proxy	[illegible]		tcp	20	65444
8381	1Aug2001	16:42:44	drop	3128	[illegible]		tcp	20	65444
8382	1Aug2001	16:42:46	drop	http	[illegible]		tcp	20	65445
8383	1Aug2001	16:42:46	drop	https	[illegible]		tcp	20	65445
8384	1Aug2001	16:42:46	drop	http-proxy	[illegible]		tcp	20	65445
8385	1Aug2001	16:42:46	drop	3128	[illegible]		tcp	20	65445

For Help, press F1 | fw.log | 127.0.0.1 | NUM

Figure 2 - Firewall log showing dropped web service connections

1.2.8 Evidence Of Active Targeting

Low. The services being targeted are generic web services. The portscan covers the whole of the /28 address space, and does not discriminate betw een servers. The timestamps however suggest that this was specifically targeted at this address range (or more likely a larger address range than just my /28 portion) – in as much as they are in close succession rather than distributed.

1.2.9 Severity

	Criticality	4	Scan is searching for webservers, some of which do exist in the scanned address space.
+	Lethality	2	Not lethal in this context, the results of what seems to be an intelligence gathering phase maybe though.
-	System Countermeasures	4	None of the systems are running services on the 3128 or 8080 ports. All systems save for "badger" (the honeypot) are modern and running the recommended patches.
+	Network Countermeasures	4	Again with the exception of the honeypot system, the firewall blocked acce ss to the 3128, 8080 and where appropriate 443 ports. Port 80 has to be allowed through to support the primary function of the webserver.
	Total	**-2**	**Low. Though further monitoring strongly recommended.**

1.2.10 Defensive Recommendations

- Recent events continue to illustrate that the correct patches should be installed in a timely fashion.
- Monitor firewall logs for further connection attempts to the ports 3128 and 8080.

1.2.11 Test Question

In the TCPDump capture above, what switches are likely to have been used (choose all that apply)

a) -a
b) -q
c) -x
d) -vv

Answer
C and D. -x hex dumps packet contents up to SNAPLEN bytes. -vv provides additional packet detail (TTL, IPID).

-a also dumps packet contents, but in ASCII, not hex.
-q - "Quiet" mode.

See man tcpdump for further deta ils.

1.3 Detect #3 - WU-FTPD “SITE EXEC” exploit

1.3.1 Trace Data

Please note that the password below has been obscured as it was obscene!

1.3.1.1 Snort Alert Log

```
[**] FTP site exec [**]
07/15-03:14:01.450000 24.10.97.32:2661 -> badger:21
TCP TTL:240 TOS:0x10 ID:0 IpLen:20 DgmLen:508
***AP*** Seq: 0x465091C0  Ack: 0xF4536B80  Win: 0x7FE0  TcpLen: 20
55 53 45 52 20 66 74 70 0D 0A 50 41 53 53 20 46  USER ftp..PASS F
75 43 4B 79 30 4D 6F 6D 6D 41 2E 63 30 6D 0D 0A  XXXXXXXXXXXXXX..
73 69 74 65 20 65 78 65 63 20 78 78 28 B0 25 2E  site exec xx(.%.
66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66  f%.f%.f%.f%.f%.f
25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25  %.f%.f%.f%.f%.f%
2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E  .f%.f%.f%.f%.f%.
66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66  f%.f%.f%.f%.f%.f
25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25  %.f%.f%.f%.f%.f%
2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E  .f%.f%.f%.f%.f%.
66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66  f%.f%.f%.f%.f%.f
25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25  %.f%.f%.f%.f%.f%
2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E  .f%.f%.f%.f%.f%.
66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66  f%.f%.f%.f%.f%.f
25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25  %.f%.f%.f%.f%.f%
2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E  .f%.f%.f%.f%.f%.
66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66  f%.f%.f%.f%.f%.f
25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25  %.f%.f%.f%.f%.f%
2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E  .f%.f%.f%.f%.f%.
66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66  f%.f%.f%.f%.f%.f
25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25  %.f%.f%.f%.f%.f%
2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E  .f%.f%.f%.f%.f%.
66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66  f%.f%.f%.f%.f%.f
25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25  %.f%.f%.f%.f%.f%
2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E  .f%.f%.f%.f%.f%.
66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66  f%.f%.f%.f%.f%.f
25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25  %.f%.f%.f%.f%.f%
2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E  .f%.f%.f%.f%.f%.
66 25 2E 66 25 2E 66 25 2E 66 25 2E 66 25 2E 66  f%.f%.f%.f%.f%.f
25 2E 66 25 63 25 63 25 63 25 2E 66 7C 25 70 0D  %.f%c%c%c%.f|%p.
0A                                               .

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

1.3.1.2 /var/log/messages – System Log File

```
Jul  15 03:14:05 badger ftpd[495]: ANONYMOUS FTP LOGIN FROM 24.10.97.32
[158.152.26.39], xxxxxxxxxxxxxx
Jul  15 03:29:10 badger ftpd[495]: User ftp timed out after 900 seconds at Thu Aug  2
03:29:10 2001
Jul  15 03:29:10 badger ftpd[495]: FTP session closed
```

1.3.2 Location Of Trace

Home internet connection. See Detect #1 for further details.

1.3.3 Likelihood Of Address Spoofing?

Low. This attack is directed at an FTP server and attempts to gain remote root access which will require an established TCP session. It is therefore unlikely that the source is a spoofed address.

1.3.4 Description Of Attack

From http://www.whitehats.com/cgi/arachNIDS/Show?_id=ids286&view=research quoting from www.securityfocus.com

> Washington University ftp daemon (wu-ftpd) is a very popular unix ftp server shipped with many distributions of Linux. Wu-ftpd is vulnerable to a very serious remote attack in the SITE EXEC implementation. Because of user input going directly into a format string for a *printf function, it is possible to overwrite important data, such as a return address, on the stack. When this is accomplished, the function can jump into shellcode pointed to by the overwritten eip and execute arbitrary commands as root. While exploited in a manner similar to a buffer overflow, it is actually an input validation problem. Anonymous ftp is exploitable making it even more serious as attacks can come anonymously from anywhere on the internet.

1.3.5 Attack Mechanism

In this instance, it does not seem as though the attack was successful. The documentation that I have been able to locate regarding this does not make any mention of 2.6.0 on RH5.2 being vulnerable. This may be the reason, or it might be that the exploit was not executed correctly.

Whatever the reason, subsequent packet dumps of the activity from "badger" do not reveal any indication of outgoing activity as a result of compromise.

1.3.6 Correlations

This system has been placed outside of the firewall, so local firewall logs are not available. What application level logs for the host exist are included above in "Trace Data"

http://www.whitehats.com/cgi/arachNIDS/Show?_id=ids286&view=research

1.3.7 Evidence Of Active Targeting

Difficult to say. The targeted server is a Linux box running a version of wu-ftpd, however there is nothing further in either the snort logs relating to this source address, or the full tcpdump traces that are also recorded.

1.3.8 Severity

	Criticality	4	Exploit targets a seemingly vulnerable FTP server exposed with an anonymous account.
+	Lethality	4	Successful execution of this exploit leads to root on the target system.
-			
	System Countermeasures	1	Unfirewalled host, running targeted version of FTP demon.
+	Network Countermeasures	2	The attack was detected.
	Total	**5**	**High.**

1.3.9 Defensive Recommendations

Upgrade to 2.6.1 as this contains fixes to address this issue.

The file http://www.wu-ftpd.org/CHANGES includes the following brief description

> Changes in 2.6.1: Released 2 Jul, 2000
> Fix security leaks that could result in a root shell compromise.

1.3.10 Test Question

Using the data in the Snort Alert Log, which Operating System may the attacker be using? Note that there may not be a correct answer to this one.

a) Windows 98
b) Windows NT
c) Solaris
d) Linux

Answer
c. Basing the answer on the value of the TTL field. The majority of operating systems tend to use TTL's in the range 64 -128. Solaris is known to use 255, though this can be changed (as it can for other systems).

http://www.switch.ch/docs/ttl_default.html

1.4 *Detect #4 – Bulk CGI vulnerability scan*

1.4.1 Trace Data

1.4.1.1 Apache Webserver Logs

A portion of the webserver log is shown below.

Log entries have fields with the following meanings - Source IP Address, Time/Date Stamp, Document Requested, HTTP Version, Server Status Code, Size of Document Returned

```
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/flexform.cgi HTTP/1.0"
404 0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/flexform HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/LWGate HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/lwgate HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/LWGate.cgi HTTP/1.0" 404
0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/lwgate.cgi HTTP/1.0" 404
0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-win/ HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/pu3.pl HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/meta.pl HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/day5datacopier.cgi
HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/webutils.pl HTTP/1.0" 404
0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/tigvote.cgi HTTP/1.0" 404
0
24.23.19.211 - - [21/Jul/2001:17:32:45 +0000] "HEAD /cgi-bin/tpgnrock HTTP/1.0" 404 0
```

```
24.23.19.211 - - [21/Jul/2001:17:32:46 +0000] "HEAD /cgi-bin/webwho.pl HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:46 +0000] "HEAD /cgi-bin/form.cgi HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:46 +0000] "HEAD /cgi-bin/message.cgi HTTP/1.0" 404
0
24.23.19.211 - - [21/Jul/2001:17:32:46 +0000] "HEAD /cgi-
bin/.cobalt/siteUserMod/siteUserMod.cgi HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:46 +0000] "HEAD /cgi-bin/.fhp HTTP/1.0" 404 0
24.23.19.211 - - [21/Jul/2001:17:32:46 +0000] "HEAD /cgi-bin/htsearch HTTP/1.0" 404 0
```

Simple scripts look for failed document requests (characterised by a 4xx or 5xx result code) – included in the appendix.

1.4.2 Location Of Trace

Home internet connection. See Detect #1 for further details.

1.4.3 Likelihood Of Address Spoofing?

Low. This attack is directed at HTTP servers and so requires that a valid TCP 3 -way handshake be completed.

1.4.4 Description Of Attack

Many home grown and commercially available CGI scripts contain exploitable weaknesses - most commonly of the information leak variety (such as reading files outside of the CGI directory). There is no one common footprint to the vulnerabilities.

1.4.5 Attack Mechanism

This is a bulk probe for many different CGI weaknesses. At a guess, given the exclusive use of HEAD methods (rather than GET's probably as a performance enhancement), and the large number of different probes registered, I'd sa y this was probably Whisker (http://www.wiretrip.net/~rfp), but if anyone thinks differently, I'm open to suggestions.

1.4.6 Correlations

Snort detected many of these CGI probes and , when combined with SnortSnarf, provides useful overview data.

Snortsnarf (http://www.silicondefence.com/snortsnarf) takes data recorded by Snort and produces a browser based report. In the example below, I have "drilled down" to the full detail the activities of one particular source address – that identified by the Apache scripts.

Snort includes many cross-references to well known vulnerability sites including http://whitehats.com, http://mitre.cve.org and http://www.securityfocus.com . A number of the probes intercepted have entries on one or more of the above sites.

This simplifies the task of identifying p revious incidents of these CGI attacks.

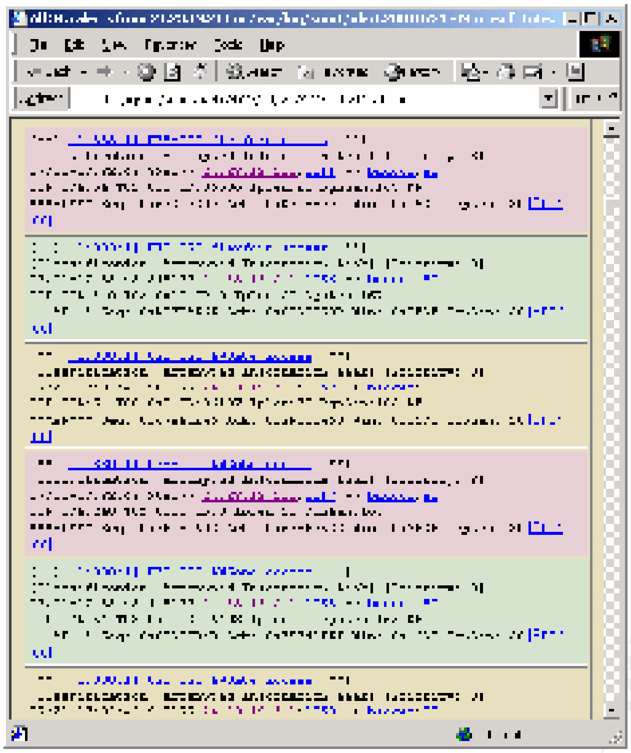


Figure 3 - Snortsnarf Summary

1.4.7 Evidence Of Active Targeting

Some. This is an attempt to identify flawed CGI programs, and it was directed at a webserver.

1.4.8 Severity

	Criticality	4	Webserver
+	Lethality	1	Server does not run any CGI programs.
-			
	System Countermeasures	4	Server does not run any CGI programs.
+	Network Countermeasures	2	The attack was detected. Even if the host had been firewalled, the attack probes are across HTTP which would have been allowed through.
	Total	**-1**	**Low.**

1.4.9 Defensive Recommendations

- Ensure that any affected CGI programs are replaced with patched versions as soon as is possible.
- Implement a restrictive firewall policy for outbound traffic as well as inbound. This probably won't stop an HTTP/CGI compromise, but might help reduce the damage that your compromised system can do to other victims. This would be particularly useful if it is stateful as this would probably catch things such as a hostile process bound to port 80 (such as netcat), where a simple packet filter would not.

1.4.10 Test Question

Identify the false statement based on the logs above.

a) HEADs are used to retrieve only the first portion of the requested document.
b) HEADs test for the existence of the requ ested document.
c) The /cgi-bin/webutils.pl script was not found and executed by the server.
d) HTTP 1.0 has been used as a transport to maximise compatability.

Answer
a. The HEAD method checks for the existence of the requested document. For a vulnerability scanner this is a sensible choice as it is trying to identify that a script exists, but usually does not attempt the exploit itself.

1.5 Detect #5 – Low Port-Low Port SYNFIN Scan

1.5.1 Trace Data

1.5.1.1 Snort Alert Log

Please note that much of the content of this log segme nt has been removed, and that the destination addresses have been sanitised.

```
[**] spp_stream4: STEALTH ACTIVITY (SYN FIN scan) detection [**]
08/09-19:33:32.052372 217.60.238.3:23 -> xx.yy.197.178:23
TCP TTL:31 TOS:0x0 ID:39426 IpLen:20 DgmLen:44
******SF Seq: 0x35FADD46  Ack: 0x29392866  Win: 0x404  TcpLen: 24
TCP Options (1) => MSS: 536
0x0000: 00 00 00 00 00 01 00 20 6F 08 60 C7 08 00 45 00  ....... o.`...E.
0x0010: 00 2C 9A 02 00 00 1F 06 36 A6 D9 3C EE 03 xx yy  .,......6..<..>1
0x0020: C5 B2 00 17 00 17 35 FA DD 46 29 39 28 66 60 03  ......5..F)9(f`.
0x0030: 04 04 67 8B 00 00 02 04 02 18 00 00              ..g.........

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

[**] spp_stream4: STEALTH ACTIVITY (SYN FIN scan) detection [**]
08/09-19:33:32.072372 217.60.238.3:23 -> xx.yy.197.179:23
TCP TTL:31 TOS:0x0 ID:39426 IpLen:20 DgmLen:44
******SF Seq: 0x35FADD46  Ack: 0x29392866  Win: 0x404  TcpLen: 24
TCP Options (1) => MSS: 536
0x0000: 00 00 00 00 00 01 00 20 6F 08 60 C7 08 00 45 00  ....... o.`...E.
0x0010: 00 2C 9A 02 00 00 1F 06 36 A5 D9 3C EE 03 xx yy  .,......6..<..>1
0x0020: C5 B3 00 17 00 17 35 FA DD 46 29 39 28 66 60 03  ......5..F)9(f`.
0x0030: 04 04 67 8A 00 00 02 04 02 18 00 00              ..g.........

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

[**] spp_stream4: STEALTH ACTIVITY (SYN FIN scan) detection [**]
08/09-19:33:32.232372 217.60.238.3:23 -> xx.yy.197.187:23
TCP TTL:31 TOS:0x0 ID:39426 IpLen:20 DgmLen:44
******SF Seq: 0x638CECE1  Ack: 0x1DB99E53  Win: 0x404  TcpLen: 24
TCP Options (1) => MSS: 536
0x0000: 00 00 00 00 00 01 00 20 6F 08 60 C7 08 00 45 00  ....... o.`...E.
0x0010: 00 2C 9A 02 00 00 1F 06 36 9D D9 3C EE 03 xx yy  .,......6..<..>1
0x0020: C5 BB 00 17 00 17 63 8C EC E1 1D B9 9E 53 60 03  ......c......S`.
0x0030: 04 04 BF E7 00 00 02 04 02 18 00 00              ............

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

[**] spp_stream4: STEALTH ACTIVITY (SYN FIN scan) detection [**]
08/09-19:33:32.252372 217.60.238.3:23 -> xx.yy.197.188:23
TCP TTL:31 TOS:0x0 ID:39426 IpLen:20 DgmLen:44
******SF Seq: 0x638CECE1  Ack: 0x1DB99E53  Win: 0x404  TcpLen: 24
TCP Options (1) => MSS: 536
0x0000: 00 00 00 00 00 01 00 20 6F 08 60 C7 08 00 45 00  ....... o.`...E.
0x0010: 00 2C 9A 02 00 00 1F 06 36 9C D9 3C EE 03 xx yy  .,......6..<..>1
0x0020: C5 BC 00 17 00 17 63 8C EC E1 1D B9 9E 53 60 03  ......c......S`.
```

```
0x0030: 04 04 BF E6 00 00 02 04 02 18 00 00              ............

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

[**] spp_stream4: STEALTH ACTIVITY (SYN FIN scan) detection [**]
08/09-19:33:32.292372 217.60.238.3:23 -> xx.yy.197.190:23
TCP TTL:31 TOS:0x0 ID:39426 IpLen:20 DgmLen:44
******SF Seq: 0x638CECE1  Ack: 0x1DB99E53  Win: 0x404  TcpLen: 24
TCP Options (1) => MSS: 536
0x0000: 00 00 00 00 00 01 00 20 6F 08 60 C7 08 00 45 00  ....... o.`...E.
0x0010: 00 2C 9A 02 00 00 1F 06 36 9A D9 3C EE 03 xx yy  .,......6..<..>1
0x0020: C5 BE 00 17 00 17 63 8C EC E1 1D B9 9E 53 60 03  ......c......S`.
0x0030: 04 04 BF E4 00 00 02 04 02 18 00 00              ............

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

1.5.2 Location Of Trace

Home internet connection. See Detect #1 for further details.

1.5.3 Likelihood Of Address Spoofing?

Low. This probe makes use of an invalid TCP flag combination, however it is still only useful if the attacker can see the results of his probe, suggesting valid source addresses.

1.5.4 Description Of Attack

So-called "stealthy" port scan.

1.5.5 Attack Mechanism

Not an attack as such, but a probe with some significant characteristics.

- The TCP flag combination of SYN and FIN is illegal.
- Low port to Low Port. This is unusual enough to warrant comment, particularly with Telnet where one end w ould almost[1] always be ephemeral. The source port is likely chosen to penetrate stateless packet filters.
- IPID's remain constant (39426) throughout scan.

Minor points;

- The TCP MSS is 536 bytes, a common length for dialup (or typically PPP) connections, but all the connection attempts happen within one second perhaps suggesting a higher -speed connection.
- SYN packets correctly do not contain any payload data.

1.5.6 Correlations

Packets with an identical signature (SF, static IPID, fixed Window Size) reported at SANS.

http://www.sans.org/y2k/111600.htm

[1] I've never yet see n a stock telnet client connection that doesn't initiate off of an ephemeral port, but that's not to say there isn't one somewhere.

It is also possible that this is a form of OS determination. Older versions of Linux are known to have erroneously responded to SYN -FIN packets with SYN -FIN-ACK, though it does not exhibit NMAP's OS identification characteristics.

http://archives.neohapsis.com/archives/snort/2000-07/0183.html

1.5.7 Evidence Of Active Targeting

Low. This scan covers the entire /28 address range.

1.5.8 Severity

	Criticality	2	General scan, not highly targeted.
+	Lethality	1	None of the machines scanned expose port 23.
-			
	System Countermeasures	4	None of the machines scanned expose port 23.
+	Network Countermeasures	4	Firewall actively blocks incoming telnet connections.
	Total	**-5**	**Low.**

1.5.9 Defensive Recommendations

Nothing significant. None of the machines offer telnet as a service and the firewall blocks incoming connections anyway.

1.5.10 Test Question

What are the TCP options used and in byte terms, how are they defined?

a) 2 bytes Window Size, 2 Bytes MSS
b) 1 Byte MSS, 1 byte NOP
c) 1 Byte Kind, 1 Byte Length, 2 Bytes MSS
d) 2 Byte Selective ACK, 2 Bytes MSS.

Answer
C. RFC 793 defines each TCP option as follows;

Field	**Length**	**Purpose**
Kind	1 Byte	Option Identifier
Length (Bytes)	1 Byte	Total length of options (including Kind/Length fields)
Option Data	Variable	Variable

The MSS field is defined as Kind=2, Length=4, MSS Value=2 bytes. In the event that options don't reach a multiple of 4 bytes in length, they are padded with NOP's.

2 Assignment #2 - What happens before and after your sensor alarms?

2.1 Introduction

One of the problems with Intrusion Detection sensors is that they are reactive. Providing alerts based on a packet signature is a valuable ability, but sensors will only alert on what they know about.

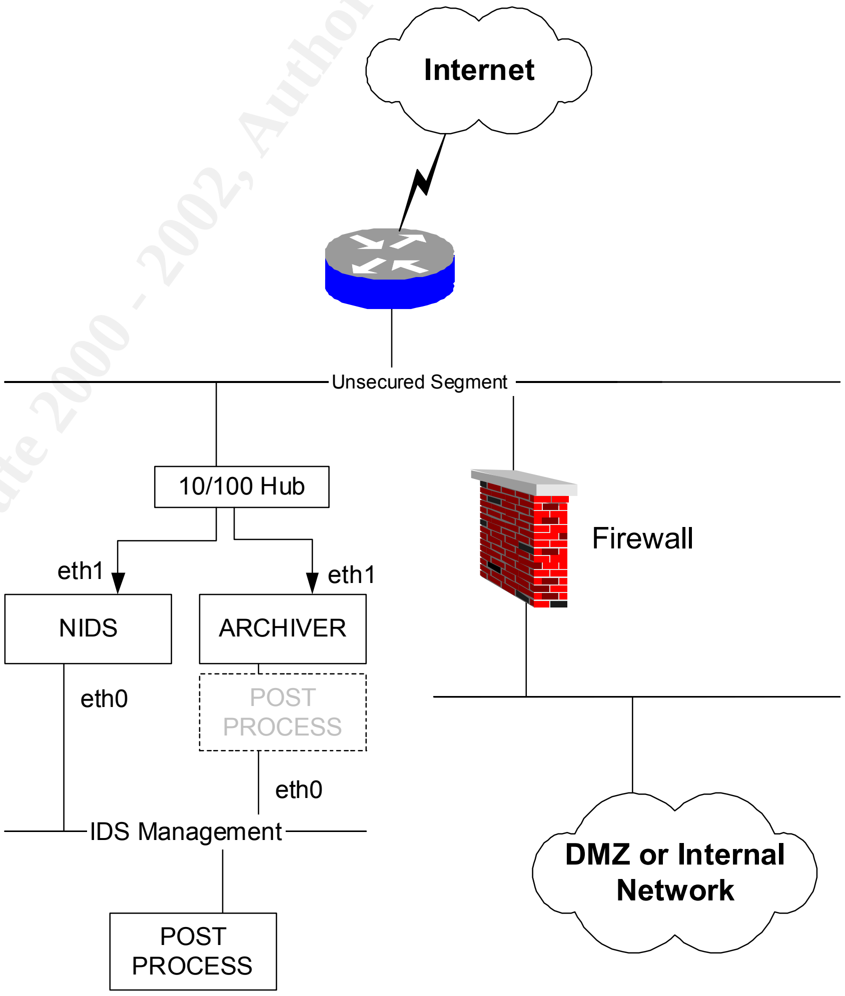
With today's fast processors, cheap RAM , and huge hard disks (100GB IDE units at sub-200UKP) the ability to provide "full fidelity" storage even on relatively fast links becomes a possibility.

An approach is outlined below that will enable answers to the question "what happened before and afte r a given alert", but basically rely on a machine termed an "Archiver" that records off the wire everything that the sensor is exposed to. The idea is that the data obtained from the Archiver is post processed to provide more detail than the sensor can pr ovide alone – critically covering the periods before and after the exploit was detected.

2.2 Method

In order for network based intrusion detection to work, you must provide the sensor with a data stream for it to monitor. This is may be done either by providi ng the infrastructure on a shared media (a hub), when using Cisco equipment via the SPAN mechanism that allows frames from one or more ports to be copied to another port for analysis, or through the use of so -called "Taps".

The diagram below does not make any distinction between the methods used to provide the infrastructure supporting the "unsecured segment". It does however rely on the use of a shared media to feed the Sensor and the Archiver. If you are using a Cisco SPAN port, span the incoming feed (the Ethernet interface of your internet router), and copy the frames to the switch port linked to your hub.


Internet
Unsecured Segment
10/100 Hub
eth1
eth1
NIDS
ARCHIVER
Firewall
eth0
POST
PROCESS
eth0
IDS Management
POST
PROCESS
DMZ or Internal
Network

2.3 What Do you Need?

2.3.1 The Hub

The use of a hub has two main advantages. Firstly, these days they're cheap – a quick scout around the web finds 5 port 10/100 hubs for just over $40. Now you might want to pay a little more than that for something with an integrated PSU, or one that's rack mountable, but the point here is that they're inexpensive and will do the job just fine.

Secondly the nature of the hub, is "what one port sees, all ports see" - that is, the collision domain typically covers all of the ports on the unit. When you want to work independently on multiple copies of the same frame, that's a real advantage.

You'll need to attach the hub to the switch supporting the "unsecured segment" in the diagram. Usually this requires a crossed Ethernet cable instead of the more usual straight ones. Many hubs have a dedicated or switchable uplink port that can be used with a standard Ethernet patch lead.

Potentially, a 100mb hub installed on a transit network (i.e. one with no hosts), should be able to support relatively high traffic rates – almost certainly capable of the majority of links here in Europe where bandwidth is still very expensive . Adding additional hosts onto the transit network will increase the risk of collisions and decrease throughput.

2.3.2 The Archiver

The Archiver records raw packets from the wire to disk, and ideally, should do nothing else. If you have the hardware available, perform post-processing elsewhere. This is not essential, but performing CPU intensive operations does run the risk of causing dropped packets. I don't have this luxury.

This machine can be running any operating system capable of supporting packet capture software, but I've opted for a Linux version of tcpdump. tcpdump is built on the libpcap system and is as close to a UNIX standard as you'll get. There are a variety of tools that can read tcpdump format files to help with the analysis procedure (including Snort). Examples of these are TCPSLICE and TCPTRACE.

As far as hardware configuration goes the Archiver is heavy on disk space (though this can be tuned as discussed below), but CPU and RAM levels are not so critical. For sub $1000 you'll get a quick PC (~1 GHz), with adequate memory (256Mb), and big disk (20-60 GB).

Having multiple (or at least dual) network cards is preferred as it allows the listening interface to be passive. High spec. graphics cards are an unnecessary extravagance.

My Archiver is a 1Ghz, 256Mb, 20GB, Dual NIC, Pentium 3 running Redhat Linux 7.1

You'd probably want to apply the same hardening mechanisms to the Archiver as you would to the sensor. A good place to start is with Bastille

You do need to bear in mind Operating Sy stem limits on the maximum file sizes. Most Linux implementations (or at least those using ext2 as the file -system) have a limit of 2GB per file. Other Operating Systems will vary.

2.3.3 Your Sensor

In my setup Snort is used as a sensor. Snort has an option to read tcpdump files and process these rather than process on -line from an interface, which makes it ideal for post as well as online processing.

If you're using a hub to feed your sensors, and budget allows, multiple systems in parallel from different ve ndors may be an idea. You'll need to consider how to post - process data from multiple formats though.

2.4 Task List

Below is only a recommendation based on a process that I've found to work quite well.

- Configure the internal interface (eth0 in the diagram) as appropriate for your network.
- Configure the external interface (eth1). Don't bother with an IP address, as recent versions of libpcap don't require an IP stack if used in promiscuous mode.
- Configure access to the Archiver from your internal network. If possible use SSH, particularly if you have had to configure IP on eth1.
- Configure your packet capturing software to start at boot.
- Run a scheduled job to rotate the capture files at a frequency suitable for your network.
- Move the archive files elsewhere t o post-process if applicable. There are many ways to do this, SCP, FTP, HTTP (perhaps over SSL). You may also want to look at RSYNC as it provides a number of useful features such as compression and SSH support.
- Post Process as appropriate. A good appro ach (with Snort) is to replay the captured tcpdump file with the –r option. If you do this multiple times with different configuration files, you can achieve activity snapshots for different types of traffic rather than a single jumbled up alert file.

2.5 Tuning

To a degree, tuning is a personal or site specific preference and I'm just including a couple of things here that you might want to consider.

2.5.1 Packet Sizes

If you have the disk space it may be worth capturing the entire packet payload for future analysis. However, you might decide that all you really need is the first 384 (or some other value) bytes of a given packet.

Quite how you arrive at an appropriate figure is up to you, but there's a clear relationship between the size of the packets you capture and length of history that you maintain.

2.5.2 Encrypted Traffic

If you can't read the traffic, why keep it? Perhaps good candidates for exclusion are HTTPS, SSH sessions (TCP 443 and 22), and the IP protocols that IPSEC uses (IP Protocol types 50 & 51, UDP 500)

2.5.3 Bulk Traffic

You could argue that bulk traffic is the least interesting. You might want to record only smaller packets as these may contain interactive content such as telnet or rlogin. File transfers, web sessions and other “bulk” traffic flows generally use larger packets for performance reasons.

2.6 Relevant Scripts

Below are some of the relevant configuration files that I use to implement the system described above.

2.6.1 Script To Start At Boot

My server is a RedHat Linux box, so the script below is suitable for placing as part of /etc/rc.d/init.d to be called at boot. This is just a copy of one of many init scripts amended accordingly and I’m certain that there are more elegant ways of achieving the same goals.

```
#!/bin/bash
# chkconfig: - 50 50
# description: TCP recorder startup
#

# source function library
. /etc/init.d/functions

OPTIONS="-i eth1 -p -s 1514"
RETVAL=0
prog="tcpdump"
LOG_NAME="tcpdump.log"
FNAME=`date +%Y%m%d-%H%M`

start() {
        echo -n $"Starting $prog: "
         tcpdump $OPTIONS -w /usr/tcpdump/$LOG_NAME &
        RETVAL=$?
        echo
        touch /var/lock/subsys/tcpdump
        return $RETVAL
}

stop() {
        echo -n $"Stopping $prog: "
        killproc /usr/tcpdump
        RETVAL=$?
        echo
        rm -f /var/lock/subsys/tcpdump
        mv /usr/tcpdump/tcpdump.tcp /usr/tcpdump/$FNAME.tcp
        return $RETVAL
}

reload(){
        stop
        start
}
```

```
restart(){
        stop
        start
}

condrestart(){
    [ -e /var/lock/subsys/tcpdump ] && restart
    return 0
}

case "$1" in
  start)
        start
        ;;
  stop)
        stop
        ;;
  restart)
        restart
         ;;
  reload)
        reload
         ;;
  condrestart)
        condrestart
        ;;
  status)
         status tcpdump
        RETVAL=$?
         ;;
  *)
        echo $"Usage: $0 {start|stop|status|restart|condrestart|reload}"
        RETVAL=1
esac
exit $RETVAL
```

2.6.2 Crontab entry to Rotate TCPDUMP files

I don't have enough bandwidth to necessitate swapping archive files intra -day. The 2Gb Linux file size limit is usually sufficient, hence the file is switched just before midnight.

```
59 23 * * * /root/rotate_tcpdump
```

2.6.3 Script to Rotate TCPDUMP files

```
PID=`ps -ef | grep tcpdump | egrep -v grep | awk '{print $2 }'`
FNAME=`date +%Y%m%d-%H%M`

kill $PID
mv /usr/tcpdump/tcpdump.tcp /usr/tcpdump/$FNAME.tcp

# restart tcpdump
/usr/sbin/tcpdump -i eth1 -p -w /usr/tcpdump/tcpdump.tcp -s 1514 &

# snort the file newly created file
# place output files in default /var/log/snort directory
/usr/local/bin/snort -A full -c /etc/snort/snort.conf -X -P 1514 \
 -r /usr/tcpdump/$FNAME.tcp
```

2.7 Conclusion

Hopefully this will prove useful. In a scenario like this, there isn't a "right" way of doing things. All manner of software can be combined to provide a set of tools that will give you just a little more data than your sensor can.

Ultimately choices will have to be made about the hardware and software that you use, data transport mechanisms and security, and the m ethods used to perform any further analysis.

2.8 References

1. Cisco SPAN mechanism. See http://www.cisco.com/warp/public/473/41.html
2. TCPDUMP / TCPSLICE. See http://www.tcpdump.org/related.html
3. TCPTRACE. See http://www.tcptrace.org/
4. SNORT. See http://www.snort.org/
5. Bastille hardening scripts. See http://www.bastille-linux.org/
6. IP Protocol Types - http://packetderm.cotse.com/CIE/RFC/1700/3.htm
7. RYSNC - rsync is an open source utility that provides fast incremental file transfer. See http://www.rsync.org/
8. Stevens' TCP/IP Illustrated Vol 1

3 Assignment #3 - Analyse This

3.1 List of Analysed Files

The files analysed for this assignment are shown below. There was no particular reason for choosing these files. Each category of data was combined into a single file for processing.

Scans	Alerts	Out Of Spec
Scans.010621	Alert.010621	oos_Jun.21.2001
Scans.010622	alert.010622	oos_Jun.22.2001
Scans.010623	alert.010623	oos_Jun.23.2001
Scans.010624	alert.010624	oos_Jun.24.2001
Scans.010625	alert.010625	oos_Jun.25.2001
bigscans	*bigalerts*	*bigoos*

3.2 Overview

In common with many other educational establishments, ingress and egress filtering does not seem to have previously been a priority, thus opening up internal systems to attack. A brief overview of the top three issues follows.

3.2.1 Multicast Destinations

From the alerts that Snort has generated, it would seem as though the most serious problem is the quantity of packets with dubious source and destination addresses. However, the bulk of the se packets are destined for multicast addresses, and so may be legitimate traffic after all.

Further investigation shows that in the raw Snort alert file most of the reported "UDP SRC and DST" alerts relate to multicast destination addresses, and that for the majority of the occurrences the addresses are registered to Yahoo! Broadcast Services, a multi-media content delivery site. With this in mind further analysis is conducted with these sources are removed as they are considered misreported. Alert, Sou rce and Destination summaries from the raw data are available in section 4.2

The Snort configuration file should be updated to reflect the relevant multicast destination addresses as belonging to $HOME_NET.

3.2.2 Trojan Activity

After discounting multicast traffic, the biggest single worry is the seeming prevalence of Sub7 traffic. This is largely a result of the "open door" networking policy, and the implementation of border packet filters (discussed in 3.9.1 below) would put a stop to this and remove 44% (post multicast removal) of the alerts.

3.2.3 Hostile Sources

Sixty-nine source addresses from the block reference by L -ISDNNET-99051 account for 37% of the detected alerts. If you already have reason to believe that this is a hostile source, use a packet filter and block them.

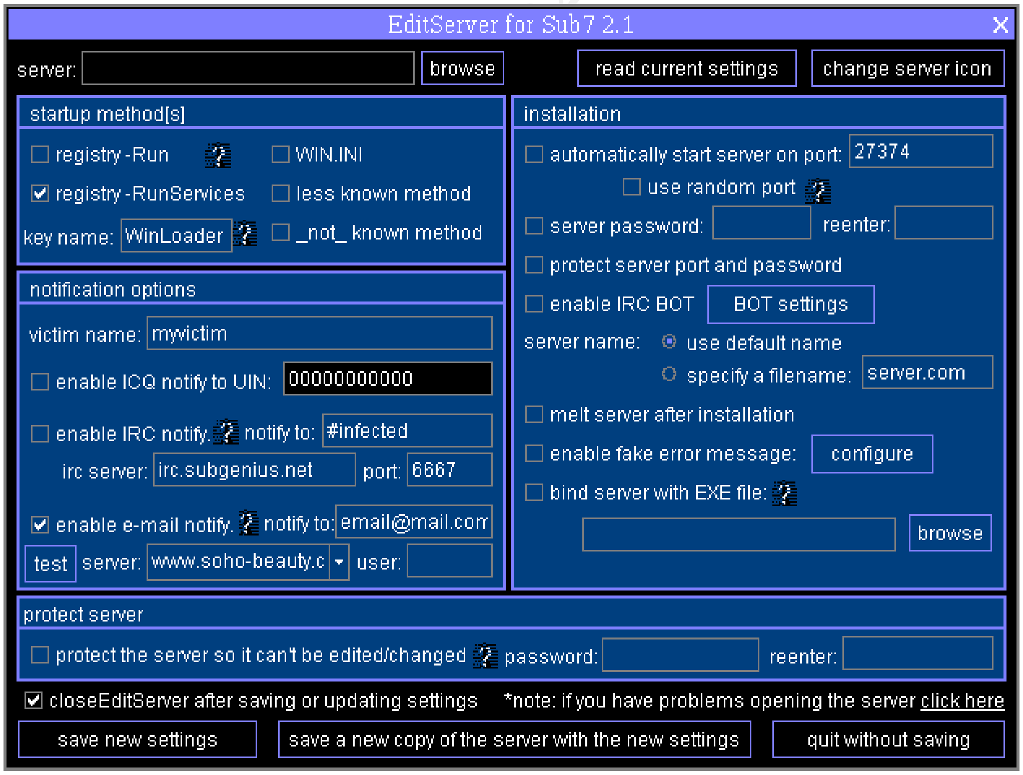
3.3 *Prioritised Detects*

The table below identifies the ten most frequent Snort detects.

```
--------------------------------------------------------------
  Top 10 Alert Summary
  Count  Alert Detail                             Sources  Dests.
--------------------------------------------------------------
  21600  Possible trojan server activity            2970    9149
  17946  Watchlist 000220 IL-ISDNNET-99051            69      19
   3612  External RPC call                            15    1184
   2032  SMB Name Wildcard                           194     710
   1023  connect to 515 from outside                   8     638
    698  UDP SRC and DST outside network              31      91
    574  Watchlist 000222 NET-NCFC                     8       8
    321  Queso fingerprint                            23      32
    296  Back Orifice                                  3     180
    295  High port 65535 tcp - possible Re            15      18
--------------------------------------------------------------
  49260 total alerts
  38950 total portscans
--------------------------------------------------------------
  88210 total events
--------------------------------------------------------------
```

3.3.1 Possible trojan server activity

Snort has identified some signs of a host compromised by a Trojan application. All of these alerts relate to traffic either to or from TCP port 27374 - the default port for the well-known Sub7 Trojan (as shown in Figure 4)



EditServer for Sub7 2.1

server:

startup method[s]
□ registry-Run
□ WIN.INI
☑ registry-RunServices
□ less known method
key name: WinLoader
□ _not_ known method

notification options
victim name: myvictim
□ enable ICQ notify to UIN: 00000000000
□ enable IRC notify. notify to: #infected
irc server: irc.subgenius.net port: 6667
☑ enable e-mail notify. notify to: email@mail.com
server: www.soho-beauty.c user:

installation
□ automatically start server on port: 27374
□ use random port
□ server password: reenter:
□ protect server port and password
□ enable IRC BOT
server name: ● use default name
○ specify a filename: server.com
□ melt server after installation
□ enable fake error message:
□ bind server with EXE file:

protect server
□ protect the server so it can't be edited/changed password: reenter:

☑ closeEditServer after saving or updating settings *note: if you have problems opening the server click here

Figure 4 - Sub7 configuration

Recent Snort rules include binary co ntent to help identify real Sub7 activity as opposed to traffic that happens to be using the ephemeral port 27 374 . Given the quantity of detects here though, Snort's assertion is likely to be correct.

3.3.2 Watchlist 000220 IL-ISDNNET-990517

The network 212.179.0.0 appears to have been singled out for Snort to alert on. The alerts here seem to be based on the originating network rather than signature based.

3.3.3 External RPC call

Machines within MY.NET are attempting to access external RPC services. RPC programs themselves serve legitimate purposes, but there are many well -documented problems with insecure programs.

Without further analysis it is not possible to say what proportion of this traffic is legitimate and what portion is attempting to exploit RPC vulnerabilities.

3.3.4 SMB Name Wildcard

Microsoft Windows system have a tendency to issue NETBIOS packets to any host that the client machine communicates with, irrespective of the other party's operating system and offered services, so you would expect to see a sizeable number of these packets on any network.

While many of the packets may be legitimate, it is clear following analysis of the logs that there is a large scale NETBIOS scan being conducted too.

3.3.5 connect to 515 from outside

The LPR service that provides printing services to Unix clients and servers resides on port 515. Exploit code is available to provide an attacking user root access via misuse of the LPR daemon.

Unless the university offers printing services to external hosts, these should be classed as a definite intrusion attempt.

3.3.6 UDP SRC and DST outside network

Here Snort has detected packets where neither the source or destination IP addresses are part of the MY.NET address space. Assuming that Snort is correctly configured, it is very likely that machines within MY.NET are sending packets to external addresses with forged (spoofed) source addresses in order to mask their identity.

Spoofed UDP packets form the basis of many DDOS (Distributed Denial Of Service) attacks.

A number of the IP addresses recorded against this alert are invalid (0.14.226.1 for example), or not generally considered routable (RFC1918 – 10.0.1.2 for example).

The majority of the packets recorded here are directed at the ports associated with Windows naming services (137), or DNS (53). A small number are using the UDP ports that are usually associated with BOOTP requests.

3.3.7 Watchlist 000222 NET-NCFC

In the same manner as 3.3.2 above, the network 159.226.0.0 appears to have been singled out for Snort to alert on. Again, the alerts here seem to be based on the originating network rather than any particular signature.

3.3.8 Queso fingerprint

Queso uses "crafted" TCP/IP packets to try and identify a remote Operating System from its IP fingerprint.

The standards that dictate how TCP/IP should be implemented (RFC's) allow for variation in some elements of the IP st ack's operation (the order of TCP options for example). These subtle differences act as a fingerprint.

One of the characteristics of Queso is the use of reserved bits/flags in the TCP header. Recently these bits have been adopted by RFC2481 as providing a form of flow-control through a technique known as ECN.

It is possible that this is a valid packet from an operating system utilising an ECN aware IP stack, or it could be a valid Queso detect. If a valid detect, t his is not dangerous in itself (thou gh there is a slight risk that a malformed packet will crash a particular host), but is a definite reconnaissance indicator.

3.3.9 Back Orifice

Backs Orifice is a well-known Trojan application providing an attacker a number of mechanisms to interfere with compro mised machines.

These feature include

- Keystroke Logging
- File Transfer
- File Sharing
- Password Dumping
- Remote Command Shell

Machines with Back Orifice installed are frequently used to attack other systems.

3.3.10 High port 65535 tcp - possible Red Worm - traffic

There are at least two Trojans that are known to bind to TCP port 65535 - RC1 and Adore.

Without access to the rule set that generated this alert we can't say exactly what triggered this alarm.

3.4 Top Talkers

3.4.1 Port Scans

Your attention is drawn to the MY.NET devices that appear in the Top Sources list below. These machines may or may not be compromised but are certainly engaged in hostile activities.

3.4.1.1 Top Sources

```
Count   Source Addresses
----------------------------------
  20050   139.134.102.192
  18451   MY.NET.160.114
  13485   205.188.244.121
  13276   211.72.171.75
  12575   165.230.53.35
  12368   194.100.55.131
  11730   MY.NET.98.167
   9565   205.188.233.121
   7110   205.188.246.121
   6831   205.188.233.153
----------------------------------
 125441
```

3.4.1.2 Top Destinations

```
Count   Destination Addresses
----------------------------------
   4092   MY.NET.110.33
   3677   MY.NET.110.169
   3534   MY.NET.145.166
   3397   MY.NET.108.13
   2986   MY.NET.178.154
   2688   MY.NET.108.15
   2586   MY.NET.109.62
   2277   MY.NET.178.222
   2230   MY.NET.106.178
   2197   MY.NET.111.30
----------------------------------
  29664
```

3.4.2 Alerts

The tables below identify the addresses that most frequently occur in the Alert files. A breakdown of the activity for each address is also included.

The tables highlight that the majority of the attackers are single minded in their goal - that is looking for only one vulnerability. This is often an indication that automated tools are being employed in a "fire and forget" manner rather than someone using "cause and effect" to approach a compromise.

3.4.2.1 Top Sources

```
--------------------------------------------------------------------------------
Top 10 Source Addresses                  Alert breakdown for this host
--------------------------------------------------------------------------------
  14370  212.179.79.2
                                 14370    Watchlist 000220 IL-ISDNNET-990517
   7050  129.170.104.19
                                  7050    Possible trojan server activity
   5606  216.220.164.141
                                  5606    Possible trojan server activity
   2893  212.179.47.70
                                  2893    Watchlist 000220 IL-ISDNNET-990517
   1492  165.230.53.35
                                  1492    SMB Name Wildcard
   1176  211.152.241.1
                                  1176    External RPC call
    734  24.147.14.159
                                   734    External RPC call
    493  159.226.41.166
                                   493    Watchlist 000222 NET-NCFC
    425  216.220.167.94
                                   425    Possible trojan server activity
    394  24.27.62.134
                                   394    External RPC call
--------------------------------------------------------------------------------
  34633 events
--------------------------------------------------------------------------------
```

3.4.2.2 Top Destinations

```
--------------------------------------------------------------------------------
Top 10 Destination Addresses             Alert breakdown for this host
```

```
--------------------------------------------------------------------------------
  14379  MY.NET.218.198
                                14369    Watchlist 000220 IL-ISDNNET-990517
                                   10    WinGate 1080 Attempt
   4675  216.220.164.141
                                 4675    Possible trojan server activity
   2894  MY.NET.97.175
                                 2893    Watchlist 000220 IL-ISDNNET-990517
                                    1    Null scan!
   2738  129.170.104.19
                                 2738    Possible trojan server activity
    300  MY.NET.100.56
                                  300    Watchlist 000222 NET-NCFC
    257  MY.NET.70.97
                                  149    Watchlist 000220 IL-ISDNNET-990517
                                   64    Queso fingerprint
                                   38    Null scan!
                                    3    High port 65535 tcp - possible Red Worm
                                    2    Possible trojan server activity
                                    1    SYN-FIN scan!
    224  MY.NET.218.230
                                  219    Tiny Fragments - Possible Hostile Activity
                                    2    Possible trojan server activity
                                    2    Watchlist 000220 IL-ISDNNET-990517
                                    1    Queso fingerprint
    212  MY.NET.97.47
                                  212    Watchlist 000220 IL-ISDNNET-990517
    193  MY.NET.100.83
                                  193    Watchlist 000222 NET-NCFC
    148  130.132.143.42
                                  148    UDP SRC and DST outside network
--------------------------------------------------------------------------------
  26020 events
--------------------------------------------------------------------------------
```

3.4.3 Out Of Spec

Out of Spec packets violate the TCP/IP specifications in some way. This may be due to corruption in transit, badly crafted packets (in correct checksums for example), or just perceived OOS by an analysis tool.

The belief here is that many of the OOS packets have been classified as such because of the existence of ECN data in the reserved bit fields of the TCP options header. More recent versions of Snort (1.8+) correctly identify ECN options.

However, a number of the packets contain either unknown IP or TCP options.

3.4.3.1 Top Sources

```
Top OOS Sources
-------------------------
    293  199.183.24.194
    226  210.77.146.33
    133  193.226.113.248
    126  213.116.114.212
    125  209.48.248.58
    112  111.111.111.111
    111  217.0.72.73
     90  213.116.160.205
     61  192.168.1.1
     26  62.243.160.209
-------------------------
   1303
-------------------------
```

3.4.3.2 Top Destinations

```
Top OOS Destinations
-------------------------
    382  MY.NET.100.165
    285  MY.NET.70.97
    180  MY.NET.253.114
    133  216.235.163.163
    105  MY.NET.253.43
    103  MY.NET.253.42
     91  MY.NET.253.41
     40  216.235.163.151
     34  MY.NET.253.125
     30  MY.NET.150.225
-------------------------
   2686
-------------------------
```

3.5 External Source Registration Details

Included below are the registration details for the source addresses identified in section 3.4.2.1 above.

3.5.1 212.179.79.2

```
inetnum:      212.179.79.0  - 212.179.79.63
netname:      CREOSCITEX
descr:        CREOSCITEX -SIFRA
country:      IL
admin-c:      ZV140 -RIPE
tech-c:       NP469 -RIPE
status:       ASSIGNED PA
notify:       hostmaster@isdn.net.il
mnt-by:       RIPE -NCC-NONE-MNT
changed:      hostmaster@isdn.net.il 20001109
source:       RIPE

route:        212.179.0.0/17
descr:        ISDN Net Ltd.
origin:       AS8551
notify:       hostmaster@isdn.net.il
mnt-by:       AS8551 -MNT
changed:      hostmaster@isdn.net.il 19  990610
source:       RIPE

person:       Zehavit Vigder
address:      bezeq -international
address:      40 hashacham
address:      petach tikva 49170 Israel
phone:        +972 52 770145
fax-no:       +972 9 8940763
e-mail:       hostmaster@bezeqint.net
nic-hdl:      ZV140 -RIPE
changed:      zehavitv@bezeqint.net 20000528
source:       RIPE

person:       Nati Pinko
address:      Bezeq International
address:      40 Hashacham St.
address:      Petach Tikvah  Israel
phone:        +972 3 9257761
e-mail:        hostmaster@isdn.net.il
nic-hdl:      NP469 -RIPE
changed:      registrar@ns.il 19990902
source:       RIPE
```

3.5.2 129.170.104.19

```
Dartmouth College ( NET-DART-ETHER)
   Kiewit Computation Center
   Hanover,  NH 03755
   US

   Netname: DART -ETHER
   Netblock:  129.170.0.0  -  129.170.255.255

   Coordinator:
      Campbell, Stephen  ( SC59-ARIN)  steve@AVALON.DARTMOUTH.EDU
      603-646-3231

   Domain System inverse mapping provided by:

   NS1.DARTMOUTH.EDU              129.170.17.4
   NS2.DARTMOUTH.ED U             129.170.16.4
   MAGGIE.TELCOM.ARIZONA.EDU      128.196.128.233

   Record last updated on 21 -Dec-1999.
   Database last updated on 28 -Aug-2001 23:14:19 EDT.
```

3.5.3 216.220.164.141

```
Pennsylvania Online ( NETBLK-PAONLINE -1)
   PO Box 6501
   Harrisburg, PA 17112
   US

   Netname: PAONLINE -1
   Netblock:  216.220.160.0  -  216.220.175.255
   Maintainer: PAON

   Coordinator:
      Peace, George  ( GP11-ARIN)  george@PAONLINE.NET
      (717) 657-0000 (FAX) (717) 657 -0132

   Domain System inverse mapping provided by:

   NS1.PAONLINE.COM               198.69.90.250
   NS2.PAONLINE.COM               198.69.90.11
   NS3.PAONLINE.COM               207.44.20.1

   ADDRESSES WITHIN THIS BLOCK ARE NON  -PORTABLE

   Record last updated on 27 -Feb-2001.
   Database last updated on 28 -Aug-2001 23:14:19 EDT.
```

3.5.4 165.230.53.35

```
Rutgers University ( NET-RUTGERS-B2)
   Telecommunications Division Room 018, Hill Center, Busch Campus
Brett Road
   Piscataway, NJ 08855 -0879
   US

   Netname: RUTGERS -B2
   Netblock:  165.230.0.0  -  165.230.255.255
   Coordinator:
      Rutgers University Computing Services   (  RU-ORG-ARIN)
netmanager@TDMX.RUTGERS.EDU
      +1 732 -445-0327

   Domain System inverse mapping provided by:

   DNS1.RUTGERS.EDU                165.230.144.131
   DNS2.RUTGERS.EDU                128.6.21.9
   RU-UFL.RUTGERS.EDU              128.227.128.162
   TURTLE.MCC.COM                  128.62.1.215

   Record last u pdated on 09 -Aug-2000.
   Database last updated on 28 -Aug-2001 23:14:19 EDT.
```

3.5.5 211.152.241.1

```
   Search results for '211.152.241.1'

   inetnum                  211.152.224.0  - 211.152.255.255
   netname                  JSBBNET
   descr                   JS -CASIL BCTV Network Data Co., Ltd.
   ÄÏ¾©ËÕÌì¹ã²¥µçÊÓÍøÂçÊý¾ÝÓÐÏÞ¹«Ë¾
   country                 CN
   admin-c                  YJ110-AP, inverse
   tech-c                   DX37-AP, inverse
   mnt-by                   MAINT-CNNIC-AP, inverse
   changed                 luoyan@cnnic.net.cn 20010611
   source                  APNIC


   person                   Yin Jinjun, inverse
   address                 9/F, S ujian Building, 31 -1 Yunnan Road,
   Nanjing, China
   country                 CN
   phone                   +86 -025-3235063
   fax-no                  +86 -025-3235066
   e-mail                   jjyin@public1.ptt.js.cn , inverse
   nic-hdl                  YJ110-AP, inverse
   mnt-by                   MAINT-CNNIC-AP, inverse
   changed                 ipas@cnnic.net.cn 20010131
   source                  APNIC


   person                   Ding Xinquan , inverse
   address                 9/F, Sujian Building, 31  -1 Yunnan Road,
   Nanjing, China
   country                  CN
   phone                   +86 -025-3235069
   fax-no                  +86 -025-3260102
   e-mail                   js-casil@public1.ptt.js.cn , inverse
   nic-hdl                  DX37-AP, inverse
   mnt-by                   MAINT-CNNIC-AP, inverse
   changed                 ipas@cnnic.net.cn 20010131
   source                  APNIC
```

3.5.6 24.147.14.159

```
MediaOne NorthEast ( NET-M1-NE-2)
   27 Industrial Ave.
   Chelmsford, MA 01 824
   US

   Netname: M1 -NE-2
   Netblock: 24.147.0.0 - 24.147.255.255
   Maintainer: MDON

   Coordinator:
      MediaOne NorthEast  (ZM117-ARIN)  abuse@mediaone.net
      978-244-4020

   Domain System inverse mapping provided by:

   NS3.MEDIAONE.NET                 24.128.1.82
   NS4.MEDIAONE.NET                 24.130.1.43
   NS5.MEDIAONE.NET                 24.129.0.103

   Record last updated on 10 -Aug-2001.
   Database last updated on 28 -Aug-2001 23:14:19 EDT.
```

3.5.7 159.226.41.166

```
The Computer Network Center Chinese Academy of Sciences ( NET-NCFC)
   P.O. Box 2704 -10,
   Institute of Computing Technology Chinese Academy of Sciences
   Beijing 100080, China
   CN

   Netname: NCFC
   Netblock: 159.226.0.0 - 159.226.255.255

   Coordinator:
      Qian, Haulin  (QH3-ARIN)  hlqian@NS.CNC.AC.CN
      +86 1 2569960

   Domain System inverse mapping provided by:

   NS.CNC.AC.CN                     159.226.1.1
   GINGKO.ICT.AC.CN                 159.226.40.1

   Record last updated on 25 -Jul-1994.
   Database last updated on 28 -Aug-2001 23:14:19 EDT.
```

3.5.8 216.220.167.94

```
Pennsylvania Online (NETBLK-PAONLINE-1)
   PO Box 6501
   Harrisburg, PA 17112
   US

   Netname: PAONLINE -1
   Netblock: 216.220.160.0 - 216.220.175.255
   Maintainer: PAON

   Coordinator:
      Peace, George  (GP11-ARIN)  george@PAONLINE.NET
      (717) 657-0000 (FAX) (717) 657 -0132

   Domain System inverse mapping provided by:

   NS1.PAONLINE.COM                 198.69.90.250
   NS2.PAONLINE.COM                 198.69.90.11
   NS3.PAONLINE.COM                 207.44.20.1
   ADDRESSES WITHIN THIS BLOCK ARE NON-PORTABLE

   Record last updated on 27-Feb-2001.
   Database last updated on 28-Aug-2001 23:14:19 EDT.
```

3.5.9 24.27.62.134

```
ServiceCo LLC - Road Runner (NET-ROAD-RUNNER-1)
   13241 Woodland Park Road
   Herndon, VA 20171
   US

   Netname: ROAD-RUNNER-1
   Netblock: 24.24.0.0 - 24.30.95.255
   Maintainer: SCRR

   Coordinator:
      ServiceCo LLC  (ZS30-ARIN)  abuse@rr.com
      1-703-345-3416

   Domain System inverse mapping provided by:

   DNS1.RR.COM                    24.30.200.3
   DNS2.RR.COM                    24.30.201.3
   DNS3.RR.COM                    24.30.199.7
   DNS4.RR.COM                    65.24.0.172

   Record last updated on 15-Aug-2001.
   Database last updated on 28-Aug-2001 23:14:19 EDT.
```

3.6 Correlations

Correlations for detects listed in section 3.3 follow below.

3.6.1 Possible trojan server activity

Sub7 activity is very common and the Trojan itself has gone through a number of iterations. Reports have been previously submitted to SANS regarding activity by client searching for machines running the Sub7 server component.

http://www.sans.org/y2k/032700.htm
http://www.sans.org/y2k/091900.htm
http://vil.mcafee.com/dispVirus.asp?virus_k=10171&

Work has been recently carried out by Team2600 to port the Sub7 engine to the Apple Mac platform (both Mac OS X and earlier versions)

3.6.2 Watchlist 000220 IL-ISDNNET-990517

Previous submissions are littered with references to addresses in the 212.179.0.0 network.

http://www.sans.org/y2k/practical/Fred_Portnoy_GCIA.doc
http://www.sans.org/y2k/practical/Stephan_Odak.doc
http://www.sans.org/y2k/practical/Tony_Smith.doc
http://www.sans.org/y2k/051900.htm

3.6.3 SMB Name Wildcard

SMB Name Wildcard queries are a common occurrence, and a signature match can be produced using just standard Windows commands (NBTSTAT)

http://www.sans.org/newlook/resources/IDFAQ/port_137.htm

3.6.4 connect to 515 from outside

A number of people have reported this type of connection event previously. Without access to the payload data, we cannot say with certainty that this was an LPR exploit.

http://www.sans.org/y2k/021401.htm
http://www.incidents.org/archives/intrusions/msg01143.html
http://www.incidents.org/archives/intrusions/msg01192.html

3.6.5 UDP SRC and DST outside network

There aren't specific correlations for this signature, but a search on Google gives some indication of their frequency.

http://www.google.com/search?hl=en&q=%22spoofed+UDP+packets%22

3.6.6 Watchlist 000222 NET-NCFC

Previous occurrences of detects with sources belonging to the 159.226.0.0 network are contained in the submissions shown below.

http://www.sans.org/y2k/practical/Stephan_Odak.doc
http://www.sans. org/y2k/practical/Tony_Smith.doc
http://www.sans.org/y2k/practical/Sidney_Faber_gcia.doc

3.6.7 Queso fingerprint

Queso is a well known fingerprinting tool (though largely superseded by NMAP). Detailed explanations are available at the links below.

http://www.whitehats.com/info/IDS29
http://www.sans.org/y2k/ecn.htm

Note particularly that packets from ECN enabled Linux machines are often labelled as Queso attempts. Max Vision points out that you can reduce the number of false positives by looking for this signature in combination with high value TTL's.

3.6.8 Back Orifice

Back Orifice by Cult of the Dead Cow is another "Remote Administration Tool" . Previous SANS candidates have reported BO activities.

http://www.sans.org/y2k/practical/Stephan_Odak.doc
http://www.bo2k.com/indexw hatis.html

3.6.9 High port 65535 tcp - possible Red Worm – traffic

http://archives.neohapsis.com/archives/incidents/2000 -04/0050.html
http://archives.neohapsis.com/archives/incidents/2000 -03/0052.html

3.7 *Out Of Spec (OOS) Link Analysis*

The Link Graph below demonstrates the relationship between the most common OOS source address and its destinations.

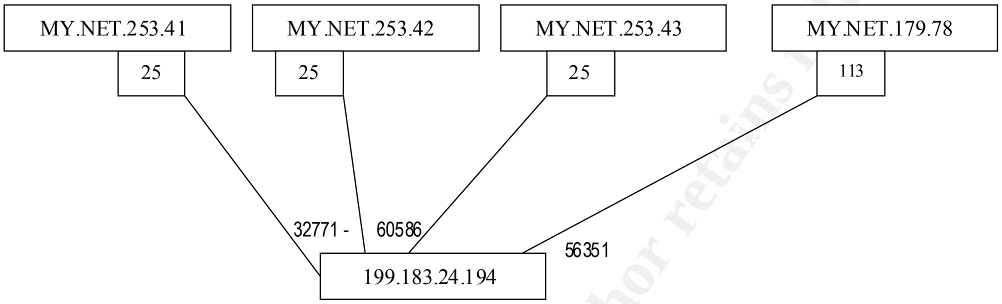


Figure 5 - OOS Link Analysis for top source

The dominant service is SMTP. In fact, nothing about this looks suspicious. What we see is a the typical high port to low port actions of a mail exchange, coupled with one IDENT request.

My guess here is that the packets have been considered OOS because the client machine (probably an upstream mail server) is running an ECN enabled Kernel. For this particular source, no other destination ports are used.

The excerpt of OOS log below demonstrates that the previously reserved bits are set, lending support to the ECN theory.

```
06/21-00:12:12.377948 199.183.24.194:33206 -> MY.NET.253.41:25
TCP TTL:54 TOS:0x0 ID:17668  DF
21S***** Seq: 0x4C3835FA   Ack: 0x0   Win: 0x16D0
TCP Options => MSS: 1460 SackOK TS: 258044158 0 EOL EOL EOL EOL
```

3.8 *Anomalous Activity*

3.8.1 Sub7

There is clear evidence that a significant number of hosts are infected with the Sub7 Trojan (based on inbound and outbound packets with matching port numbers)

```
06/24-08:35:27.441986  [**] Possible trojan server activity [**] 216.220.164.141:1904
-> MY.NET.217.62:27374
06/24-08:35:27.443873  [**] Possible trojan server activity [**] MY.NET.217.62:27374 -
> 216.220.164.141:1904
06/24-08:35:28.049709  [**] Possible trojan server activity [**] 216.220.164.141:1904
-> MY.NET.217.62:27374
06/24-08:35:28.050294  [**] Possible trojan server activity [**] MY.NET.217.62:27374 -
> 216.220.164.141:1904
06/24-08:35:28.650287  [**] Possible trojan server activity [**] 216.220.164.141:1904
-> MY.NET.217.62:27374
06/24-08:35:28.650590  [**] Possible trojan server activity [**] MY.NET.217.62:27374 -
> 216.220.164.141:1904
```

Without access to the rules that resulted in these alerts, it is not possible to say if every logged occurrence is genuine Sub 7 transaction rather than another protocol that happens to be using the ephemeral port 27374, but Sub7 does seem likely.

3.8.2 High port 65535 tcp - possible Red Worm

The Red Worm infects Linux based computers, utilising other well known techniques to achieve a compromise (lpd, rpc.statd etc).

The worm provides a shell bound to TCP port 65535 upon receipt of an appropriately crafted ICMP packet and attempts to deliver system password files to a number of email addresses.

Given this behaviour we can say with a reasonable degree of certainty that the host below is compromised and is attempting the mail delivery phase.

```
High port 65535 tcp - possible Red Worm - traffic [**] MY.NET.253.24:65535 ->
199.154.149.191:25
High port 65535 tcp - possible Red Worm - traffic [**] MY.NET.253.24:65535 ->
205.188.156.154:25
High port 65535 tcp - possible Red Worm - traffic [**] MY.NET.253.24:65535 ->
209.196.123.3:25
```

Further details regarding this worm can be found at
http://www.europe.f-secure.com/v-descs/adore.shtml

3.8.3 Source / Destination Port 0

The source addresses below are all sending packets originating from TCP port 0.

24.31.91.225
24.101.139.227
24.166.172.31
24.226.209.39
24.252.172.9

192.168.1.1
195.202.182.128
202.131.99.142
213.118.91.234

Also notice that at least one of the sources is using addressing defined in RFC1918.

3.8.4 Probable ECN TCP Flags

These sources are all sending packets with some combination of the "reserved" TCP flags set. This commonly indicates TCP/IP implementations using ECN.

24.113.101.87
66.24.29.12
217.0.71.215

Using a more recent version of Snort may prevent this alert from being reported , or help minimize the number of false positives, as it now (1.8+) understands ECN flags.

Further details regarding ECN can be found at http://www.aciri.org/floyd/ecn.html

3.8.5 Unknown TCP Options

The sources below are all sending packets with unknown TCP option values

24.101.54.192
62.59.8.127
64.228.216.149
62.243.160.209
111.111.111.111
202.131.99.142
211.220.73.227
212.242.234.14
213.51.179.80
217.0.72.73

3.8.6 SYN FIN Flags

The 64 source addresses below have each sent at least one packet with an illegal SYN FIN combination.

24.3.98.110
24.30.32.162
24.31.91.225
24.67.149.250
24.95.215.180
24.95.222.128
24.101.54.192
24.101.139.227
24.113.101.87
24.141.215.220
24.166.172.31
24.169.233.12
24.180.168.160
24.200.176.151
24.222.118.32
24.226.208.109
24.226.209.39
24.252.172.9
62.54.135.97
62.59.7.186
62.59.8.127
62.59.16.29
62.59.136.17
62.59.150.145
62.59.153.108
62.59.153.75
62.106.25.11
62.149.151.76
62.149.156.164
62.163.52.91
62.226.74.193
62.243.160.209
64.228.216.149
64.230.225.112
65.14.2.105
66.50.122.62
66.67.48.85
111.111.111.111
130.13.168.129
192.168.1.1
194.236.154.110
195.202.182.128
195.204.46.106
196.21.162.250
199.44.16.233
200.171.165.156
202.131.99.142
206.128.215.88
208.33.170.117
208.228.170.55
211.220.73.227
212.95.76.26
212.111.188.15
212.123.168.2
212.139.40.11
212.182.11.161
213.51.179.80
213.77.216.89
213.96.38.157
213.153.212.59
217.0.71.215
217.0.72.73
217.157.84.2
217.157.84.25

3.8.7 XMAS Packets

The sources below have sent packets with SFRPAU flag options set.

62.163.52.91
66.67.48.85
111.111.111.111
192.168.1.1
195.202.182.128
212.123.168.2
217.0.72.73
217.157.84.2

3.9 Defensive Recommendations

3.9.1 Ingress / Egress Filtering

The importance of ingress/egress filtering cannot be overstated. Much of the malicious activity detected would be stopped by aggre ssive access control lists on the Internet border routers.

Many of the basic, scripted attacks would be blocked, leaving both sensors and staff free to concentrate on the serious attempts and/or breaches. Ingress filters also serve a useful function in limiting the damage caused by directed broadcast attacks such as Smurf.

Given the frequency with which attacks are observed from the networks described in 3.3.2 and 3.3.7, it may be appropriate to b lock incoming traffic from these subnets at the border routers.

Packet filtering isn't the only answer, as the recent Code Red Worm has pointedly demonstrated. Systems must be kept up to date, and exploits are developed that make use of services that hav e to be let through a packet filter (after all there's little point in blocking TCP port 80 traffic to a web server) - as in the case of Code Red.

Any changes that impact the flow of traffic into and out of the site have to be researched thoroughly before implementation, but once a baseline has been decided upon, packet filters can remain reasonably static.

Don't forget that the goal to strive for is "drop everything, permit only what's needed".

3.9.2 Anti-Spoofing

Border routers should be configured in such a way as to reject traffic with spoofed addresses (though note the concerns in section 3.2 regarding multicast destination addresses)

As a simple policy, drop inbound packets where

- Source address is as defined by RFC1918 (priva te addresses such as 10.x.x.x)
- Source address is within MY.NET

Similarly, drop outbound packets where

- Source address is as defined by RFC1918
- Source address is **not** within MY.NET

This can be implemented as part of broader ingress/egress filtering, or as a standalone precaution.

Though spoofed traffic does not play a major part in the malicious traffic observed at MY.NET, the current configuration could allow the campus to be used as a major player in DDOS attacks.

3.9.3 Restrictive Firewall Policy

In some ways this is similar to 3.9.1, but here we are concerned with traffic that has already passed inspection by the packet filtering performed at the border routers.

The firewall installed at this point should be able to provide two major functions

- Some idea of state (that is, accept inbound packets only when a outbound request has been observed)
- Some level of protocol awareness. The firewall should be able to tell that the traffic on TCP port 80 is actually HTTP, and not something masquerading as HTTP.

Obviously logging is also a concern, and depending on your requirements a product supporting high-availability functions (either through hardware of software).

Once again, a policy of "drop everything unless specifically allowed" should apply. If you already run a restrictive firewall policy, then the majority of the exploits and Trojans that exist will be blocked here.

3.9.4 Email Attachment Scanning

Many of the alerts recorded by Snort relate to activity resulting from Trojan application. Unlike remote exploits that lead to a machine compromise, Trojans are typically executed (albeit unwittingly) by the end-user.

Frequently, Trojan applications are delivered as attachments to email messages, where ill-educated users execute them, unaware of the consequences.

Mail attachment scanning when implemented outside of the users control (IE at a mail server on the mail transit path) can help reduce the risk that these types of Trojan applications pose by stripping the applications from the message body. This form of scanning is also useful as a first line of defence against more traditional viruses.

3.9.5 Virus Scanning

While scanning for malicious attachments at an email gateway can help reduce the risk of introducing infected or Trojan applications into the network, rigorous and non-optional virus scanning at the desktop and server level is also important.

3.10 Analysis Process

Having read a number of previous submissions, I didn't consider using SnortSnarf to parse the alert files as I expected that the amount of data was too great to process even on a fairly decent machine.

Instead I wrote a number Perl programs to sort the different type of files (Portscans, Alerts and OOS).

The Portscan and OOS files are processed by simple utilities that sort by occurrence of source and destination address and then summarise. The one for the alerts has more functionality, including the ability to discard multicast traffic, include traffic breakdowns and more.

The results of the summaries produced where cross checked using command line equivalents (combinations of grep, cut, awk, sort, uniq and wc). Once interesting data had been discovered, further investigations where performed with ad-hoc Perl or command line expressions.

One other technique that I found usefu l was simply to cat a given file to the screen, and look for visual patterns as it scrolls by. Not terribly sophisticated I know, but you'd be surprised at what jumps out.

Internet search engines and security focused sites (Neohapsis, Technotronic, SecurityFocus, SecurityPortal and SANS) also play a large part in gaining insights into approaches and for particular correlations.

It's certainly worth downloading and reading many of the previous submissions as there are many worthwhile tips to be gained fr om peoples prior experiences.

4 Appendices

4.1 Apache Failed Document Script

```
#!/usr/bin/perl
#
# failed.pl
#
# Looks for server status codes in the 4xx and 5xx ranges,
# spits out a minimal amount of info and error counts.
#
# usage : failed.pl < access_log

# define field positions that we're interested in
$SRC_IP=0;
$URL=6;
$SERVER_RESULT_CODE=8;

# setup some error counters
$doc_errors=0;
$server_errors=0;

# read the log
while (<>) {
  # skip any comments
  next if /^#/;

  @fields=split;

  # look for 4xx error types
  if ($fields[$SERVER_RESULT_CODE] =~ /4\d\d/) {
    print "NOT_FOUND : $fields[$SRC_IP], $fields[$URL]\n";
    $doc_errors++;
  }

  # look for 5xx error types
  if ($fields[$SERVER_RESULT_CODE] =~ /5\d\d/) {
    print "SERVER_ER : $fields[$SRC_IP], $fields[$URL]\n";
    $server_errors++;
  }
}
print "#\n";
print "# $doc_errors 4xx errors, $server_errors 5xx errors\n";
print "#\n";
```

4.2 Non-Multicast Alert Breakdowns

4.2.1 Alert Summary

```
-------------------------------------------------------------------
 Top 10 Alert Summary
 %       Count  Alert Detail                         Sources Dests.
-------------------------------------------------------------------
61.762   78438  UDP SRC and DST outside network         35      95
17.008   21600  Possible trojan server activity       2970    9149
14.131   17946  Watchlist 000220 IL-ISDNNET-99051       69      19
2.844     3612  External RPC call                       15    1184
1.600     2032  SMB Name Wildcard                      194     710
0.806     1023  connect to 515 from outside              8     638
0.452      574  Watchlist 000222 NET-NCFC                8       8
0.253      321  Queso fingerprint                       23      32
0.233      296  Back Orifice                             3     180
0.232      295  High port 65535 tcp - possible Re       15      18
-------------------------------------------------------------------
99.32  127000 total alerts
        38950 total portscans
-------------------------------------------------------------------
       165950 total events
-------------------------------------------------------------------
```

4.2.2 Top Sources

```
--------------------------------------------------------------------------------
Top 10 Source Addresses                  Alert breakdown for this host
--------------------------------------------------------------------------------
  56240  63.250.213.124
                                56240    UDP SRC and DST outside network
  18804  63.250.213.26
                                18804    UDP SRC and DST outside network
  14370  212.179.79.2
                                14370    Watchlist 000220 IL-ISDNNET-990517
   7050  129.170.104.19
                                 7050    Possible trojan server activity
   5606  216.220.164.141
                                 5606    Possible trojan server activity
   2893  212.179.47.70
                                 2893    Watchlist 000220 IL-ISDNNET-990517
   2113  63.250.213.147
                                 2113    UDP SRC and DST outside network
   1492  165.230.53.35
                                 1492    SMB Name Wildcard
   1176  211.152.241.1
                                 1176    External RPC call
    734  24.147.14.159
                                  734    External RPC call
--------------------------------------------------------------------------------
 110478 events
--------------------------------------------------------------------------------
```

4.2.3 Top Destinations

```
--------------------------------------------------------------------------------
Top 10 Destination Addresses             Alert breakdown for this host
--------------------------------------------------------------------------------
  56240  233.28.65.62
                                56240    UDP SRC and DST outside network
  18804  233.28.65.164
                                18804    UDP SRC and DST outside network
  14379  MY.NET.218.198
                                14369    Watchlist 000220 IL-ISDNNET-990517
                                   10    WinGate 1080 Attempt
   4675  216.220.164.141
                                 4675    Possible trojan server activity
   2894  MY.NET.97.175
                                 2893    Watchlist 000220 IL-ISDNNET-990517
                                    1    Null scan!
   2738  129.170.104.19
                                 2738    Possible trojan server activity
   2113  233.40.70.17
                                 2113    UDP SRC and DST outside network
    583  233.28.65.222
                                  583    UDP SRC and DST outside network
    300  MY.NET.100.56
                                  300    Watchlist 000222 NET-NCFC
    257  MY.NET.70.97
                                  149    Watchlist 000220 IL-ISDNNET-990517
                                   64    Queso fingerprint
                                   38    Null scan!
                                    3    High port 65535 tcp - possible Red Worm
                                    2    Possible trojan server activity
                                    1    SYN-FIN scan!
--------------------------------------------------------------------------------
 102983 events
--------------------------------------------------------------------------------
```