Practical Network Defense

Master's degree in Cybersecurity 2020-21

IPv6 addressing lab

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Lab activity

Main tasks

- Properly configure the topology provided in the lab packages
- Manual configuration
  - Via ip and via interfaces file
- Automatic configuration
  - Via SLAAC
  - Via SLAAC + stateless DHCP

Reference links

- Linux ipv6 configuration: ipv6 sysctl
  - https://www.kernel.org/doc/Documentation/networking/ip-sysctl.txt
- Routing Advertisement deaemon: radvd
  - https://manpages.debian.org/testing/radvd/radvd.conf.5.en.html
  - https://www.linuxtopia.org/online_books/network_administration_guides/Linux+IPv6-HOWTO/hints-daemons-radvd.html
- dibbler DHCPv6 server/client
  - https://klub.com.pl/dhcpv6/doc/dibbler-user.pdf
- dnsmasq network Swiss-knife:
  - https://thekelleys.org.uk/dnsmasq/docs/dnsmasq-man.html#index

To do the activities

- We will use Kathará (formerly known as netkit)
  - A container-based framework for experimenting computer networking: http://www.kathara.org/
- A virtual machine is made ready for you
  - https://drive.google.com/open?id=15WlXIlTWXQnZuXEdYk2WSM5KLlFa9Fqx
- For not-Cybersecurity students, please have a look at the Network Infrastructure Lab material
  - http://stud.netgroup.uniroma2.it/~marcos/network_infrastructures/current/cyber/
    - Instructions are for netkit, we will use kathara

The kathara VM

- It should work in both Virtualbox and VMware
- It should work in Linux, Windows and MacOS
- There are some alias (shortcuts) prepared for you
  - Check with **`alias`**
- All the exercises can be found in the git repository:
  - https://github.com/vitome/pnd-labs.git
- You can move in the directory and run lstart
  - **NOTE**: the first lstart attempt can (...will...) fail

Lab activity: ex1

Exercise 1: pnd-labs/lab2/ex1

- Manually configure pc1, pc2, pc3 and pc4 in order to be in two different subnetworks and r1 to be the default gateway for all of the hosts
  - See the README file for the addresses to assign
- Configure pc1 using the `interfaces` file (before starting the lab), within the pc1/etc/network/ directory
- Configure pc2 and pc4 using the **`ip`** command
- Configure pc3 using the **`ifconfig`** command
- The DNS server can be the server used by the host machine
  - This should be used also in the **`r1`**
- The default gateway must be the r1 host
  - Remember: its link-local address
- Verify connectivity within the network with ping
  - See the difference when pinging a link-local address and a GUA

Lab activity: ex2

Exercise 2: pnd-labs/lab2/ex2

- Configure the four PC in order to receive their networking configuration using SLAAC
- See the README file for the different settings
- Capture the router advertisements/solicitation sent in the network
  - The `radvd` has to be started manually, so that you can launch `tcpdump` before
- Verify connectivity within the network with ping

Lab activity: ex3

Exercise 3: pnd-labs/lab2/ex3

- Configure the router and the PC
  - Router has to correctly advertise prefix, route and stateless directive (namely, via sysctl, dnsmasq)
  - Pcs have to receive their networking configuration using SLAAC and stateless DHCP
- See the README file for the different settings
- Capture the router advertisements/solicitation sent in the network
  - You should start the `dnsmasq` in foreground (-d option), so that you can launch `tcpdump` before
- Verify connectivity within the network with ping

Dnsmasq

- Very comfortable with dual stack hosts
- It handles both IPv4 and IPv6
- With DHCP it is very useful:
  - You can use DHCPv4 to get IPv4 configuration AND to send your hostname
  - You can use DHCPv6 to get IPv6 configuration
  - If the dnsmasq is also the DNS it knows ALL the hostnames in a quite automated way

That’s all for today

- **Questions?**
- See you next lecture!!