

# Linux TCP/IP Network Management

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## Outline

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- Why we need to know?
- Install more than one Ethernet card per machine.
- Files related to networking functionality.
- Configure TCP/IP networking manually with the command line.

## Why we need to know?

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- Linux is one of the best existing operating systems in the world for networking features.
- Understanding your hardware network and all files related to it is very important if you want to have a full control of what happens on your server.

# Install more than one Ethernet card per machine

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- Why do we need more than one Ethernet card?
  - Use Linux as a gateway between two networks
  - ...
- Should specify the parameters of the two card somewhere?
  - The “lilo.conf” file for a monolithic kernel.
  - The “conf.modules” file for a modularized kernel.

## The `/etc/conf.modules`

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- For PCI cards, the module will typically detect all of the installed cards automatically.
- For ISA cards, we need to supply the I/O base address if the card in `/etc/conf.modules` file.

## The /etc/conf.modules (2)

- Example: we have two 3c509 cards, one at I/O 0x300 and the other at I/O 0x320.
  - For ISA cards, edit the conf.modules and add:

```
alias eth0 3c905
alias eth1 3c905
options 3c905 io=0x300,0x320
```
  - For PCI cards, only need the alias line, since the I/O base can be safely detected.

```
alias eth0 3c905
alias eth1 3c905
```

## The /etc/lilo.conf

- In some circumstance ISA cards need to add some explicit information in the /etc/lilo.conf file, the method is to pass boot-time arguments to the kernel.

```
boot=/dev/hda  
map=/boot/map  
install=/boot/boot.b  
prompt  
timeout=50  
default=linux
```

```
image=/boot/vmlinuz-2.2.14-5.0  
label=linux  
append="ether=0,0,eth1"  
root=/dev/hda2  
read-only
```

## Files related to network functionality

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- TCP/IP network in Linux is configured through several text files.
- Normal server does not have Xwindow interface, so it's important to know how to configure network in text mode.

## The /etc/HOSTNAME

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- Store your system's fully qualified domain name (FQDN).

mike.cpe.ku.ac.th

## The /etc/sysconfig/network-scripts/ifcfg-ethN

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- Configuration file for each network device.

```
DEVICE=eth0  
BOOTPROTO=static  
IPADDR=158.108.33.97  
NETMASK=255.255.255.192  
ONBOOT=yes
```

```
DEVICE=eth1  
BOOTPROTO=static  
IPADDR=192.168.33.97  
NETMASK=255.255.255.0  
ONBOOT=yes
```

## The /etc/sysconfig/network

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- Specify information about the desired network configuration on your server.

```
NETWORKING=yes  
HOSTNAME=mike.cpe.ku.ac.th  
GATEWAY=158.108.33.65  
GATEWAYDEV=eth0  
FORWARD_IPV4=yes
```

## The /etc/sysctl.conf

- The content of /etc/sysctl.conf is loaded at each boot to setup some network security parameters through kernel tunable parameters.

```
# Enables packet forwarding  
net.ipv4.ip_forward = 1  
# Enables source route verification  
net.ipv4.conf.default.rp_filter = 1  
# Disables the magic-sysrq key  
kernel.sysrq = 0
```

## The /etc/hosts

- Mapping of some hostnames to IP addresses.

#Windows machines

```
192.168.33.171 thor.cpe.ku.ac.th      thor
192.168.33.172 nautilus.cpe.ku.ac.th          nautilus
192.168.33.173 bucephalus.cpe.ku.ac.th  bucephalus
192.168.33.174 louis.cpe.ku.ac.th             louis
192.168.33.175 memepuppy.cpe.ku.ac.th  memepuppy
192.168.33.176 tweetybird.cpe.ku.ac.th tweetybird
192.168.33.177 na.cpe.ku.ac.th          na
192.168.33.178 jin.cpe.ku.ac.th           jin
192.168.33.179 nun.cpe.ku.ac.th      nun
192.168.33.180 lucifer.cpe.ku.ac.th       lucifer
```

#Another machines's IP is 180 up

```
192.168.33.185 tawa.cpe.ku.ac.th      tawa
```

#Aj.Arnan's IP is 200 up. MIKE don't use

```
192.168.33.230 anan.cpe.ku.ac.th    anan
```

## Configure TCP/IP networking manually with the command line

- To assign the eth0 interface the IP address of 192.168.33.116, use the command:

```
[root@godzilla]# ifconfig eth0 192.168.33.116 netmask 255.255.255.0
```

- To display all the interfaces you have on your server, use the command:

```
[root@godzilla]# ifconfig
```

```
eth0  Link encap:Ethernet  HWaddr 00:00:21:C5:59:4E  
      inet addr:192.168.33.116  Bcast:192.168.33.255  Mask:255.255.255.0  
      UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
      RX packets:9122158 errors:0 dropped:0 overruns:0 frame:0  
      TX packets:10896451 errors:0 dropped:0 overruns:0 carrier:0  
      collisions:0 txqueuelen:100  
      Interrupt:10 Base address:0xd800
```

```
lo    Link encap:Local Loopback  
      inet addr:127.0.0.1  Mask:255.0.0.0  
      UP LOOPBACK RUNNING  MTU:3924  Metric:1  
      RX packets:540932 errors:0 dropped:0 overruns:0 frame:0  
      TX packets:540932 errors:0 dropped:0 overruns:0 carrier:0  
      collisions:0 txqueuelen:0
```

## Configure TCP/IP networking manually with the command line (2)

- To assign the default gateway for 192.168.33.65, use the command:

```
[root@godzilla]# route add default gw 192.168.33.65
```

- To verify that it can reach your host, use the command:

```
[root@godzilla]# ping 192.168.33.65
```

```
PING 192.168.33.65 (192.168.33.65) from 192.168.33.116 : 56(84) bytes of data.  
64 bytes from mozilla.cpe.ku.ac.th (192.168.33.65): icmp_seq=0 ttl=255 time=0.4 ms  
64 bytes from mozilla.cpe.ku.ac.th (192.168.33.65): icmp_seq=1 ttl=255 time=0.2 ms
```

- To display the routing information, use the command:

```
[root@godzilla]# route
```

```
Kernel IP routing table
```

Destination	Gateway	Genmask	Flags	Metric	Ref	Use	Iface
godzilla.cpe.ku	*	255.255.255.255	UH	0	0	0	eth0
192.168.33.0	*	255.255.255.0	U	0	0	0	eth0
127.0.0.0	*	255.0.0.0	U	0	0	0	lo
default	mozilla.cpe.ku.	0.0.0.0	UG	0	0	0	eth0

## Configure TCP/IP networking manually with the command line (3)

- To check the status of the interface quickly, use the command:

```
[root@godzilla]# netstat -i
```

```
Kernel Interface table
```

Iface	MTU	Met	RX-OK	RX-ERR	RX-DRP	RX-OVR	TX-OK	TX-ERR	TX-DRP	TX-OVR	Flg
eth0	1500	0	9127220	0	0	0	10900792	0	0	0	BRU
lo	3924	0	540932	0	0	0	540932	0	0	0	LRU

- To show all active TCP connections, use the command:

```
[root@godzilla]# netstat -t
```

```
Active Internet connections (w/o servers)
```

Proto	Recv-Q	Send-Q	Local Address	Foreign Address	State
tcp	0	0	godzilla.cpe.ku.:telnet	mammoth.cpe.ku.ac.:2249	ESTABLISHED
tcp	0	0	godzilla.cpe.ku.ac:1264	nontri.ku.ac.th:pop3	ESTABLISHED
tcp	0	0	godzilla.cpe.ku.ac:1243	louis.cpe.ku.ac.th:6000	ESTABLISHED
tcp	0	126	godzilla.cpe.ku.:telnet	louis.cpe.ku.ac.th:1125	ESTABLISHED
tcp	0	0	godzilla.cpe.ku.ac:1023	tutu.cpe.ku.ac.th:login	ESTABLISHED
tcp	0	0	godzilla.cpe.ku.:telnet	mammoth.cpe.ku.ac.:1537	ESTABLISHED
tcp	0	0	godzilla.cpe.ku.:telnet	mammoth.cpe.ku.ac.:1514	ESTABLISHED

## Configure TCP/IP networking manually with the command line (4)

- To show all active and listen TCP connections, use the command:

```
[root@godzilla]# netstat -vat
```

```
Active Internet connections (servers and established)
```

Proto	Recv-Q	Send-Q	Local Address	Foreign Address	State
tcp	0	46	godzilla.cpe.ku.:telnet	mammoth.cpe.ku.ac.:2249	ESTABLISHED
tcp	0	0	godzilla.cpe.ku.ac:1264	nontri.ku.ac.th:pop3	ESTABLISHED
tcp	0	0	godzilla.cpe.ku.ac:1243	louis.cpe.ku.ac.th:6000	ESTABLISHED
tcp	0	138	godzilla.cpe.ku.:telnet	louis.cpe.ku.ac.th:1125	ESTABLISHED
tcp	0	0	*:11112	*:*	LISTEN
tcp	0	0	godzilla.cpe.ku.ac:1023	tutu.cpe.ku.ac.th:login	ESTABLISHED
tcp	0	0	*:11111	*:*	LISTEN
tcp	0	0	godzilla.cpe.ku.:telnet	mammoth.cpe.ku.ac.:1537	ESTABLISHED
tcp	0	0	godzilla.cpe.ku.:telnet	mammoth.cpe.ku.ac.:1514	ESTABLISHED
tcp	0	0	*:smtp	*:*	LISTEN
tcp	0	0	*:kerberos4	*:*	LISTEN
tcp	0	0	*:745	*:*	LISTEN
tcp	0	0	*:swat	*:*	LISTEN

# Linux TCP/IP Network Management

