

# Linux Networking: some miscellaneous essentials

David Morgan

© David Morgan 2003-2008

## The important details

- “Private” ip addresses
- Packet filter firewalling
- IP masquerading
- Packet sniffing
- IP aliasing
- Translation/resolution
  - IP address – to – ethernet address
  - domain name – to – IP address

© David Morgan 2003-2008

## IP addresses - private IPs

- Certain ranges are reserved
  - 10.x.x.x
  - 172.16.x.x ... 172.31.x.x
  - 192.168.0.x ... 192.168.255.x
- Commercial routers refuse to handle them
- For non-internet/intraLAN (private) purposes

© David Morgan 2003-2008

## IP Firewalling

- Filter for packets
  - set up in memory as series of if/then's
  - by some user interface (command, dialog)
- iptables (or ipchains) implements in linux
- Block/permit packet passage by
  - Address of source and/or destination
  - Port number
  - Interface
  - Protocol

© David Morgan 2003-2008

```
iptables -t filter -A OUTPUT -o eth1 -p tcp --sport 23 --dport 1024:65535
-s 192.168.4.0/24 -d 0.0.0.0/0 -j ACCEPT
```

- Table for this rule
- Rule action
  - -A add rule to chain/list
  - -D delete rule from chain/list
  - -P default policy for chain/list
- Rule chain/list (tables contain chains)
  - INPUT      • PREROUTING
  - OUTPUT     • POSTROUTING
  - FORWARD
- Packet qualifiers
  - By interface and direction
  - protocol
  - source port number(s)
  - destination port number(s)
  - source address (range)
  - destination address (range)
- Packet disposition
  - ACCEPT      • SNAT
  - DROP        • DNAT
  - REJECT

© David Morgan 2003-2008

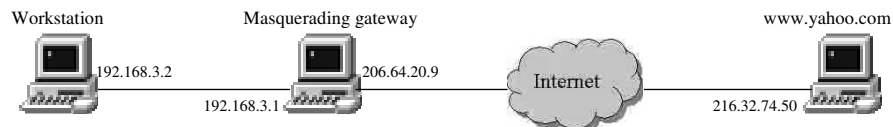
## IP masquerading

- Machines browse web w/o internet connection
- Gateway/translation service by linux machine
- Implemented as a function of firewalling

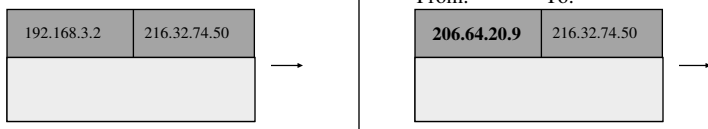
```
iptables -t nat -A POSTROUTING -j SNAT -to <gateway addr>
```
- Clients designate linux machine as gateway
- Is a kernel component – must be compiled in

© David Morgan 2003-2008

# IP masquerading



Outbound packet:



Reply:



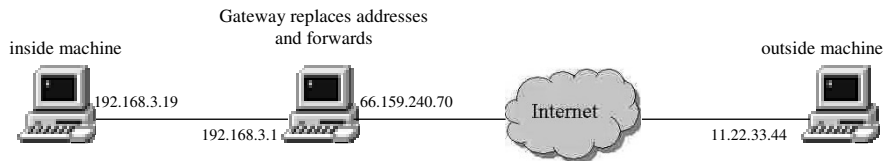
© David Morgan 2003-2008

# IP masquerading

- Also known as
  - Network Address Translation (NAT)
  - Internet Connection Sharing (ICS)
- Gateway must have “forwarding” turned on
  - `echo 1 > /proc/sys/net/ipv4/ip_forward`

© David Morgan 2003-2008

# IP forwarding



Inbound contact:

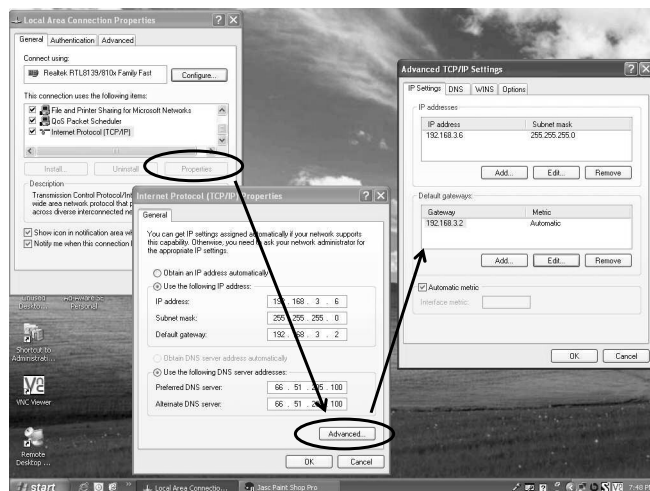


Outbound reply:



© David Morgan 2003-2008

# Gateway designation – Windows client



(linux equivalent:  
 route add default gw 192.168.3.2)

© David Morgan 2003-2008

## Tcpdump - packet sniffing

- prints packet header info
- captures packets passing through an interface
- e.g., `tcpdump -i eth1`

© David Morgan 2003-2008

## IP Aliasing

- multiple addresses on a single interface
- suffix `:n` onto interface name
  - `ifconfig eth0:1 192.168.0.11`
  - `ifconfig eth0:2 192.168.0.12`
  - `ifconfig eth0:3 192.168.0.13`
- gives `eth0` a (presumed) 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> address
- `eth0` answers to all its addresses

© David Morgan 2003-2008

# Translation – domain name-to-IP DNS

(domain name service)

- `/etc/hosts` to specify locally

```
192.168.4.21 jimmy
```

```
192.168.4.22 harry
```

```
192.168.4.23 hertsel
```

- `/etc/resolv.conf` to use DNS

```
nameserver 206.13.29.12
```

```
nameserver 206.13.30.12
```

© David Morgan 2003-2008