

# IP Simulator

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- I developed an IP simulator, which can be used in the same way as the Ethernet simulator.
  - ◆ This program does not have copyright (it is in public domain).
- This simulator runs on a (virtual) PC.
- The simulator runs with Python 3 on Windows, MAC, or Linux.
  - ◆ It can run with Python 2 if several specified parts in the programs.
- The simulator consists of three programs:  
srouter.py, iserver.py, iterm.py.
- Only static routing is supported.

# IP Simulator (cont'd)

Server 192.168.1.16 (server 410)

```
Sent: 36 bytes time: 1497663883.428462
Source IP: 192.168.1.16 Dest. IP: 192.168.2.17
Payload: 0f0e0d0c0b0a09080706050403020100
Received: 36 bytes time: 1497663883.658453
Source IP: 192.168.1.17 Dest. IP: 192.168.1.16
Payload: 000102030405060708090a0b0c0d0e0f
Sent: 36 bytes time: 1497663883.658453
Source IP: 192.168.1.16 Dest. IP: 192.168.1.17
Payload: 0f0e0d0c0b0a09080706050403020100
```

192.168.1.1

Router (router-510)

Subnet	Mask	NextHop	Packet count
192.168.1.0	255.255.255.0	*	75
192.168.2.0	255.255.255.0	192.168.0.2	75

192.168.1.1

PC 192.168.1.17 (terminal 411)

```
Sent: 36 bytes time: 1497663882.656416
Source IP: 192.168.1.17 Dest. IP: 192.168.1.16
Payload: 000102030405060708090a0b0c0d0e0f
Received: 36 bytes time: 1497663882.665395
Source IP: 192.168.1.16 Dest. IP: 192.168.1.17
Payload: 0f0e0d0c0b0a09080706050403020100
Sent: 36 bytes time: 1497663883.656515
Source IP: 192.168.1.17 Dest. IP: 192.168.1.16
Payload: 000102030405060708090a0b0c0d0e0f
Received: 36 bytes time: 1497663883.664455
Source IP: 192.168.1.16 Dest. IP: 192.168.1.17
Payload: 0f0e0d0c0b0a09080706050403020100
```

Router (router 511)

Subnet	Mask	NextHop	Packet count
192.168.2.0	255.255.255.0	*	75
192.168.1.0	255.255.255.0	192.168.0.1	75

PC 192.168.2.17 (terminal 412)

```
Sent: 36 bytes time: 1497663882.424462
Source IP: 192.168.2.17 Dest. IP: 192.168.1.16
Payload: 000102030405060708090a0b0c0d0e0f
Received: 36 bytes time: 1497663882.434387
Source IP: 192.168.1.16 Dest. IP: 192.168.2.17
Payload: 0f0e0d0c0b0a09080706050403020100
Sent: 36 bytes time: 1497663883.424522
Source IP: 192.168.2.17 Dest. IP: 192.168.1.16
Payload: 000102030405060708090a0b0c0d0e0f
Received: 36 bytes time: 1497663883.433442
Source IP: 192.168.1.16 Dest. IP: 192.168.2.17
Payload: 0f0e0d0c0b0a09080706050403020100
```

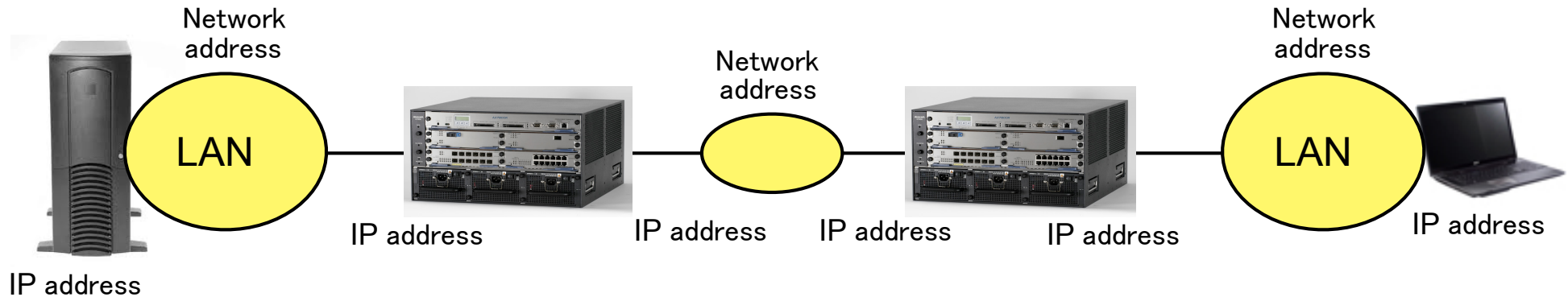
# Two Usages of the IP Simulator

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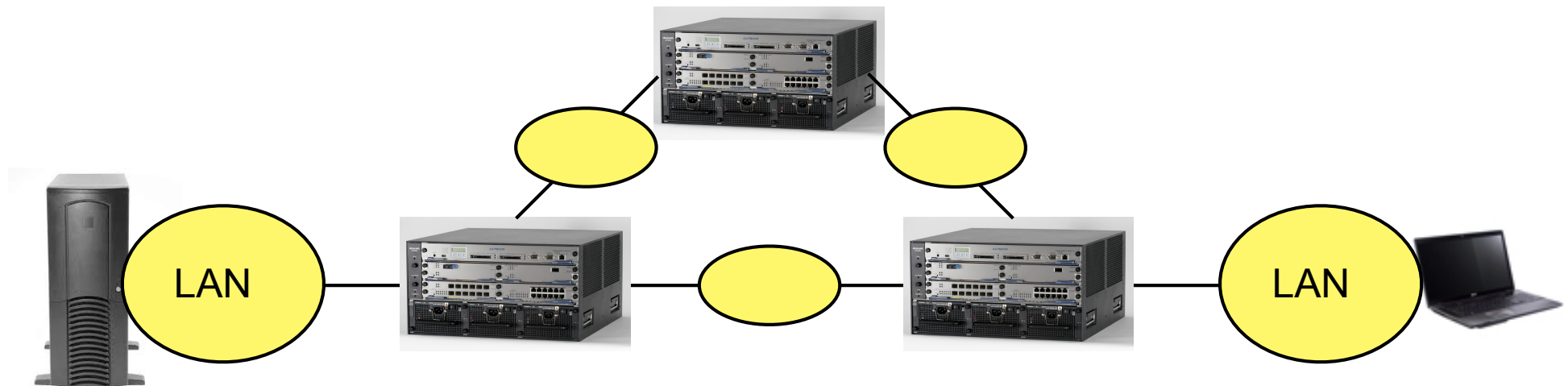
- Manual generation of shell commands
  - ◆ Manual generation of command parameters is complex, but it is better in transparency.
- Automatic generation of shell command by a “compiler”
  - ◆ The complexity is avoided by automatic generation but it is less transparent.

# Experiments using the Simulator

- At least three subnets and two routers are required.
  - ◆ The simulator directory contains it as an example.



- Minimum structure for trying an alternative path:
  - ◆ The above structure can be extended to create this structure.



# Configuration of routers

- When only one router is used:
  - ◆ Subnets are configured for routers (but no routing configuration is required).
  - ◆ IP addresses and default gateways are configured for computers.

# A network with one terminal and one router

router 500

subnet 192.168.1.1/24

subnet 192.168.2.1/24

server 400

localIP 192.168.1.2

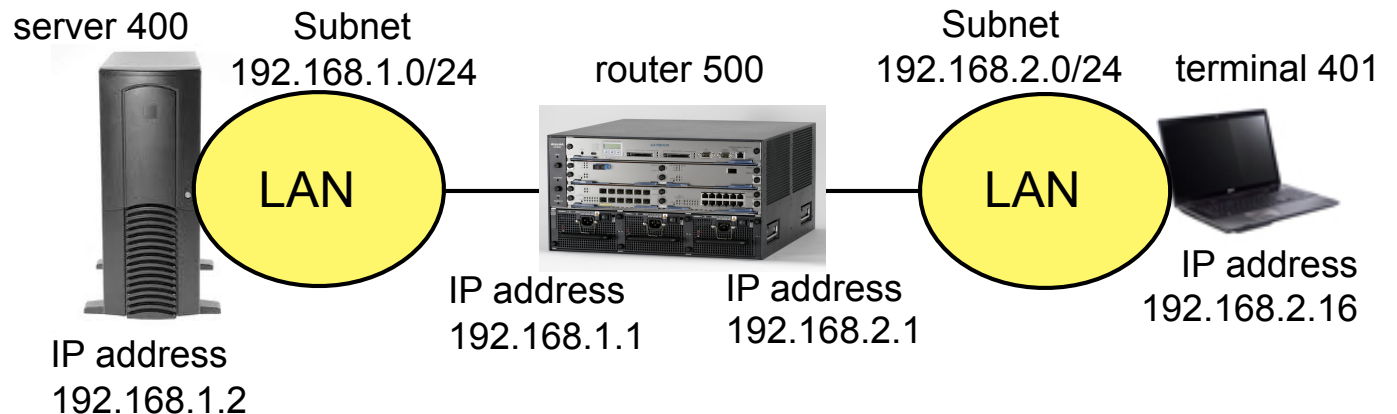
gateway 192.168.1.1

terminal 401

localIP 192.168.2.16

gateway 192.168.2.1

remoteIP 192.168.1.2



# Configuration of routers (cont'd)

- Routing must be configured when two or more routers exist.
  - ◆ Only static routing can be configured currently in this simulator.

# A network with two terminals and two routers

router 510

subnet 192.168.0.1/30

subnet 192.168.1.1/24

static 192.168.2.0/24/192.168.0.2

router 511

subnet 192.168.0.2/30

subnet 192.168.2.1/24

static 192.168.1.0/24/192.168.0.1

terminal 411

localIP 192.168.1.17

remoteIP 192.168.1.16

gateway 192.168.1.1

terminal 412

localIP 192.168.2.17

remoteIP 192.168.1.16

gateway 192.168.2.1

server 410

localIP 192.168.1.16

gateway 192.168.1.1

