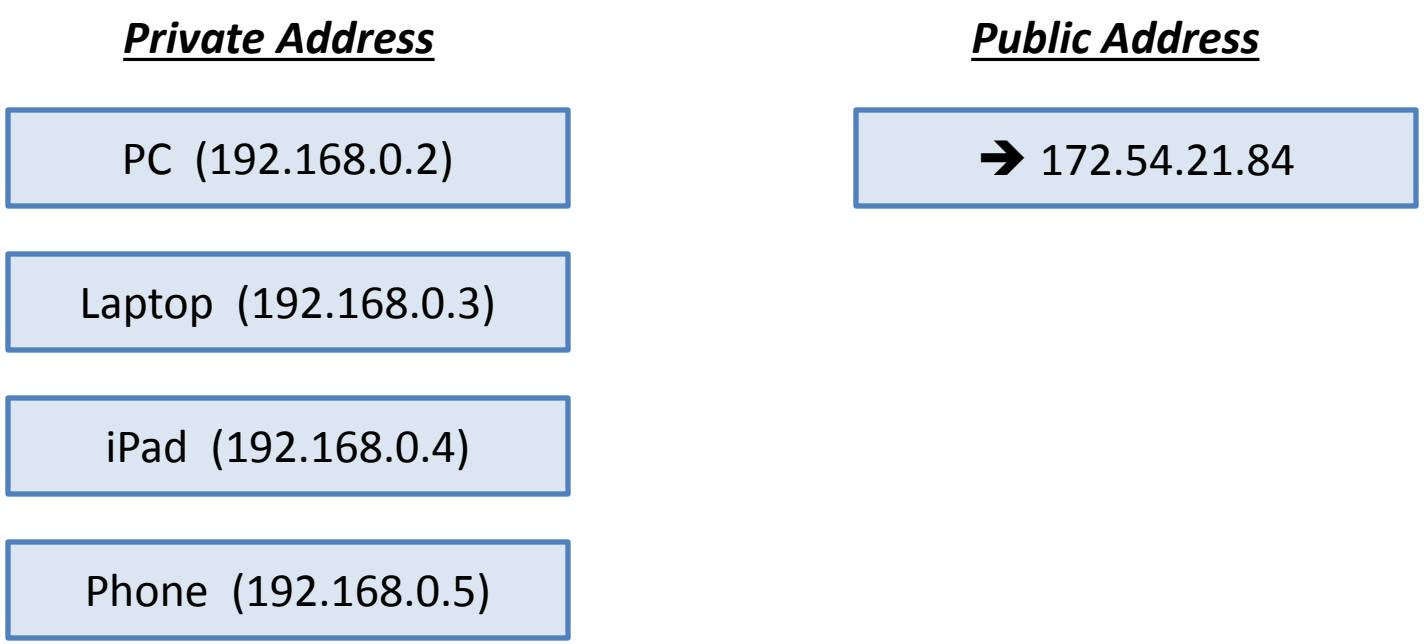
NAT and File Systems

CS 241

Nov. 22, 2013

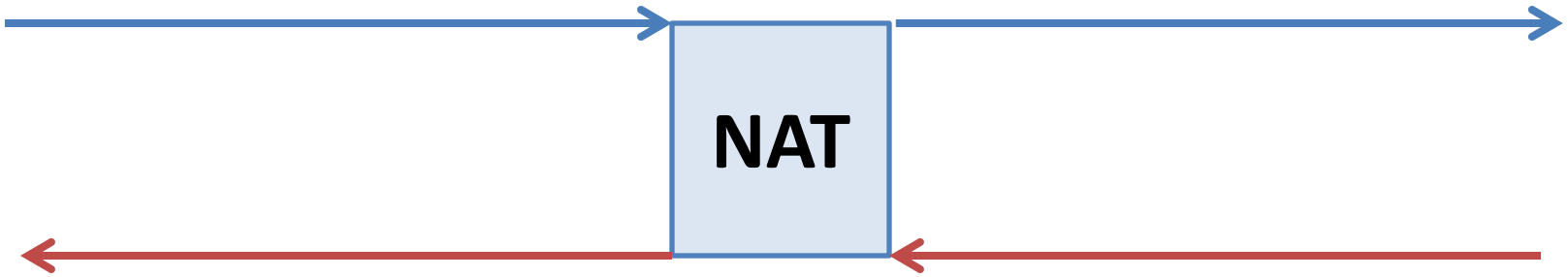
Network Address Translation

- **One Solution**: Network Address Translation
  - Allows multiple IP-enabled devices to connect using a single “public IP address”.



Network Address Translation

- **How does it work?**
  - A NAT-enabled router modifies every IP packet as the packets travel through the router.



  - Stores a Network Address Translation Table:
    - Port ➔ { Private IP Address, Port }

NAT: Consequences

- **Limited concurrent connections**
- **Breaks “end-to-end connectivity”**
- **IP addresses in application data**

File Systems

- **General Purpose File Systems**
  - Hierarchical
  - Directory-based Access
  - Examples:
    - C:\Users\Wade\
    - /usr/home/wade/
  - Everything, including directories, have a **file**.

File Systems

- **Directory File**

File Systems

- **i-node**

File Systems

- **i-node Content Pointers**

Example Problem #1

- **Example file system:**
  - Each i-node contains
    - 10 direct entries
    - 1 single indirect
    - 1 double indirect
    - 1 triple indirect
  - Each disk block is 4 KB is size
  - Each disk pointer is 8 B long

#1(a)

- What is the maximum size of a file if we used only direct entries?

#1(b)

- What is the maximum size of a file if we used direct entries and the single indirect?

#1(c) and #1(d)

- What is the maximum size of a file if we used direct entries, the single indirect, and the double indirect?

- What is the maximum size of a file?

#1(c) and #1(d)

- Detail how a 10 MB file would be stored?