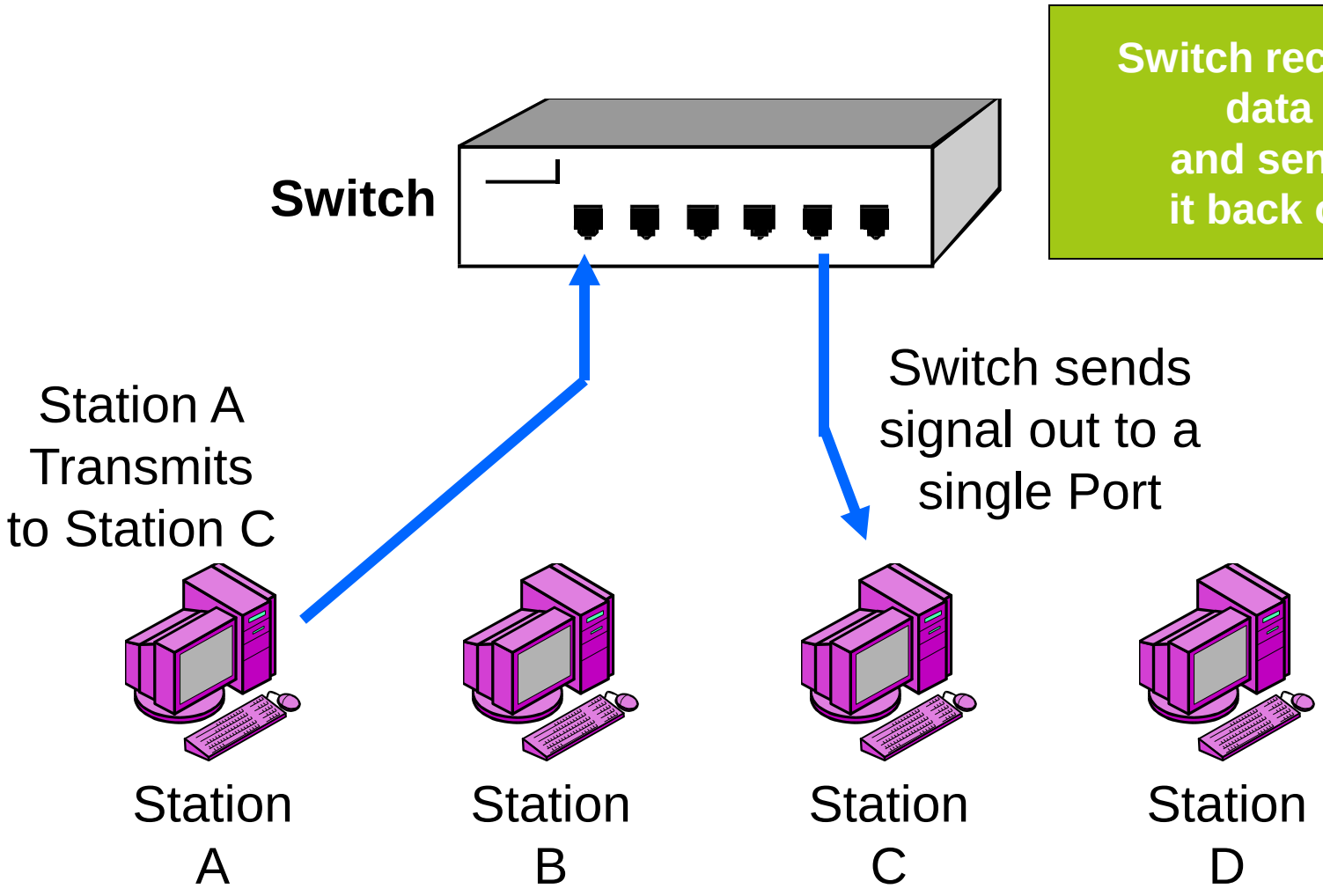
Switches

- A **switch** is a network device which directs traffic only to its intended destination(s) rather than to all devices on the network.
  - sometimes referred to as an "intelligent hub"
- Provide a dedicated connection between individual devices
  - multiple devices can send data at once

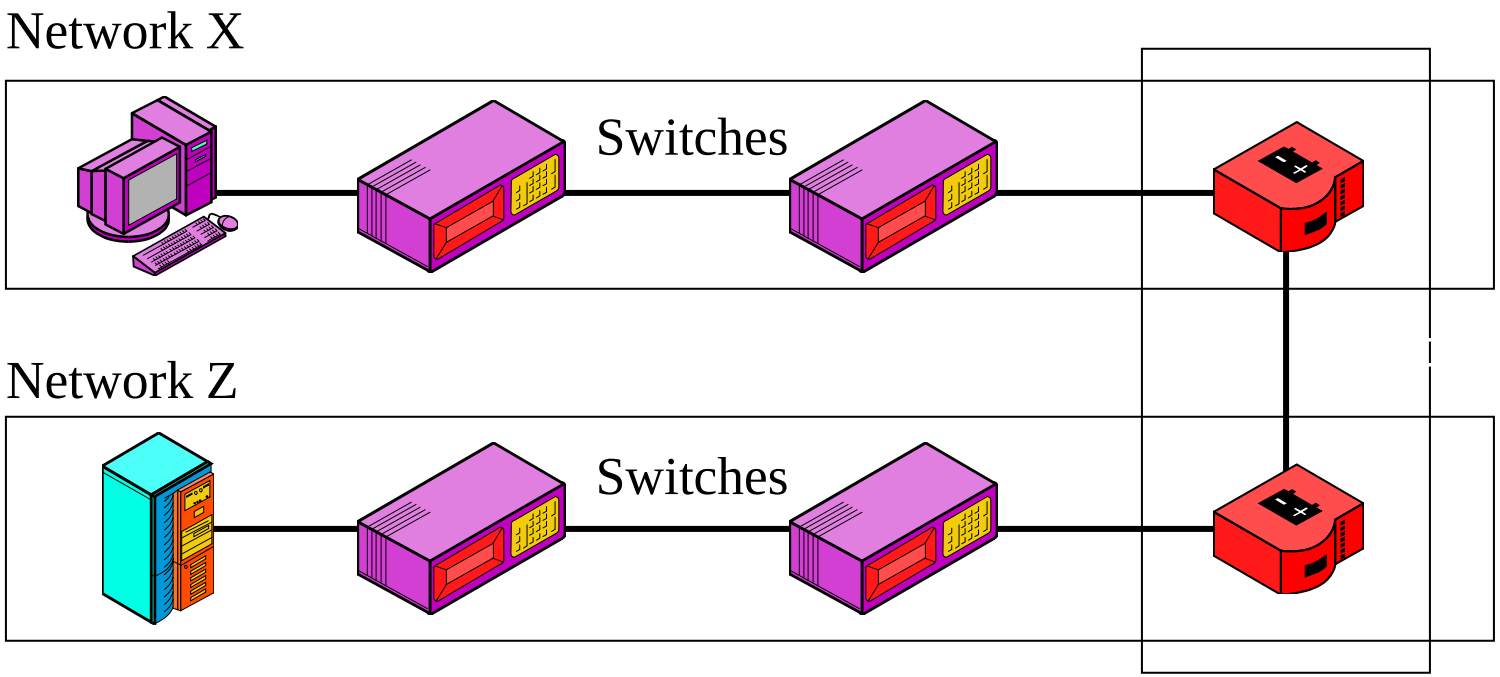
A Network Switch



Routers

Different networks connect via **routers** (not switches or hubs)

Routers even connect networks based on different protocols, which is important since not *all* networks use the same protocol.

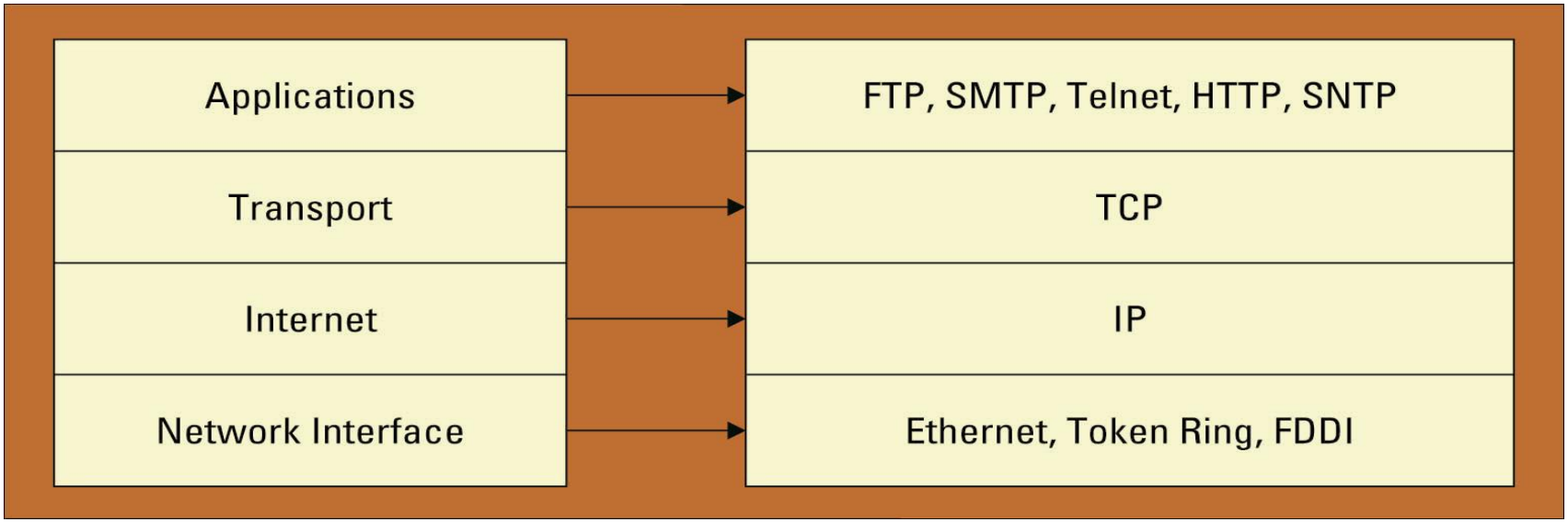


Gateway router

- When your computer needs to contact a computer that is not within the immediate network (i.e., your LAN), then your computer's networking software is configured to send the request to a particular router called a:
  - **Default Gateway**, or
  - **Gateway router**
- For each of us, the most noteworthy role of the **gateway** router is to connect your computer's LAN to your ISP's larger network so that your computer accesses the **Internet**
- Therefore, a **gateway router** is your computer's **onramp to the Internet**.

TCP/IP

- Transmission Control Protocol/Internet Protocol (TCP/IP) provides the technical foundation for the public Internet as well as for large numbers of private network. It is defined in terms of layers.
- TCP/IP layers (at left, with particular implementations at right)



Visual Trace Route Tool

approximate geophysical trace

trace information

Host trace to samsung.com
15 hops / 34.8 seconds

1. dreamhost.com
2. dreamhost.com
3. pnap.net
4. pnap.net
5. ntt.net
6. ntt.net
7. ntt.net
8. ntt.net
9. ntt.net
10. flagtel.com
11. 80.77.1.178
12. 157.197.66.5
13. samsung.co.kr
14. unitel.co.kr
15. 211.45.27.198

~12,838 miles traveled

Redraw Trace

trace the path to a network

Remote Address samsung.com | Host Trace | Proxy Trace

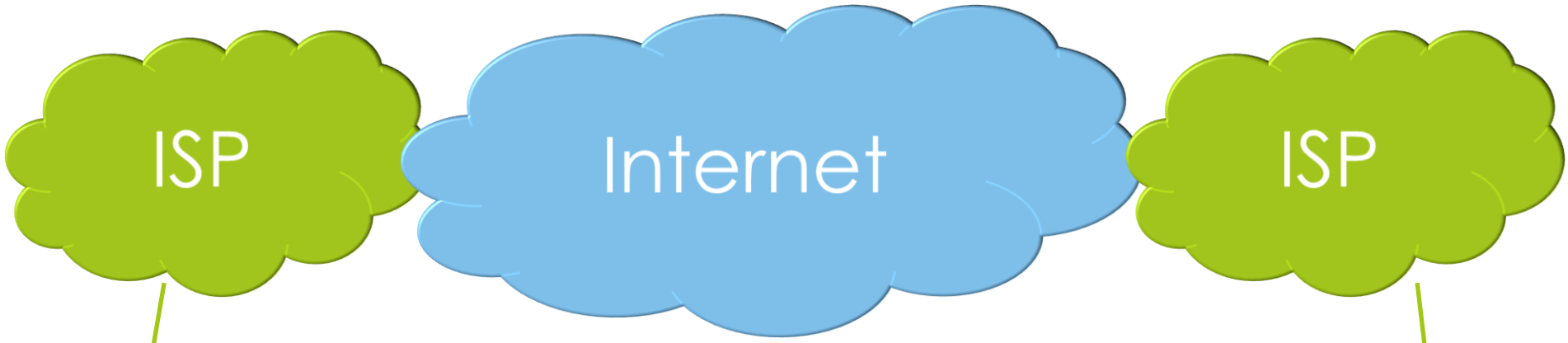
Use Current IP

http://www.yougetsignal.com/tools/visual-tracert/

Wireless networking

- Wireless fidelity (wi-fi) – a means of linking computers into a wireless local area network (WLAN)
- Also referred to as 802.11
- Wi-Fi has evolved through various standards, the most common of which have been:
  - 802.11b, with 11 Mbps bandwidth
  - 802.11g, with 54 Mbps bandwidth
  - 802.11n, with 100 - 200 Mbps bandwidth

Basic networking scenario

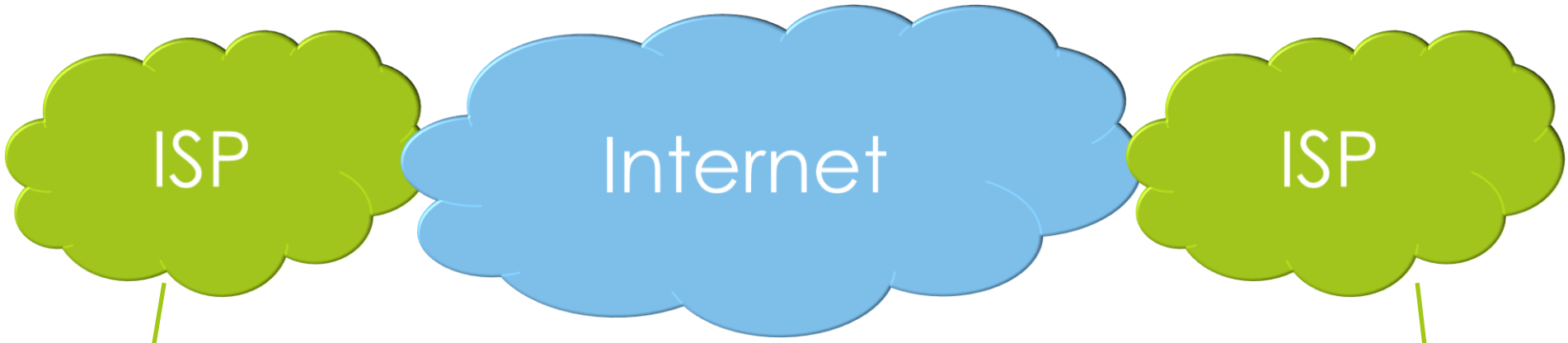


- Not secure.
- You and the person are exposed and relying on your ISPs to provide all security (from hacker attacks, viruses, worms).
- IP's are public accessible.

You
24.48.0.1

person
12.6.1.3

Better: add router (a "firewall")



24.48.0.1

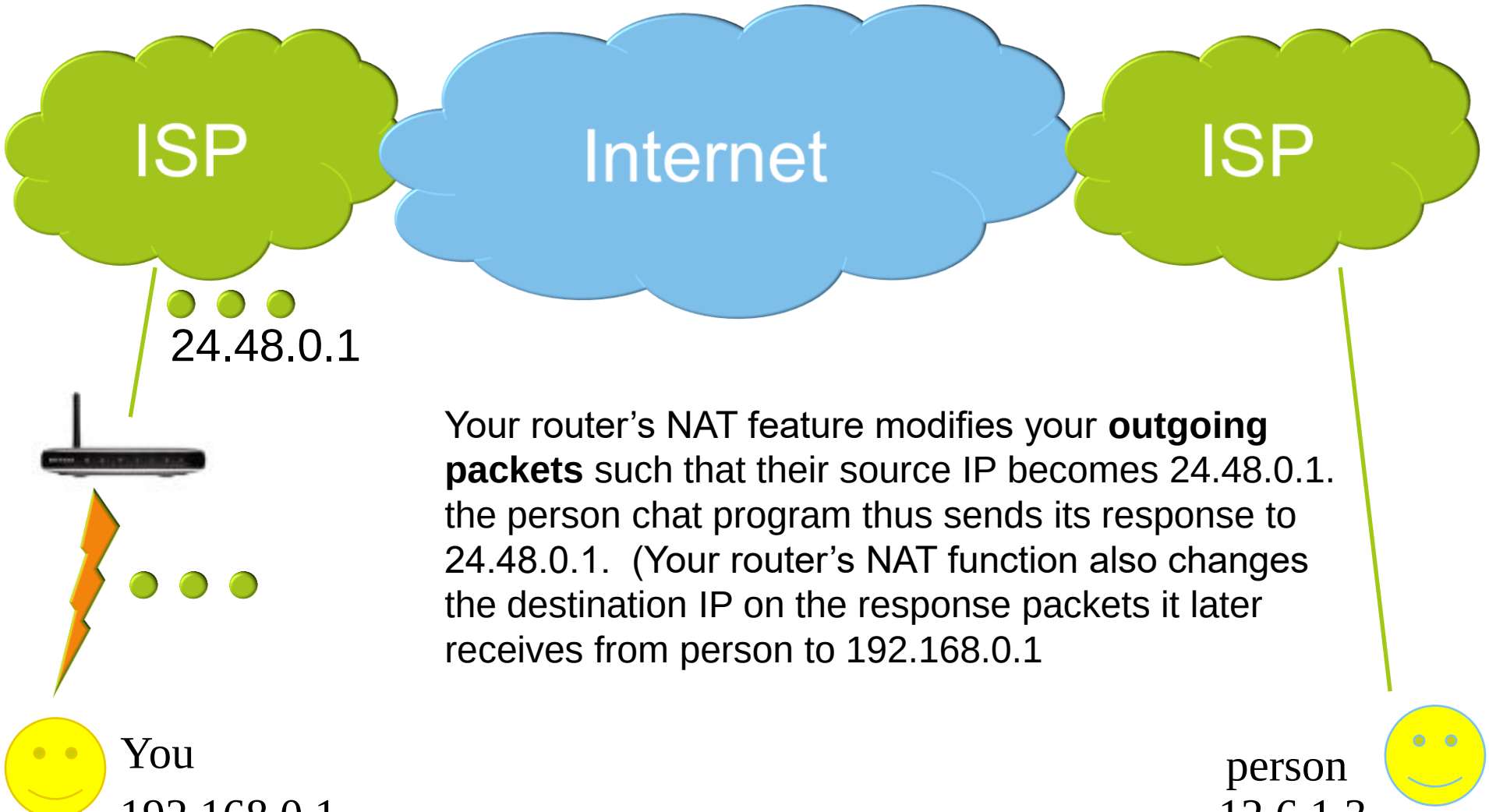
Better. You buy a router that connects to your ISP. The router assigns your PC a **private** IP address.

You
192.168.0.1

denotes wireless connection to access point

person
12.6.1.3

Private IP address requires your router's NAT (Network Address Translation)



Hiding multiple servers behind one IP address: Port Mapping

- Port mapping is what allows companies to have multiple servers accessible via one IP and corresponding DNS address
- Common example: company wish to run both an FTP and Web server from its domain name, **asite.com**
  - ftp://www.asite.com
    - Note: this is equivalent to typing **ftp://www.asite.com:21** because **port 21 is the default for ftp**
    - The firm's router with Port Mapping will send port 21 traffic to the FTP server
  - http://www.asite.com
    - Note: this is equivalent to typing **http://www.asite.com:80** because **port 80 is the default for http**
    - The firm's router with Port Mapping will send port 80 traffic to the web server

Hiding multiple servers behind one public IP address: Port Mapping