

# Linux Networking: IP internetworks

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## Routing: local vs global aspects

- it's **local** as viewed by
  - any individual machine in the path
- it's **global** as viewed by
  - the collective of machines
  - a network administrator

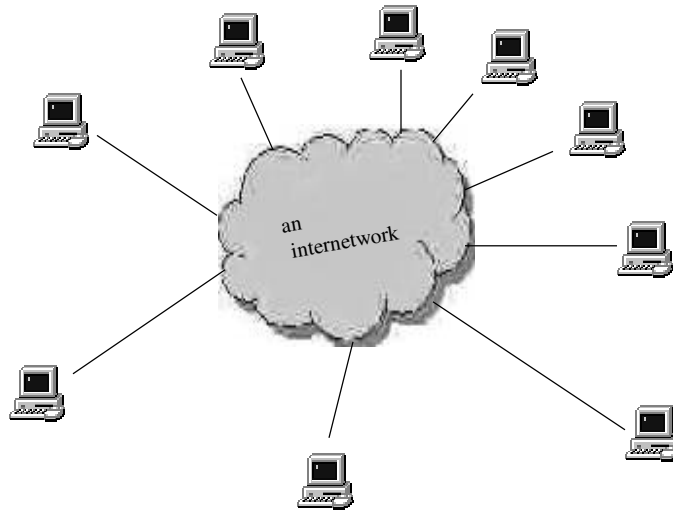
## Local view

- the “boundary” is the local machine
- the “destination” is one of the machine’s interfaces
- path to IP drives choice of interface

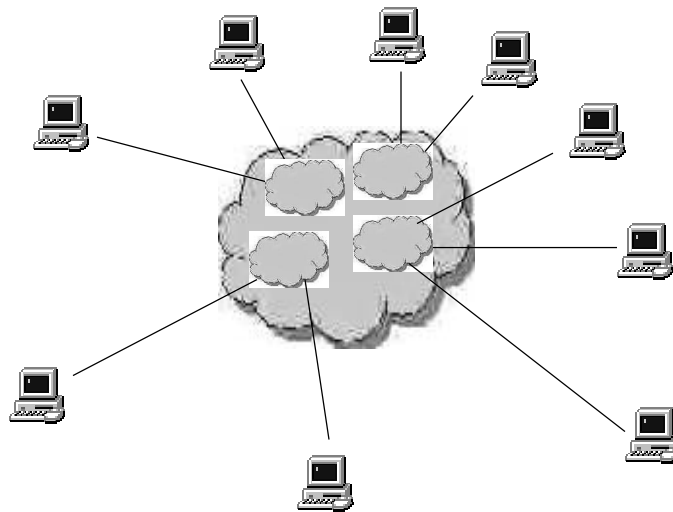
## Global view

- the “boundary” is the internetwork
- the “destination” is the other machine
- interface choice drives path to IP

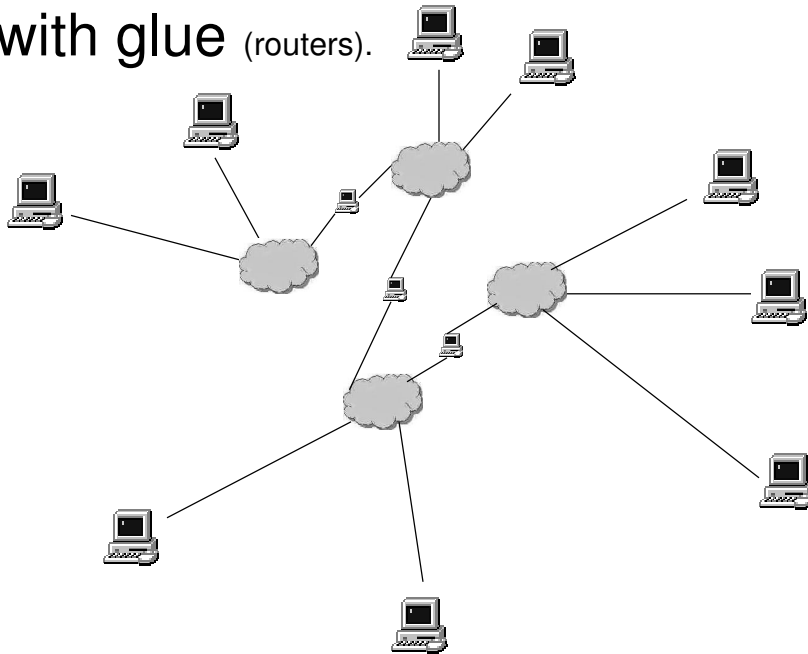
An Internetwork:  
looks like a network...



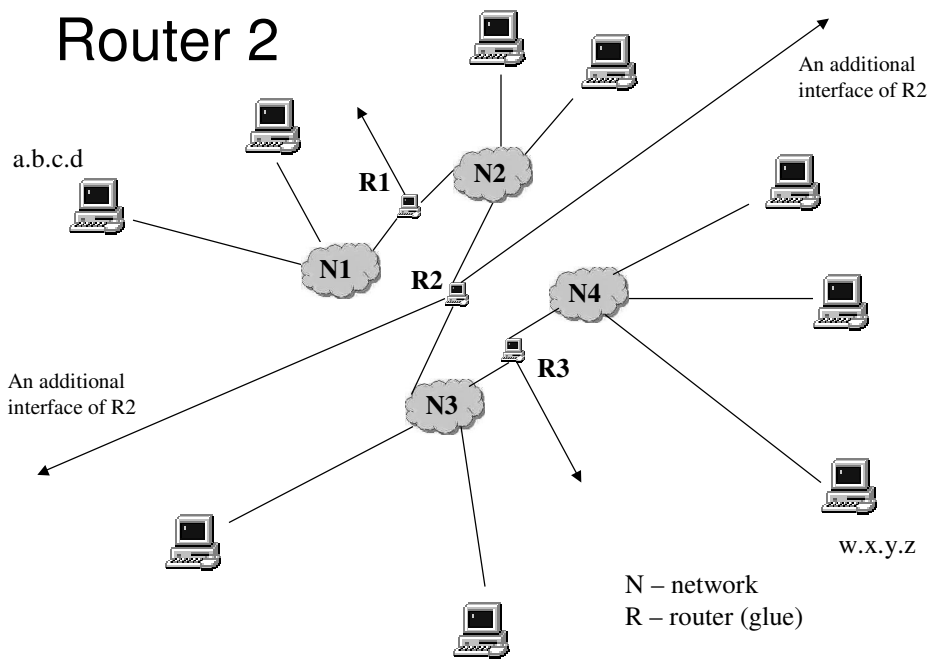
...but it's a bunch of 'em...



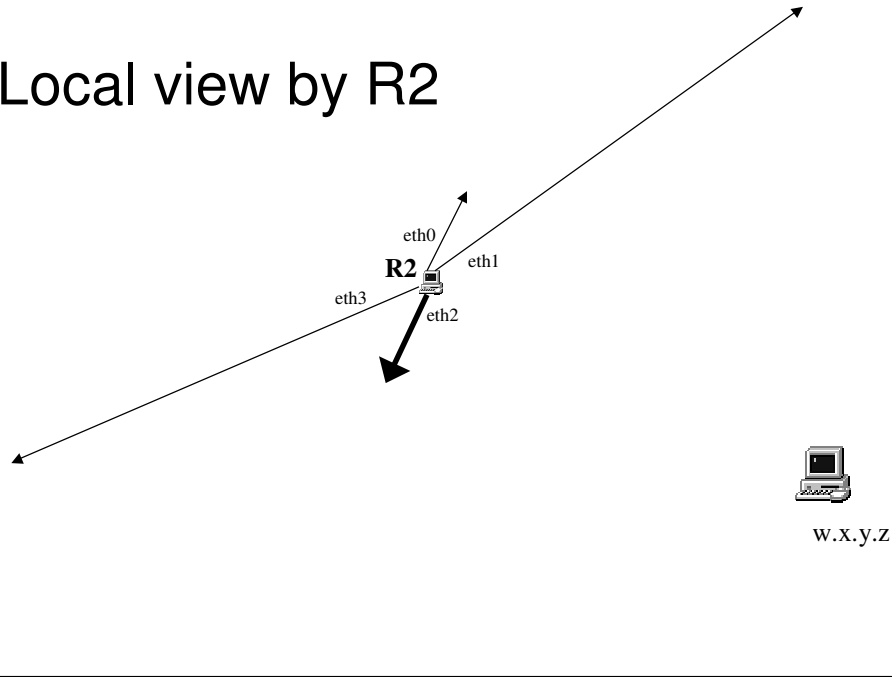
...with glue (routers).



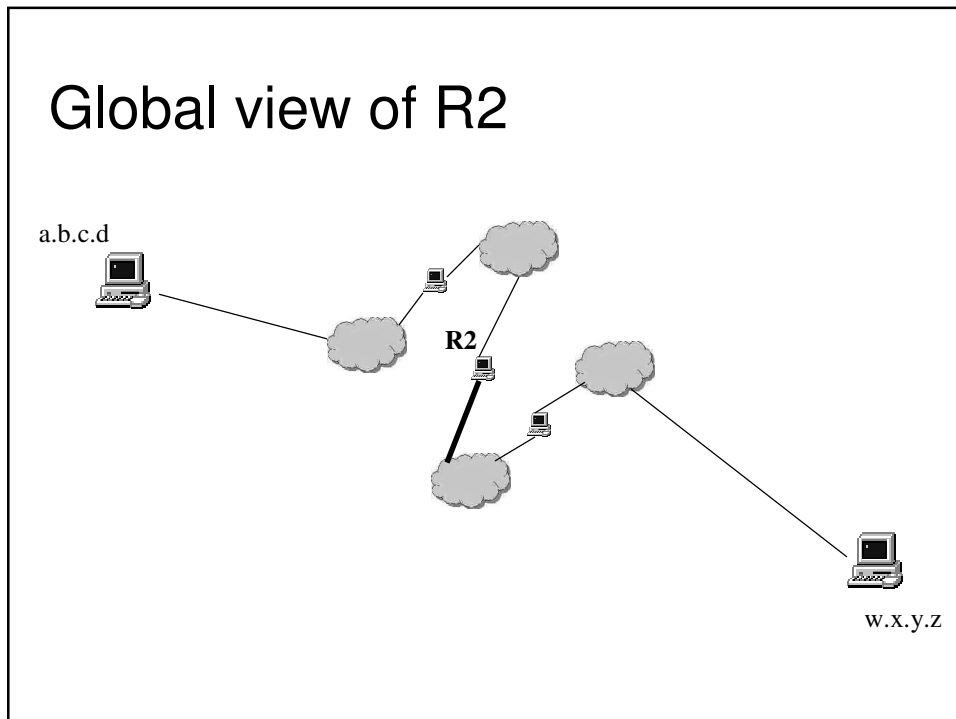
## Router 2



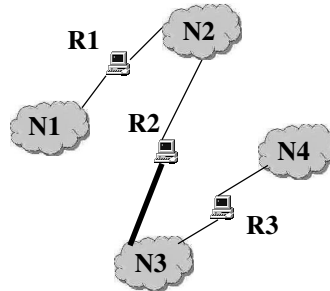
## Local view by R2



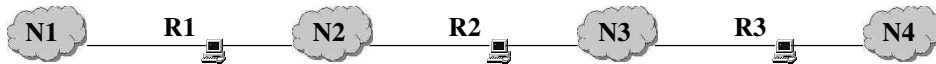
## Global view of R2



Routers are key



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# Routers' route tables

– 2 types of entries



Destination	Next hop (gateway entry)	Direct delivery (interface entry)
N1		
N2		
N3		
N4		

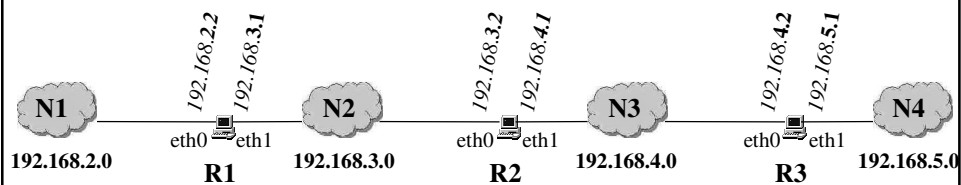
## “Direct delivery” type – linux syntax

- host route - to a single machine
  - route add –host 192.168.4.2 eth0
- network route, local - to a group of machines
  - route add –net 192.168.4.0 netmask 255.255.255.0 eth0
- network route, thru gateway - to a group of machines
  - route add –net 192.168.5.0 netmask 255.255.255.0 gw 192.168.4.1
- default route - to “any and all” else
  - route add default gw 192.168.4.1

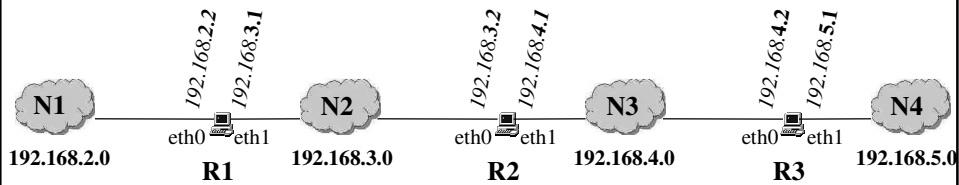
## “Next hop” type – linux syntax

- host route - to a single machine
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- network route, local - to a group of machines
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- network route, thru gateway - to a group of machines
  - route add –net 192.168.5.0 netmask 255.255.255.0 gw 192.168.4.1
- default route - to “any and all” else
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## Network and host addresses

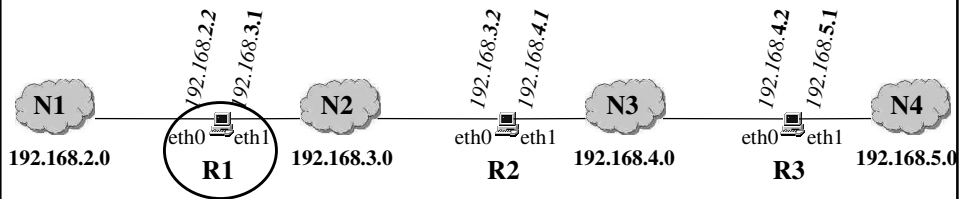


# Routers' route tables



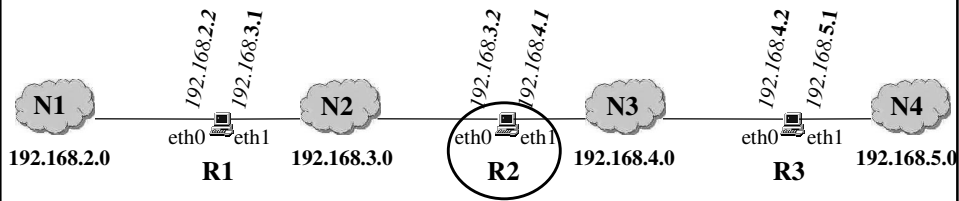
Destination	Next hop (gateway entry)	Direct delivery (interface entry)
N1		
N2		
N3		
N4		

# R1's route table



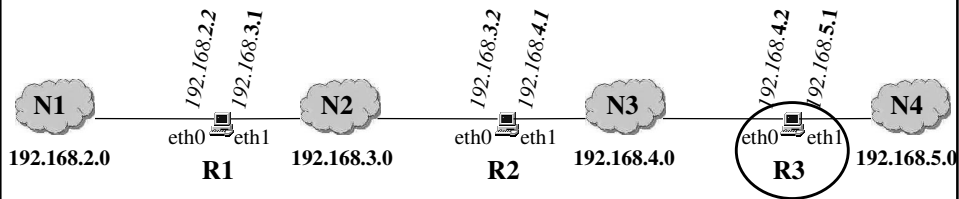
Destination	Next hop (gateway entry)	Direct delivery (interface entry)
N1		eth0
N2		eth1
N3	192.168.3.2	
N4	192.168.3.2	

## R2's route table



Destination	Next hop (gateway entry)	Direct delivery (interface entry)
N1	192.168.3.1	
N2		eth0
N3		eth1
N4	192.168.4.2	

## R3's route table



Destination	Next hop (gateway entry)	Direct delivery (interface entry)
N1	192.168.4.1	
N2	192.168.4.1	
N3		eth0
N4		eth1

## Addresses in frames/packets

	Direct delivery (target in same subnet)	Next hop (target in different subnet)
IP address:	target's	target's
MAC address:	target's	router's

Now they look like a network...

