Kali Linux and dsniff

Version 0.1, Last Updated: 3 Sep 2021

This site is dedicated to sharing information about the practice, ideas, concepts and patterns regarding computer security.

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1. Introduction

The motivation behind this paper is to explore using the tool dsniff that comes with Kali Linux.

From the Developer of the tool:

"dsniff is a collection of tools for network auditing and penetration testing. dsniff, filesnarf, mailsnarf, msgsnarf, urlsnarf, and webspy passively monitor a network for interesting data (passwords, e-mail, files, etc.). arpspoof, dnsspoof, and macof facilitate the interception of network traffic normally unavailable to an attacker (e.g, due to layer-2 switching). sshmitm and webmitm implement active monkey-in-the-middle attacks against redirected SSH and HTTPS sessions by exploiting weak bindings in ad-hoc PKI.

I wrote these tools with honest intentions - to audit my own network, and to demonstrate the insecurity of most network application protocols. Please do not abuse this software."

source: https://www.monkey.org/~dugsong/dsniff/

This is an older tool, circa late 90's and early 2000's that as of several months ago, still has active development on said.

Evidence here:

https://salsa.debian.org/pkg-security-team/dsniff/-/blob/debian/master/debian/changelog

I would like to demonostrate several of the tools that come with the dsniff package.

But before we delve into this fun, we need a secure lab setup in order to safely test these tools.

Let us proceed, shall we.

2. Requirements

2.1. Writing Conventions

If you see the following $ symbol on a command line to execute, what that means is that the command is executed as a regular user; meaning an account that does not have administrative privileges. Ignore the leading $ and execute the rest of the command.

```
$ command to execute as a regular user
```

If you see a command line lead with the # symbol, then that means that the command is executed as the root user. This implies you need to elevate to the root user before running the command, e.g. with: `sudo su - root`.

```
# command to execute as the root user
```

2.2. VirtualBox

Go to: https://www.virtualbox.org/wiki/Downloads and download VirtualBox.

The author is running on Ubuntu 18.04, so following to this URL: https://www.virtualbox.org/wiki/Linux_Downloads

For Ubuntu, double click on the .deb file, i.e. virtualbox-5.2_5.2.0-118431-Ubuntu-zesty_amd64.deb, and install VirtualBox on your local workstation.

2.2.1. Clean VirtualBox Networking

This section is here in case you already had virtualbox installed from before. The intent is to clean up the previous networking. If you do not need to do this, skip to Add VirtualBox Networking

Run these two commands from a Terminal:

```
$ VBoxManage list natnetworks
$ VBoxManage list dhcpservers
```

Output (example):

```
NetworkName:    192.168.139-NAT
IP:             192.168.139.1
Network:        192.168.139.0/24
IPv6 Enabled:   No
IPv6 Prefix:    fd17:625c:f037:2::/64
DHCP Enabled:   Yes
Enabled:        Yes
loopback mappings (ipv4)
        127.0.0.1=2


NetworkName:    192.168.139-NAT
Dhcpd IP:       192.168.139.3
LowerIPAddress: 192.168.139.101
UpperIPAddress: 192.168.139.254
NetworkMask:    255.255.255.0
Enabled:        Yes
Global Configuration:
    minLeaseTime:     default
    defaultLeaseTime: default
    maxLeaseTime:     default
    Forced options:   None
    Suppressed opts.: None
        1/legacy: 255.255.255.0
Groups:               None
Individual Configs:   None

NetworkName:    HostInterfaceNetworking-vboxnet0
Dhcpd IP:       172.20.0.3
LowerIPAddress: 172.20.0.101
UpperIPAddress: 172.20.0.254
NetworkMask:    255.255.255.0
Enabled:        Yes
Global Configuration:
    minLeaseTime:     default
    defaultLeaseTime: default
    maxLeaseTime:     default
    Forced options:   None
    Suppressed opts.: None
        1/legacy: 255.255.255.0
Groups:               None
Individual Configs:   None
```

Now, delete ALL of the pre-installed VirtualBox networks (one at a time following the syntax below):

```
VBoxManage natnetwork remove --netname <NetworkName_from_above>
VBoxManage natnetwork remove --netname 192.168.139-NAT
```

Repeat as many times as necessary to delete all of them.

Now, delete ALL of the pre-installed DHCP services:

```
VBoxManage dhcpserver remove --netname <DHCP_Server_NetworkName_from_above>
VBoxManage dhcpserver remove --netname 192.168.139-NAT
```

Repeat as many times as necessary to delete all of them.

2.2.2. Add VirtualBox Networking

Now, add the new VirtualBox networks so the Kali Linux guides work.

```
VBoxManage natnetwork add \
    --netname 192.168.139-NAT \
    --network "192.168.139.0/24" \
    --enable --dhcp on

VBoxManage dhcpserver add \
    --netname 192.168.139-NAT \
    --ip 192.168.139.3 \
    --lowerip 192.168.139.101 \
    --upperip 192.168.139.254 \
    --netmask 255.255.255.0 \
    --enable

VBoxManage hostonlyif create

VBoxManage hostonlyif ipconfig vboxnet0 \
    --ip 172.20.0.1 \
    --netmask 255.255.255.0

VBoxManage dhcpserver add \
    --ifname vboxnet0 \
    --ip 172.20.0.3 \
    --lowerip 172.20.0.101 \
    --upperip 172.20.0.254 \
    --netmask 255.255.255.0

VBoxManage dhcpserver modify \
    --ifname vboxnet0 \
    --enable
```

VirtualBox install complete.

2.3. Vagrant

Go to: https://www.vagrantup.com/downloads.html, follow the appropriate link to your OS and 32 or 64 bit version representing your local workstation. Download.

For Ubuntu, double click on the .deb file, i.e. vagrant_2.0.1_x86_64.deb, and install Vagrant on your local system.

2.4. Kali Linux and Damn Vulnerable Web Application (DVWA)

The author highly recommends to create a directory structure that is easy to navigate and find your code. As an example, you could use something similar to:

```
${HOME}/Source_Code/Education/vagrant-machines/kali-linux-vm/
```

Go ahead and make this structure with the following command (inside a Terminal):

```
$ mkdir -p ${HOME}/Source_Code/Education/vagrant-machines/kali-linux-vm/
```

From a Terminal, change directory to:

```
$ cd ${HOME}/Source_Code/Education/vagrant-machines/kali-linux-vm/
```

2.4.1. Vagrantfile

Inside of the kali-linux-vm directory, populate a new file with the exact name, “Vagrantfile”. Case matters, uppercase the “V”. This file will contain both virtual machines for Kali Linux as well as setting up the DVWA virtual machine.

Aggregating both virtual machines into one file has saved the author a lot of time. The coolness here is setting up the variables at the top of the Vagrantfile mimicing shell scripting inside of a virtual machine (passed in with provision: shell). I tested using: `apt-get update && apt-get upgrade -y`, but opted to take it out since it took over 45 minutes on my slower (old) hardware. See comment about downloading this file immediately preceding the code block.

```
# -*- mode: ruby -*-
# vi: set ft=ruby :

$os_update = <<SCRIPT
apt-get update
SCRIPT

VAGRANTFILE_API_VERSION = "2"


Vagrant.configure(VAGRANTFILE_API_VERSION) do |config|
    config.vm.define "kali-linux-vagrant" do |conf|
        conf.vm.box = "kalilinux/rolling"

        # For Linux systems with the Wireless network, uncomment the line:
        conf.vm.network "public_network", bridge: "wlo1", auto_config: true

        # For macbook/OSx systems, uncomment the line and comment out the Linux Wireless network:
        #conf.vm.network "public_network", bridge: "en0: Wi-Fi (AirPort)", auto_config: true

        conf.vm.hostname = "kali-linux-vagrant"
        conf.vm.provider "virtualbox" do |vb|
            vb.gui = true
            vb.memory = "4096"
            vb.cpus = "2"
            vb.customize ["modifyvm", :id, "--vram", "32"]
            vb.customize ["modifyvm", :id, "--accelerate3d", "off"]
            vb.customize ["modifyvm", :id, "--ostype", "Debian_64"]
            vb.customize ["modifyvm", :id, "--boot1", "dvd"]
            vb.customize ["modifyvm", :id, "--boot2", "disk"]
            vb.customize ["modifyvm", :id, "--audio", "none"]
            vb.customize ["modifyvm", :id, "--clipboard", "hosttoguest"]
            vb.customize ["modifyvm", :id, "--draganddrop", "hosttoguest"]
            vb.customize ["modifyvm", :id, "--paravirtprovider", "kvm"]
        end
        conf.vm.provision "shell", inline: $os_update
    end

    config.vm.define "dvwa-vagrant" do |conf|

        conf.vm.box = "ubuntu/xenial64"

        conf.vm.hostname = "dvwa-vagrant"

        # For Linux systems with the Wireless network, uncomment the line:
        conf.vm.network "public_network", bridge: "wlo1", auto_config: true

        # For macbook/OSx systems, uncomment the line and comment out the Linux Wireless network:
        #conf.vm.network "public_network", bridge: "en0: Wi-Fi (AirPort)", auto_config: true

        config.vm.network "forwarded_port", guest: 80, host: 8080, auto_correct: true
        config.vm.network "forwarded_port", guest: 3306, host: 3306, auto_correct: true

        conf.vm.provider "virtualbox" do |vb|
            vb.memory = "1024"
            vb.cpus = "2"
            vb.gui = false
            vb.customize ["modifyvm", :id, "--vram", "32"]
            vb.customize ["modifyvm", :id, "--accelerate3d", "off"]
            vb.customize ["modifyvm", :id, "--ostype", "Ubuntu_64"]
            vb.customize ["modifyvm", :id, "--boot1", "dvd"]
            vb.customize ["modifyvm", :id, "--boot2", "disk"]
            vb.customize ["modifyvm", :id, "--audio", "none"]
            vb.customize ["modifyvm", :id, "--clipboard", "hosttoguest"]
            vb.customize ["modifyvm", :id, "--draganddrop", "hosttoguest"]
            vb.customize ["modifyvm", :id, "--paravirtprovider", "kvm"]
        end
        conf.vm.provision "shell", inline: $os_update
        conf.vm.provision :shell, path: "bootstrap.sh"
    end
end
```

Save and write this file.

You can also download from:

```
$ curl -o Vagrantfile  http://securityhardening.com/files/Vagrantfile_20200928.txt
```

2.4.2. bootstrap.sh

Inside of the kali-linux-vm directory, populate a new file with the exact name, `bootstrap.sh`. Case matters, all lowercase. See comment about downloading this file immediately preceding the code block. `bootstrap.sh` (include the shebang in your file: the first line with `#!/usr/bin/env bash`):

```
#!/usr/bin/env bash
PHP_FPM_PATH_INI='/etc/php/7.0/fpm/php.ini'
PHP_FPM_POOL_CONF='/etc/php/7.0/fpm/pool.d/www.conf'
MYSQL_ROOT_PW='Assword12345'
MYSQL_dvwa_user='dvwa'
MYSQL_dvwa_password='sunshine'
DVWA_admin_password='admin'
recaptcha_public_key='u8392ihj32kl8hujalkshuil32'
recaptcha_private_key='89ry8932873832lih32ilj32'


install_base() {
    add-apt-repository -y ppa:nginx/stable
    sudo apt-get update
    sudo apt-get dist-upgrade -y
    sudo apt-get install -y \
        nginx \
        mariadb-server \
        mariadb-client \
        php \
        php-common \
        php-cgi \
        php-fpm \
        php-gd \
        php-cli \
        php-pear \
        php-mcrypt \
        php-mysql \
        php-gd \
        git \
        vim
}

config_mysql(){
    mysqladmin -u root password "${MYSQL_ROOT_PW}"
## Config the mysql config file for root so it doesn't prompt for password.
## Also sets pw in plain text for easy access.
## Don't forget to change the password here!!

cat <<EOF > /root/.my.cnf
[client]
user="root"
password="${MYSQL_ROOT_PW}"
EOF
    mysql -BNe "drop database if exists dvwa;"
    mysql -BNe "CREATE DATABASE dvwa;"
    mysql -BNe "GRANT ALL ON *.* TO '"${MYSQL_dvwa_user}"'@'localhost' IDENTIFIED BY '"${MYSQL_dvwa_password}"';"

    systemctl enable mysql
    systemctl restart mysql
    sleep 2
}


config_php(){
    ## Config PHP FPM INI to disable some security settings:

    sed -i 's/^;cgi.fix_pathinfo.*$/cgi.fix_pathinfo = 0/g' ${PHP_FPM_PATH_INI}
    sed -i 's/allow_url_include = Off/allow_url_include = On/g' ${PHP_FPM_PATH_INI}
```

```
    sed -i 's/allow_url_fopen = Off/allow_url_fopen = On/g' ${PHP_FPM_PATH_INI}
    sed -i 's/safe_mode = On/safe_mode = Off/g' ${PHP_FPM_PATH_INI}
    echo "magic_quotes_gpc = Off" >> ${PHP_FPM_PATH_INI}
    sed -i 's/display_errors = Off/display_errors = On/g' ${PHP_FPM_PATH_INI}

    ## explicitly set pool options
    ## (these are defaults in ubuntu 16.04 so i'm commenting them out.
    ## If they are not defaults for you try uncommenting these)
    #sed -i 's/^;security.limit_extensions.*$/security.limit_extensions = \
    #.php .php3 .php4 .php5 .php7/g' /etc/php/7.0/fpm/pool.d/www.conf
    #sed -i 's/^listen.owner.*$/listen.owner = www-data/g' /etc/php/7.0/fpm/pool.d/www.conf
    #sed -i 's/^listen.group.*$/listen.group = www-data/g' /etc/php/7.0/fpm/pool.d/www.conf
    #sed -i 's/^;listen.mode.*$/listen.mode = 0660/g' /etc/php/7.0/fpm/pool.d/www.conf


    systemctl restart php7.0-fpm
}


config_nginx(){

cat << 'EOF' > /etc/nginx/sites-enabled/default
server
{
    listen  80;
    root /var/www/html;
    index index.php index.html index.htm;
    #server_name localhost
    location "/"
    {
        index index.php index.html index.htm;
        #try_files $uri $uri/ =404;
    }

    location ~ \.php$
    {
        include /etc/nginx/fastcgi_params;
        fastcgi_pass unix:/var/run/php/php7.0-fpm.sock;
        fastcgi_index index.php;
        fastcgi_param SCRIPT_FILENAME $request_filename;
    }
}
EOF

    systemctl restart nginx
}


install_dvwa(){

    if [[ ! -d "/var/www/html" ]];
    then
          mkdir -p /var/www;
          ln -s /usr/share/nginx/html /var/www/html;
          chown -R www-data. /var/www/html;
    fi

    cd /var/www/html
    rm -rf /var/www/html/.[!.]*
    rm -rf /var/www/html/*
    git clone https://github.com/ethicalhack3r/DVWA.git ./
    chown -R www-data. ./
    cp config/config.inc.php.dist config/config.inc.php

    ### chmod uploads and log file to be writable by nobody
    chmod 777 ./hackable/uploads/
    chmod 777 ./external/phpids/0.6/lib/IDS/tmp/phpids_log.txt

    ## change the values in the config to match our setup (these are what you need to update!
    sed -i '/db_user/ s/root/'${MYSQL_dvwa_user}'/' /var/www/html/config/config.inc.php
    sed -i '/db_password/ s/p@ssw0rd/'${MYSQL_dvwa_password}'/' /var/www/html/config/config.inc.php
    sed -i "/recaptcha_public_key/ s/''/'"${recaptcha_public_key}"'/" /var/www/html/config/config.inc.php
    sed -i "/recaptcha_private_key/ s/''/'"${recaptcha_private_key}"'/" /var/www/html/config/config.inc.php

}
```

```
update_mysql_user_pws(){
## The mysql passwords are set via /usr/share/nginx/html/dvwa/includes/DBMS/MySQL.php.
#  If you edit this every time they are reset it will reset to those.
#  Otherwise you can do a sql update statement to update them all (they are just md5's of the string.
#  The issue is the users table doesn't get created until you click that button T_T to init.

#mysql -BNe "UPDATE dvwa.users SET password = md5('YOUR_MYSQL_PW_HERE') WHERE user = 'admin';"
#mysql -BNe "UPDATE dvwa.users SET password = md5('YOUR_MYSQL_PW_HERE') WHERE user = 'gordonb';"
#mysql -BNe "UPDATE dvwa.users SET password = md5('YOUR_MYSQL_PW_HERE') WHERE user = '1337';"
#mysql -BNe "UPDATE dvwa.users SET password = md5('YOUR_MYSQL_PW_HERE') WHERE user = 'pablo';"
#mysql -BNe "UPDATE dvwa.users SET password = md5('YOUR_MYSQL_PW_HERE') WHERE user = 'smithy';"

sed -i '/admin/ s/password/'${DVWA_admin_password}'/g'  /var/www/html/dvwa/includes/DBMS/MySQL.php
sed -i '/gordonb/ s/abc123/'${DVWA_admin_password}'/g'  /var/www/html/dvwa/includes/DBMS/MySQL.php
sed -i '/1337/ s/charley/'${DVWA_admin_password}'/g'  /var/www/html/dvwa/includes/DBMS/MySQL.php
sed -i '/pablo/ s/letmein/'${DVWA_admin_password}'/g'  /var/www/html/dvwa/includes/DBMS/MySQL.php
sed -i '/smithy/ s/password/'${DVWA_admin_password}'/g'  /var/www/html/dvwa/includes/DBMS/MySQL.php
}


install_base
config_mysql
install_dvwa
update_mysql_user_pws
config_php
config_nginx
```

Save and write this file.

If you have issues with copying and pasting the above file because code blocks in PDFs always copy correctly [NOT!], you could use curl, i.e. Make sure the bootstrap.sh file ends up in the same directory as the Vagrantfile.

```
$ curl -o bootstrap.sh  http://securityhardening.com/files/bootstrap_sh_20200928.txt
```

From a Terminal, change directory to:

```
$ cd ${HOME}/Source_Code/Education/vagrant-machines/kali-linux-vm/
```

Then run (inside the directory kali-linux-vm):

```
$ vagrant up
```

This will download the appropriate images and start the virtual machines. Once running, through the VirtuaBox GUI, login as root. Password is “toor”, root backwards. Edit the following file: `/etc/ssh/sshd_config`

And change the line: `#PermitRootLogin prothibit-password` To: `PermitRootLogin yes` Meaning strip the comment out on the beginning of the line and alter `prohibit-password` to `yes`.

Then restart the ssh daemon:

```
# kill -HUP $(pgrep sshd)
```

Notice, you are on a Bridged adapter, this will open the instance to allow root to ssh in with the most unsecure password in the world. Only make this change (allowing root to login via SSH) if you require root SSH access. You can change the root user’s password, which is highly recommended.

For the DVWA instance, I would first run 'vagrant status' to capture the name that vagrant is using for the running instance.

```
# vagrant status
```

Choose

```
Current machine states:
kali-linux-vagrant running (virtualbox)
dvwa-vagrant running (virtualbox)
```

This environment represents multiple VMs. The VMs are all listed above with their current state. For more information about a specific VM, run `vagrant status NAME`.

From there, log into the DVWA instance with:

```
$ vagrant ssh dvwa-vagrant
```

And then get the current IP address.

```
$ ip a
```

Choose the second network adapter, it should look like:

```
ubuntu@dvwa:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 02:53:17:3c:de:80 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global enp0s3
        valid_lft forever preferred_lft forever
    inet6 fe80::53:17ff:fe3c:de80/64 scope link
        valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:f0:77:2d brd ff:ff:ff:ff:ff:ff
    inet 172.20.156.76/24 brd 172.20.156.255 scope global enp0s8
        valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fef0:772d/64 scope link
        valid_lft forever preferred_lft forever
```

The test network used for this paper uses 172.20.156.0/24 as the network range [shown here in section 3]. Therefore, the adapter, enp0s8 is what he is looking for. The IP to use as a target is 172.20.156.76. Write down your value.

3. dsniff

If you have not done so, go ahead and run `vagrant up` from inside of your directory containing the Vagrantfile.

Log into Kali Linux.

username:root

password:toor

From what I found this year, the software certificate has expired.

Run the following commands as the root user to update the Kali linux software certificate:

```
cd /root/

curl -O https://archive.kali.org/archive-key.asc

apt-key add ./archive-key.asc
```

In a terminal as the root user, run:

```
apt udpate
apt upgrade -y

systemctl reboot
```

Once rebooted, go ahead and log in again as the root user, open a terminal and run:

```
sudo apt install -y dsniff
```

In a separate terminal from your Kali Linux on your workstation/laptop open a new terminal and run:

```
vagrant status

vagrant ssh dvwa-vagrant
```

Once authenticated into DVWA, run this command:

```
hostname -I
```

That is a `-I` as in India.

Output:

```
10.0.2.15 172.20.156.67
```

For my network, the second IP is accurate. This IP will be my target interface for attacks and scans.

The first tool I want to study is the Password Sniffer. That looks exciting.

Usage for Password Sniffer:

```
root@kali:~# dsniff --help
dsniff: invalid option -- '-'
Version: 2.4
Usage: dsniff [-cdmn] [-i interface | -p pcapfile] [-s snaplen]
              [-f services] [-t trigger[,...]] [-r|-w savefile]
              [expression]
```

3.1. First Test

Command I am using on the Kali Linux virtual machine:

```
dsniff -i eth0 -w my_password_sniff.savefile 'ip and not tcp port 22'
```

Then inside of Kali Linux virtual machine, open a web browser and go to the target URL, e.g. http://172.20.156.67:80/

This should produce something.

The session file, `my_password_sniff.savefile` is 8192 bytes long after this, but no password.

Adjusting.

3.2. Second Test

adjusting my thinking here

```
root@kali-linux-vagrant:/home/vagrant# dsniff -i eth0 -w my_password_sniff.savefile 'tcp port 80'
dsniff: listening on eth0 [tcp port 80]
```

Still nothing for my `admin` password inside of the saved file.

What the contents of the file look like:

```
$ cat -v my_password_sniff.savefile
^@^@^@^@^A^@^@^@^@^@^@^@b1^E^@  ^@^@^@^@^P^@^@^@
^@^@^@^@^@^@^A^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@O^H^R^@^A^H^@^@^\M-Z'VM-}
^@^@^@^@^@^@^@^@^@^@^B^@^@^@^@^@^@^@
^@^@^@^A^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^root@kali-linux-vagrant:/home/vagrant# dsniff -i eth1 -w my_password_sniff.savefile 'tcp port 80'
dsniff: listening on eth1 [tcp port 80]
^Croot@kali-linux-vagrant:/home/vagrant# ls -l
total 8
-rw------- 1 root root 8192 Nov 14 09:45 my_password_sniff.savefile
root@kali-linux-vagrant:/home/vagrant# dsniff  -r my_password_sniff.savefile
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
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@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^A^@^@^@^A^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^P^A^E^@^@^@^@^@^@^A^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^O^H^R^@^A^H^@^@^\M-Z'VM-}
^@^@^@^@^@^@^@^@^@^@^B^@^@^@^@^@^@^@
^@^@^@^A^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^
@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@^@
```

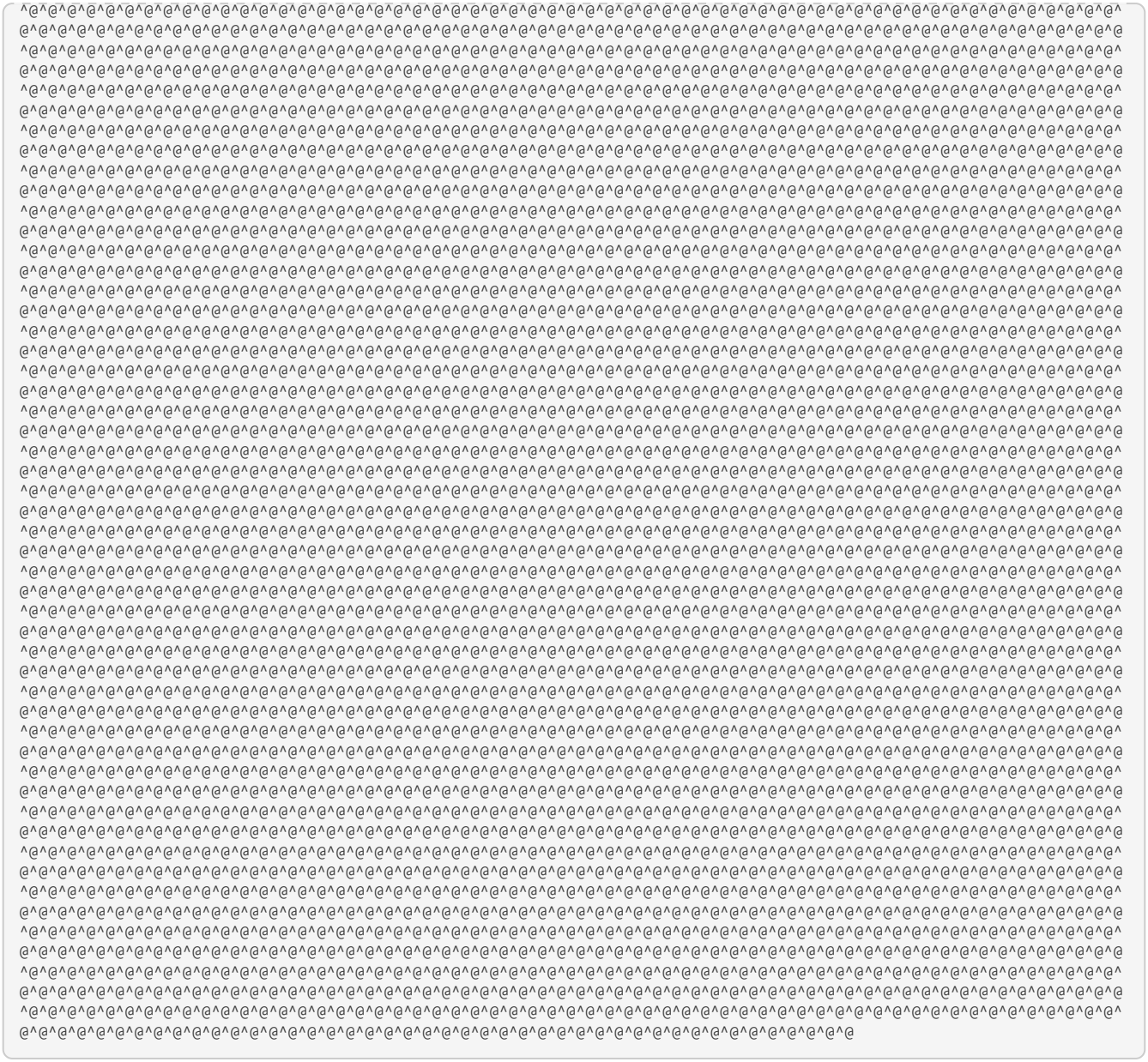

So far, admittingly, I could be using the wrong syntax with the results I believe I want.

I just found:

```
^Croot@kali-linux-vagrant:/home/vagrant# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:47:26:55 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute eth0
       valid_lft 84943sec preferred_lft 84943sec
    inet6 fe80::a00:27ff:fe47:2655/64 scope link noprefixroute
       valid_lft forever preferred_lft forever
3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:d5:8a:32 brd ff:ff:ff:ff:ff:ff
    inet 172.20.156.78/24 brd 172.20.156.255 scope global dynamic eth1
       valid_lft 84963sec preferred_lft 84963sec
    inet6 fe80::a00:27ff:fed5:8a32/64 scope link
       valid_lft forever preferred_lft forever
```

So yes, Syntax is off for the network adaptor, which should have been `eth1`, not `eth0`.

3.3. Third Test

```
root@kali-linux-vagrant:/home/vagrant# dsniff -i eth1 -w my_password_sniff.savefile 'tcp port 80'
dsniff: listening on eth1 [tcp port 80]

^Croot@kali-linux-vagrant:/home/vagrant# ls -l
total 8
-rw------- 1 root root 8192 Nov 14 09:45 my_password_sniff.savefile

root@kali-linux-vagrant:/home/vagrant# dsniff  -r my_password_sniff.savefile
```

You can see my Control + C kill after I have logged in via Firefox from inside of the Kali Linux server.

The file `my_password_sniff.savefile` still has a file size of 8192 bytes and still no interesting content.

3.4. Fourth Test

I installed `dsniff` on the DVWA virtual machine here.

```
root@dvwa-vagrant:~# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 02:95:cf:22:ea:76 brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global enp0s3
       valid_lft forever preferred_lft forever
    inet6 fe80::95:cfff:fe22:ea76/64 scope link
       valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 08:00:27:51:c9:06 brd ff:ff:ff:ff:ff:ff
    inet 172.20.156.67/24 brd 172.20.156.255 scope global enp0s8
       valid_lft forever preferred_lft forever
    inet6 fe80::a00:27ff:fe51:c906/64 scope link
       valid_lft forever preferred_lft forever
root@dvwa-vagrant:~# dsniff -ni enp0s8
dsniff: listening on enp0s8
```

Still nothing usefull for the password sniffing.

I am going to cut my losses with the password sniff at this juncture since clearly I am doing something wrong. I have spent a few minutes Googling for this and everyone [minus the author] seem to be focusing on arpspoof and the other tools in this suite. Adjusting!

3.5. Arpspoof

Man Page for arpspoof

```
SYNOPSIS
       arpspoof [-i interface] [-c own|host|both] [-t target] [-r] host

DESCRIPTION
       arpspoof  redirects  packets  from  a  target  host  (or  all hosts) on the LAN intended for another host on
the LAN by forging ARP replies.  This is an
       extremely effective way of sniffing traffic on a switch.

       Kernel IP forwarding (or a userland program which accomplishes the same, e.g. fragrouter(8)) must be turned
on ahead of time.

OPTIONS
       -i interface
              Specify the interface to use.

       -c own|host|both
              Specify which hardware address t use when restoring the arp configuration; while cleaning up, packets
can be send with the own address as well as
              with  the address of the host. Sending packets with a fake hw address can disrupt connectivity with
certain switch/ap/bridge configurations, how-
              ever it works more reliably than using the own address, which is the default way arpspoof cleans up
afterwards.

       -t target
              Specify a particular host to ARP poison (if not specified, all hosts on the LAN). Repeat to specify
multiple hosts.

       -r     Poison both hosts (host and target) to capture traffic in both directions.  (only valid in conjuntion
with -t)

       host   Specify the host you wish to intercept packets for (usually the local gateway).
```

3.5.1. Test run with Arpspoof

```
root@kali-linux-vagrant:/home/vagrant# arpspoof -i eth1 -t 172.20.156.67 -r 172.20.156.1
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at 8:0:27:d5:8a:32
^CCleaning up and re-arping targets...
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at a0:4:60:a:29:dd
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at a0:4:60:a:29:dd
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at a0:4:60:a:29:dd
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at a0:4:60:a:29:dd
8:0:27:d5:8a:32 8:0:27:51:c9:6 0806 42: arp reply 172.20.156.1 is-at a0:4:60:a:29:dd
```

Success!

Target: 172.20.156.67

Router: 172.20.156.1

In a serparate terminal in Kali Linux virtual machine, run:

```
arpspoof -i eth1 -t 172.20.156.1 -r 172.20.156.67
```

interface: eth1

target: 172.20.156.1 ## the router

victim_target: 172.20.156.67

What this looks like from the DVWA virtual machine:

```
root@dvwa-vagrant:~# tcpdump -i enp0s8 -nnvltq -s 1524 'arp'
tcpdump: listening on enp0s8, link-type EN10MB (Ethernet), capture size 1524 bytes
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.58 is-at a0:04:60:0a:12:8b, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.194 tell 172.20.156.1, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.127 tell 169.254.57.20, length 498
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.85 (24:77:03:c4:7d:2c) tell 172.20.156.58, length
46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.194 tell 172.20.156.1, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.61 tell 169.254.57.20, length 498
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.128 tell 169.254.57.20, length 498
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.194 tell 172.20.156.1, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.59 tell 169.254.57.20, length 498
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.198 tell 169.254.57.20, length 498
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.85 (24:77:03:c4:7d:2c) tell 172.20.156.58, length
46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.59 is-at b0:e4:d5:b7:5c:64, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.119 tell 169.254.57.20, length 498
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.119 is-at f2:2b:38:82:26:39, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.194 tell 172.20.156.1, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.54 tell 169.254.57.20, length 498
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.194 tell 172.20.156.1, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.63 tell 169.254.57.20, length 498
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.194 tell 172.20.156.1, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.68 tell 169.254.57.20, length 498
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Request who-has 172.20.156.85 tell 172.20.156.57, length 46
```

This is interesting to me. We can see the arp `who-has` as well as the `Reply`.

Isolating down to just the Kali Linux and DVWA

```
root@dvwa-vagrant:~# tcpdump -i enp0s8 -nnvltq -s 1524 'arp and (host 172.20.156.67 or host 172.20.156.78)'
tcpdump: listening on enp0s8, link-type EN10MB (Ethernet), capture size 1524 bytes
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
ARP, Ethernet (len 6), IPv4 (len 4), Reply 172.20.156.1 is-at 08:00:27:d5:8a:32, length 46
```

Where we are at right now is we need a third session terminal opened on Kali Linux and running a listener for unencrypted protocols, like: FTP, HTTP, SNMP, POP, LDAP. We could run:

```
root@kali-linux-vagrant:~# dsniff -i eth1
dsniff: listening on eth1
```

And then any traffic being spoofed back to Kali Linux that was unencrypted, would be able to scan for passwords.

3.6. Other tools

To sniff only URL’s information:

```
urlsnarf -n -i eth1
```

To sniff SMTP mail traffic:

```
mailsnarf -n -i eth1
```

To sniff messages, "msgsnarf records selected messages from AOL Instant Messenger, ICQ 2000, IRC, MSN Messenger, or Yahoo Messenger chat sessions.":

```
msgsnarf -i eth1
```

4. Conclusion

The author has demonstrated a few of the tools in the `dsniff` suite.

There is still a very solid use for the tool `arpspoof` in order to create a man-in-the-middle attack.

The tooling was originally written when SSL certificates were not very well known and a lot of information could be gathered because sites had not switched to PKI (x509) certificates to encrypt traffic from client to server. That said, today's use for this tool means you will have to have a compromised server in the target subnet, then use `arpspoof` to spoof the switch and force all traffic to the compromised server, where a listener will need to be running either on tcp port 80, but more likely tcp port 443 and said listener will need to act as an SSL proxy between the client and the eventual destination. In that capacity, the listener service can then decrypt the traffic, observing what it needs to (meaning looking for sensitive data: e.g. user names, passwords, and possibly credit card numbers).

The author highly recommends never to dismiss older tools like what has been shown because with some creativity, they can still be used in a manner that helps and/or furthers network security.

5. Appendix

References

https://www.kali.org/tools/dsniff/

https://www.monkey.org/~dugsong/dsniff/

source code: https://salsa.debian.org/pkg-security-team/dsniff