Intrusion Detection System

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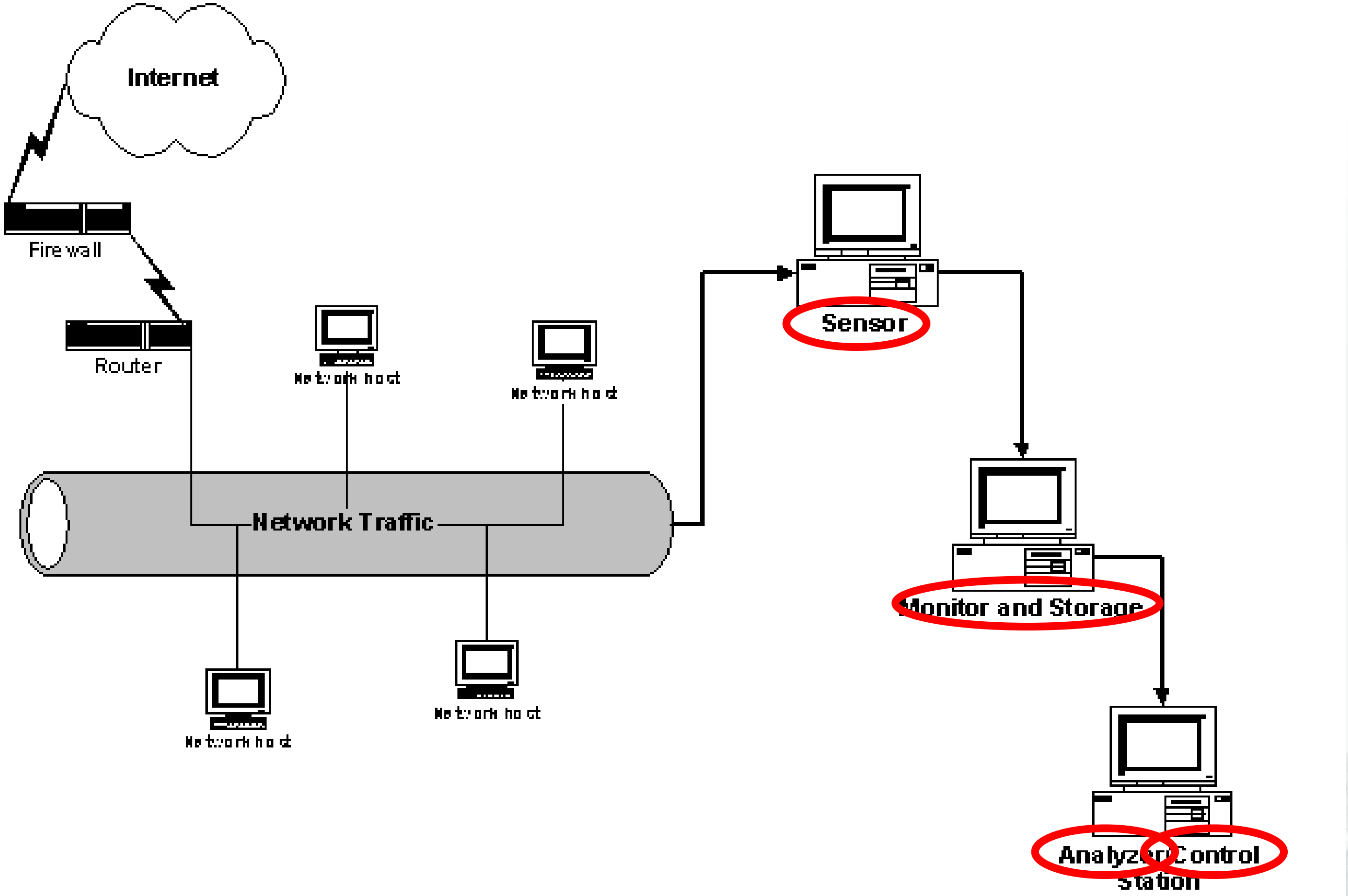
- Intrusion Detection Systems
- Tripwire
- Snort

IDS (Definition)

- Intrusion Detection is the process of monitoring the events occurring in a computer system or network, analyzing them for signs of security problem.

- The bulk of intrusion detection research and development has occurred since 1980.

IDS (Architecture)



IDS (Information Sources)

- The first requirement for intrusion detection is a set of input data.
- Which source is the best source for intrusion detection?

Information Sources (Cont.)

- Host-Based Information Sources
- Network-Based Information Sources

Host-Based

- Operating System Audit Trails
- System Logs
- Application Information
- Target-Based Monitoring

Network-Based

- In network-based approach, information is collected form the network traffic stream as it travels on the network segment.

IDS (Analysis)

- Analysis is organizing and characterizing data about user and system to identify activity of interest.

- This process is divided into three phases:
  - Constructing the analyzer.
  - Performing analysis of live data.
  - Feedback or refinement of the process.

Analysis (Cont.)

- Misuse Detection
  - Engines look for something defined to be bad.
- Anomaly Detection
  - Engines look for something rare or unusual.

IDS (Responses)

- Active Responses
  - Take action against the intruder
  - Amend the environment
  - Collect more information

- Passive Responses
  - Alarm and notification
  - SNMP Trap

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Tripwire

- It is a host-based IDS.
- It is one of the most popular applications for determining when a file or directory has been alerted.
- It scans the system’s hard drive and create a database.

Tripwire Files

- /usr/sbin/tripwire
  - The tripwire binary responsible for reading, creating and updating the database.
- /etc/tripwire/twpol.txt
  - The tripwire policy configuration file.
- /etc/tw.pol
  - The signed tripwire policy file.

Tripwire Files

- /usr/tripwire/twinstall.sh
  - The file that signs the /etc/tripwire/twpol.txt and /etc/tripwire/twcfg.txt files.
- /etc/tripwire/twcfg.txt
  - Configures the environment for the /usr/sbin/tripwire binary.
- /var/lib/tripwire/hostname.twd
  - The default location of the Tripwire database file.

Configuring the Tripwire Policy File

- /etc/tripwire/twpol.txt

- /etc/shadow -> $(IgnoreNone);
  - Any file followed by the **IgnoreNone** argument will be checked by Tripwire's "paranoid mode," which means that any and all changes will be reported to you.

- !/proc;
  - Informs Tripwire to ignore the /proc directory.

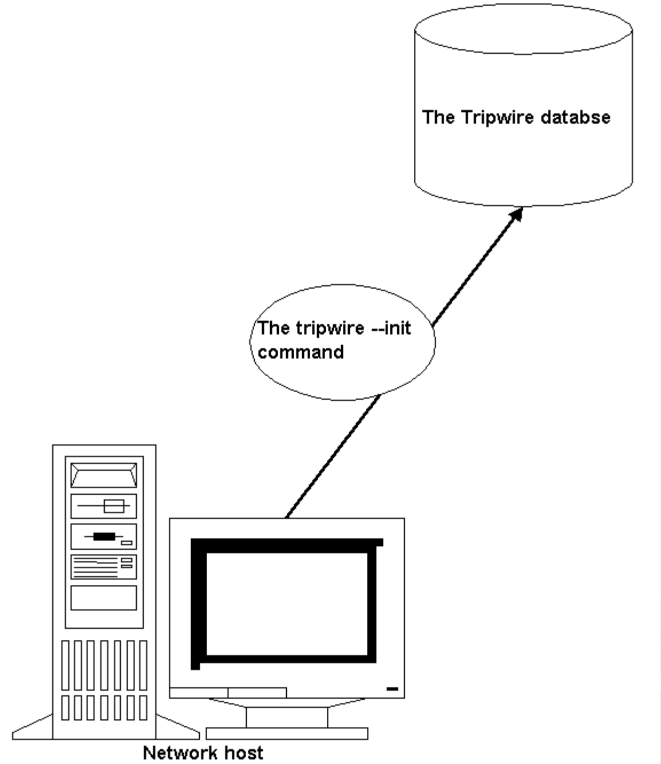
Creating the Tripwire Policy File

- After you have installed Tripwire and edited the /etc/tripwire/twpol.txt, you are ready to begin the initial scan.

- Simply run the /etc/tripwire/twinstall.sh script.
  - It will then create the Tripwire configuration file.

Database Initialization Mode

- After you have created a policy file, you can then enter database initialization mode.
- tripwire --init
- tripwire --help init



Integrity Checking Mode

- After you have created the database, you can run Tripwire in integrity checking mode.
- tripwire --check

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Snort

- It is a network-based IDS.

- It places the NIC into promiscuous mode and captures all traffic on your network segment.

Snort Files and Directories

- /usr/local/snort
  - The Snort binary, when installed from an RPM package.
- /usr/local/bin/snort
  - The binary, when installed from a tarball.
- /etc/snort/
  - A directory that contains the Snort configuration file, as well as all Snort rules.

Snort Files and Directories

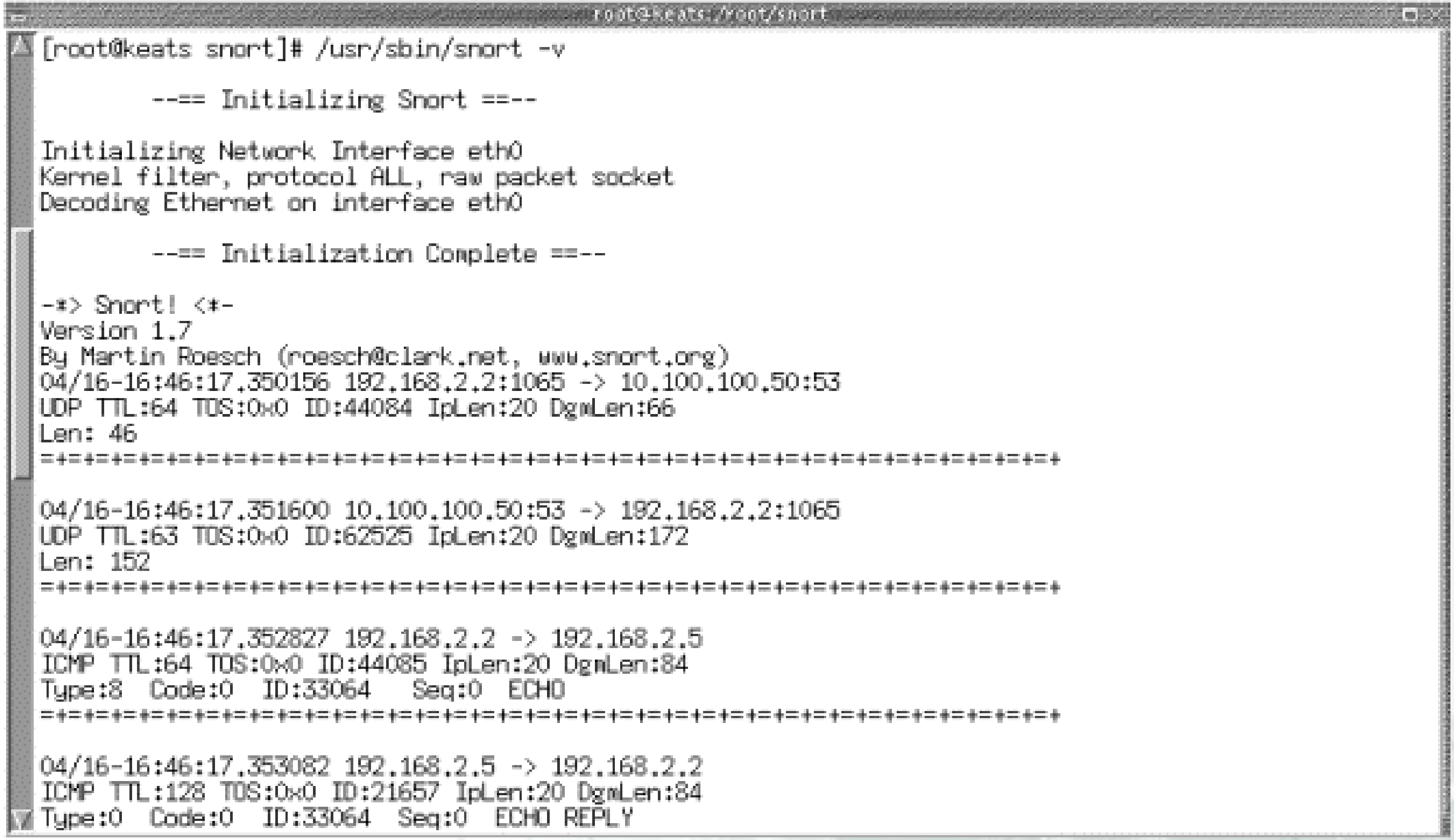
- /etc/snort/snort.conf
  - The Snort configuration file.
- /usr/share/doc/snort-1.7
  - The documentation directory if you install Snort using the RPM. If you install using a tarball, the documentation will be in the subdirectory where you installed all of the source files.
- /etc/rc.d/init.d/snortd
  - The initialization script for snortd.

Starting Snort

- Start Snort as a simple packet sniffer.
- This command will log traffic only at the network level.

-
  ```
  snort -v
  ```

Starting Snort

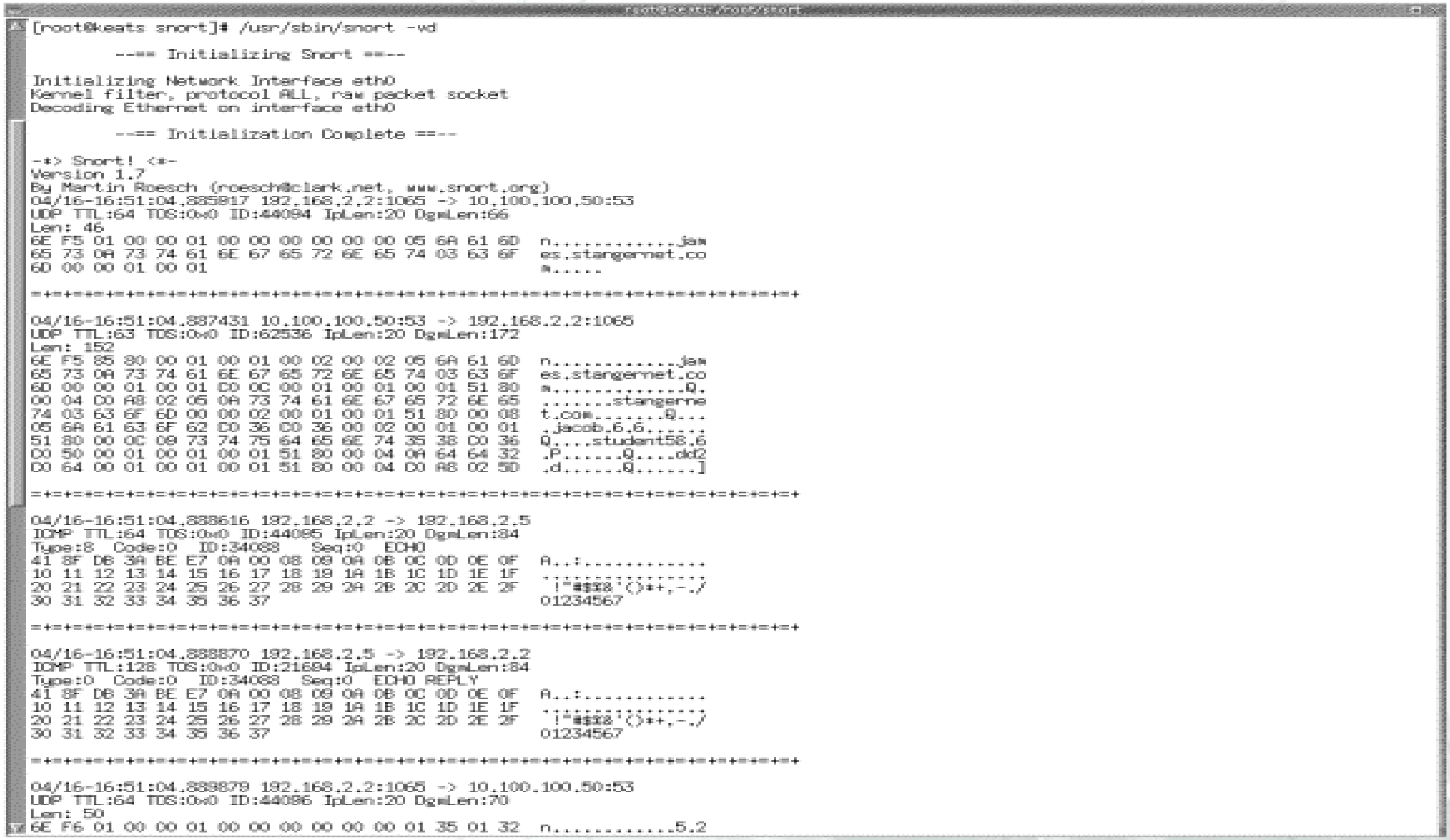


```
[root@keats snort]# /usr/sbin/snort -v

        --== Initializing Snort ==--

Initializing Network Interface eth0
Kernel filter, protocol ALL, raw packet socket
Decoding Ethernet on interface eth0

        --== Initialization Complete ==--

-*> Snort! <*-
Version 1.7
By Martin Roesch (roesch@clark.net, www.snort.org)
04/16-16:46:17.350156 192.168.2.2:1065 -> 10.100.100.50:53
UDP TTL:64 TOS:0x0 ID:44084 IpLen:20 DgmLen:66
Len: 46
=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

04/16-16:46:17.351600 10.100.100.50:53 -> 192.168.2.2:1065
UDP TTL:63 TOS:0x0 ID:62525 IpLen:20 DgmLen:172
Len: 152
=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

04/16-16:46:17.352827 192.168.2.2 -> 192.168.2.5
ICMP TTL:64 TOS:0x0 ID:44085 IpLen:20 DgmLen:84
Type:8  Code:0  ID:33064   Seq:0  ECHO
=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+=+

04/16-16:46:17.353082 192.168.2.5 -> 192.168.2.2
ICMP TTL:128 TOS:0x0 ID:21657 IpLen:20 DgmLen:84
Type:0  Code:0  ID:33064  Seq:0  ECHO REPLY
```

Starting Snort

- If you use the -d option to have Snort capture application-layer data, you will capture additional information.
- snort -vd

Starting Snort



```
[root@keats snort]# /usr/sbin/snort -vd

        --== Initializing Snort ==--

Initializing Network Interface eth0
Kernel filter, protocol ALL, raw packet socket
Decoding Ethernet on interface eth0

        --== Initialization Complete ==--

-*> Snort! <*-
Version 1.7
By Martin Roesch (roesch@clark.net, www.snort.org)
04/16-16:51:04.885917 192.168.2.2:1065 -> 10.100.100.50:53
UDP TTL:64 TOS:0x0 ID:44094 IpLen:20 DgmLen:66
Len: 46
6E F5 01 00 00 01 00 00 00 00 00 00 05 6A 61 6D  n............jam
65 73 0A 73 74 61 6E 67 65 72 6E 65 74 03 63 6F  es.stangernet.co
6D 00 00 01 00 01                                m.....

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

04/16-16:51:04.887431 10.100.100.50:53 -> 192.168.2.2:1065
UDP TTL:63 TOS:0x0 ID:62536 IpLen:20 DgmLen:172
Len: 152
6E F5 85 80 00 01 00 01 00 02 00 02 05 6A 61 6D  n............jam
65 73 0A 73 74 61 6E 67 65 72 6E 65 74 03 63 6F  es.stangernet.co
6D 00 00 01 00 01 C0 0C 00 01 00 01 00 01 51 80  m.............Q.
00 04 C0 A8 02 05 0A 73 74 61 6E 67 65 72 6E 65  .......stangerne
74 03 63 6F 6D 00 00 02 00 01 00 01 51 80 00 08  t.com.......Q...
05 6A 61 63 6F 62 C0 36 C0 36 00 02 00 01 00 01  .jacob.6.6......
51 80 00 0C 09 73 74 75 64 65 6E 74 35 38 C0 36  Q....student58.6
C0 50 00 01 00 01 00 01 51 80 00 04 0A 64 64 32  .P......Q....dd2
C0 64 00 01 00 01 00 01 51 80 00 04 C0 A8 02 5D  .d......Q......]

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

04/16-16:51:04.888616 192.168.2.2 -> 192.168.2.5
ICMP TTL:64 TOS:0x0 ID:44095 IpLen:20 DgmLen:84
Type:8  Code:0  ID:34088   Seq:0  ECHO
41 8F DB 3A BE E7 0A 00 08 09 0A 0B 0C 0D 0E 0F  A..:............
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F  ................
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F   !"#$%&'()*+,-./
30 31 32 33 34 35 36 37                          01234567

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

04/16-16:51:04.888870 192.168.2.5 -> 192.168.2.2
ICMP TTL:128 TOS:0x0 ID:21684 IpLen:20 DgmLen:84
Type:0  Code:0  ID:34088  Seq:0  ECHO REPLY
41 8F DB 3A BE E7 0A 00 08 09 0A 0B 0C 0D 0E 0F  A..:............
10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F  ................
20 21 22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F   !"#$%&'()*+,-./
30 31 32 33 34 35 36 37                          01234567

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

04/16-16:51:04.888879 192.168.2.2:1065 -> 10.100.100.50:53
UDP TTL:64 TOS:0x0 ID:44096 IpLen:20 DgmLen:70
Len: 50
6E F6 01 00 00 01 00 00 00 00 00 00 01 35 01 32  n............5.2
```

Logging Snort Entries

- /usr/sbin/snort -u snort -g snort -dev -l /var/log/snort -h 192.168.2.0/24
- This command starts Snort under a user and group of Snort.
- It then logs all packets to the /var/log/snort directory.
- The e option has Snort read data link layer headers, as well.
- The –h command tells Snort that the 192.168.2.0/24 network is the home network and to log all packets relative to the 192.168.2.0 system.

Running Snort as a Network-Based IDS

- snort -u snort -g snort -dev -h 192.168.2.0/24 -d -D -i eth0 -c /etc/snort/snort.conf

- This command has snort run in daemon mode (-D) and specifies the eth0 interface.

- The last part of the command specifies the snort.conf file, which if properly configured will enable Snort to log traffic only as it violates the rules it contains.

Question?