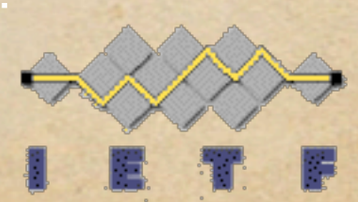
IPv6

From an Application Layer Perspective

Patrik Fältström

Area Director, Applications Area, IETF

Consulting Engineer, Cisco Systems



Agenda

- What are Applications?
- Why is end-to-end so important?
- What is IPv6 solving for Applications?
- Summary...

Application Layer

- Contrary to traditional communication, we have three layers on the Internet

Application Layer

- Contrary to traditional communication, we have three layers on the Internet

Application

Internet (IP)

Transmission

Why is this so important?

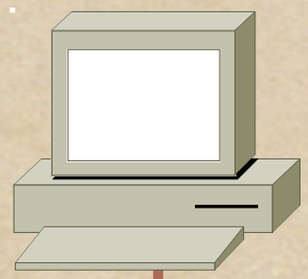
- With three layers, the application layer ends up being independent from the transmission
- As soon as you have IP connectivity, you can run any application using IP
- Previously, you had to change application if transmission changes

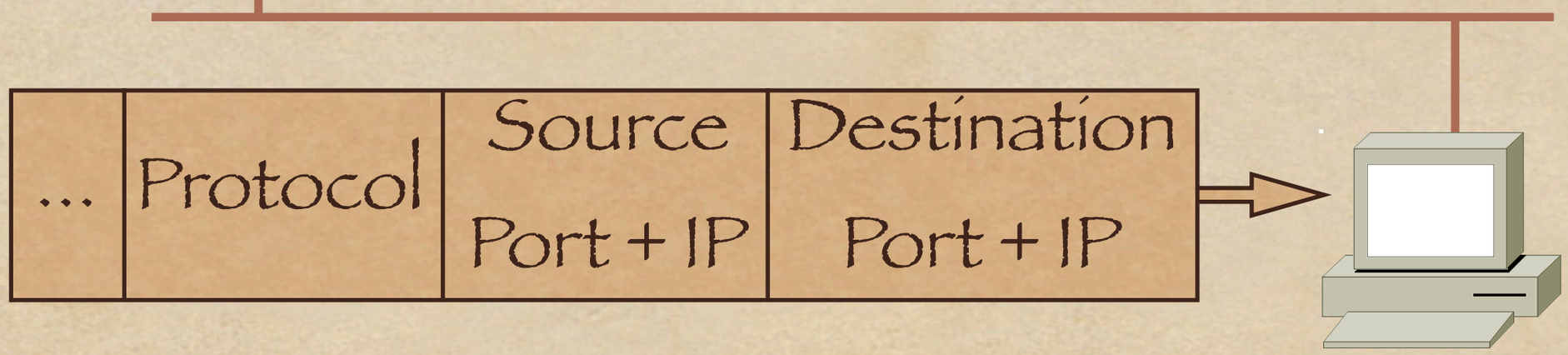
How does this work?

- Create a packet
- Include *your* (sender) information
- Add address of destination
- Send on *your* local interface
- Packet will reach destination
  - Or *you* will be told otherwise

Addressing

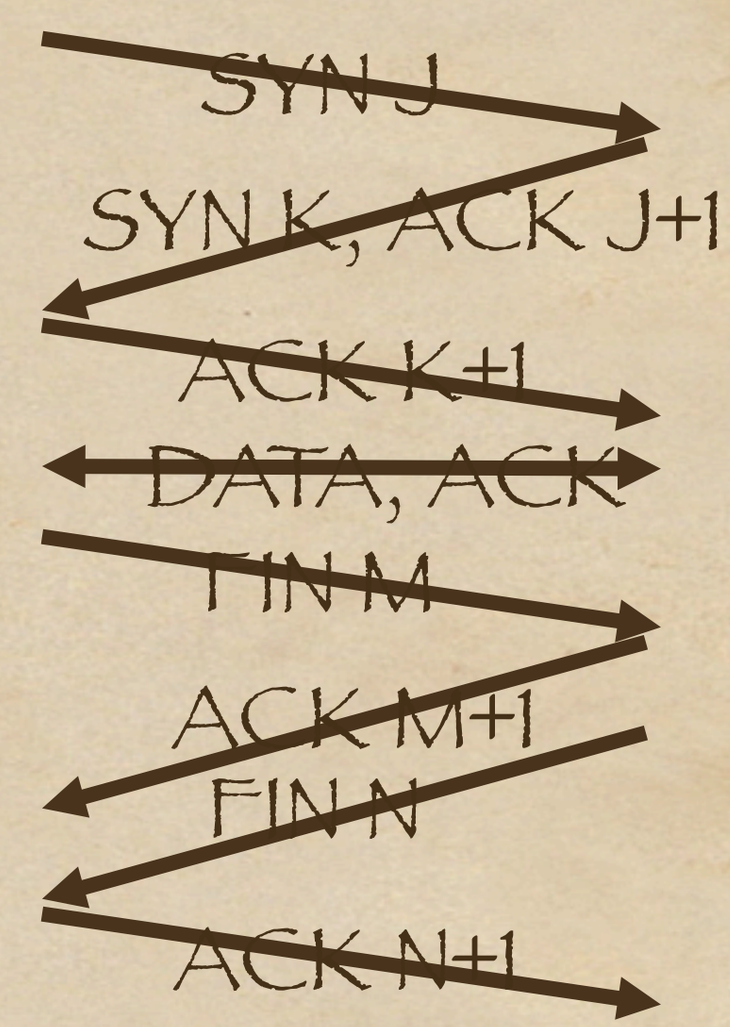
Absolutely fundamental
is the existence of the 5-tuple
which identifies a connection!





Simple "fetch"

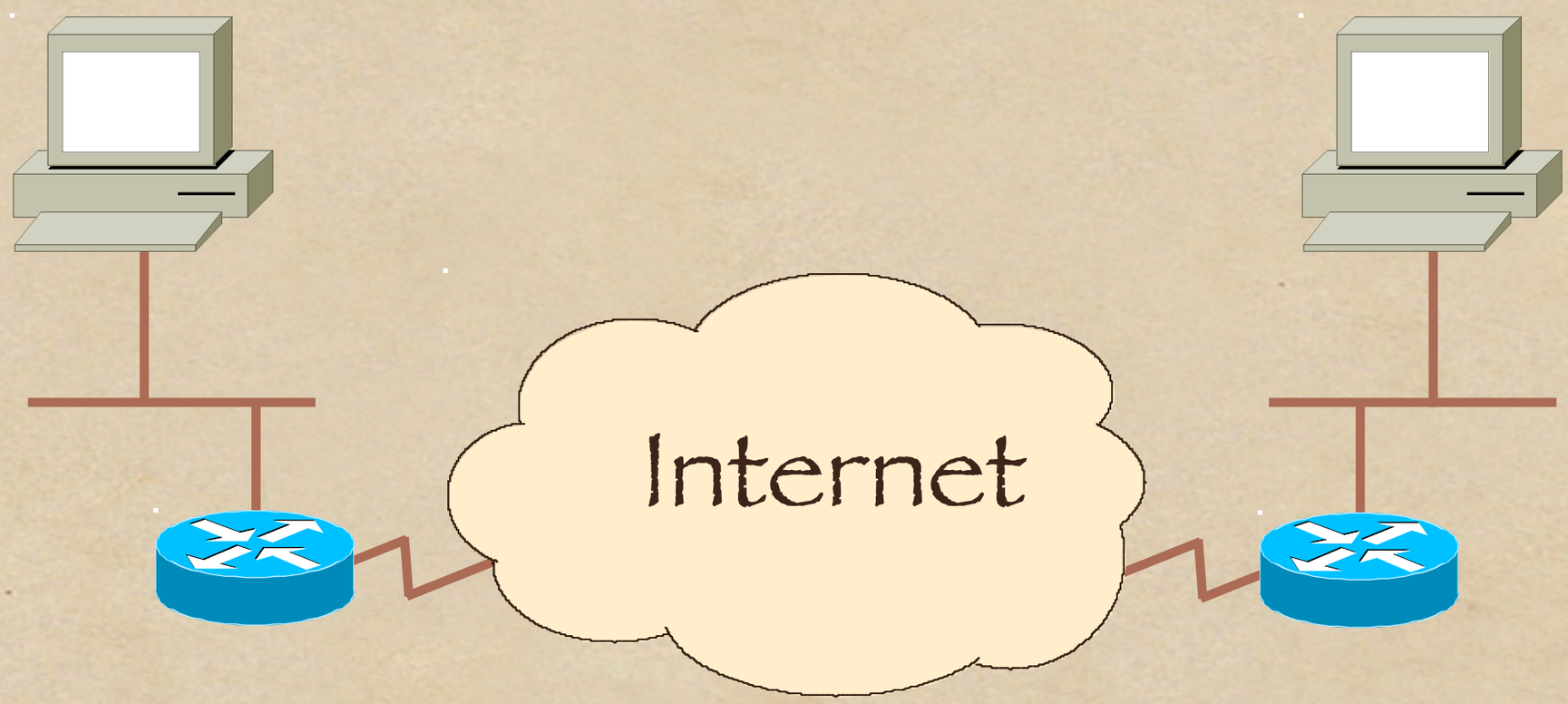
- A simple fetch in a TCP-based protocol is more than one exchange of packets
- HTTP 1.1 spec. is 176 pages long!



A simple network

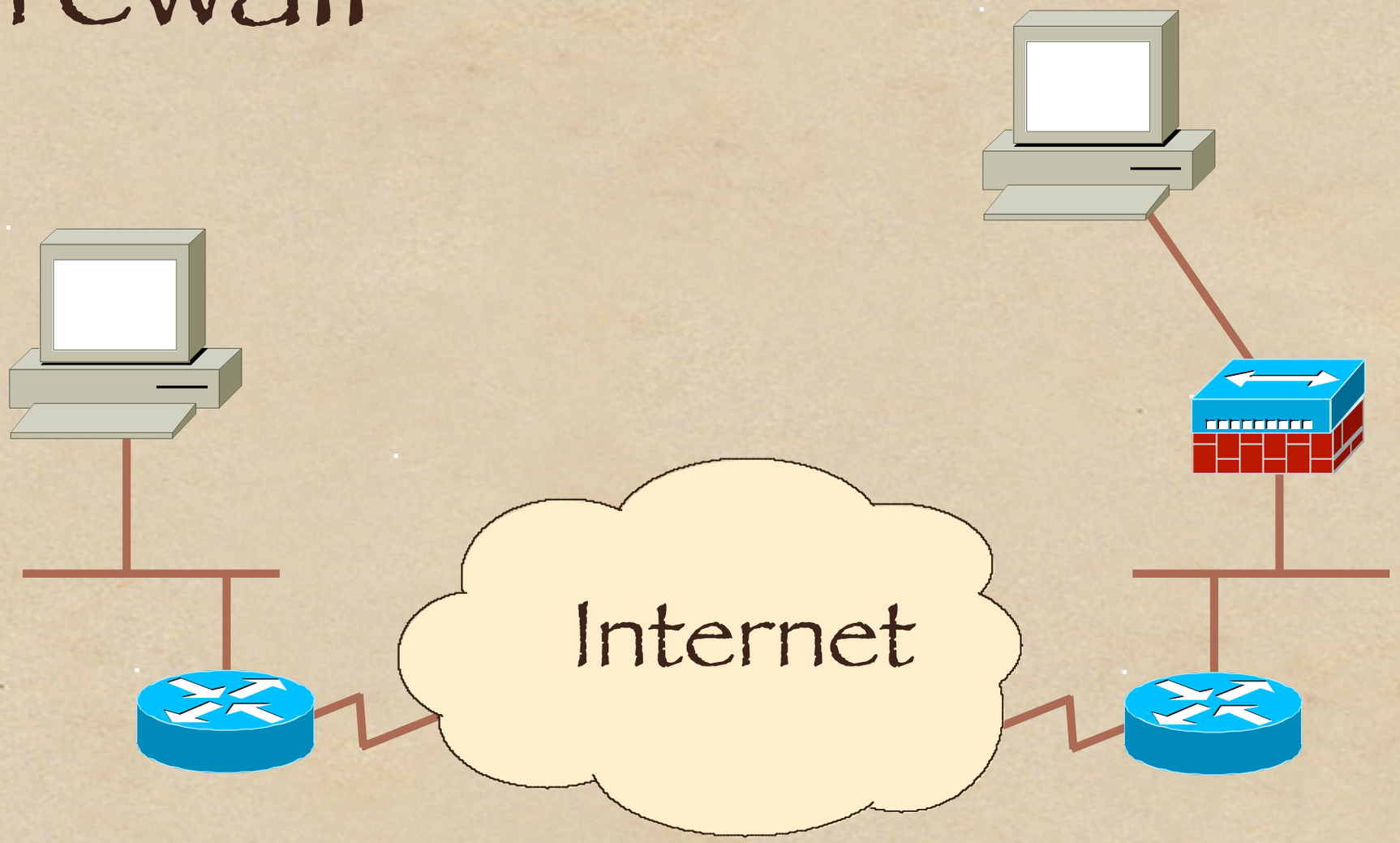
- Two hosts connected to the same cable

The Internet



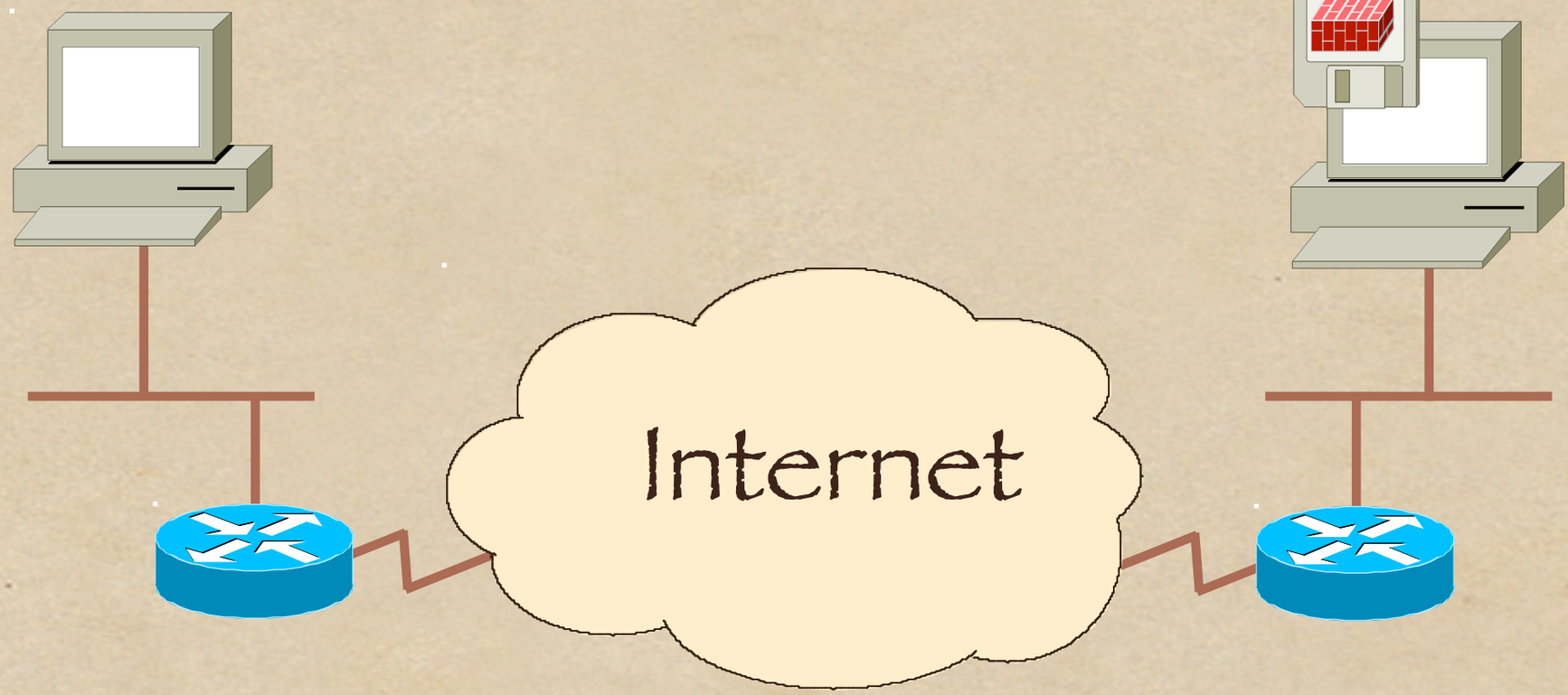
- Routing is introduced

Firewall



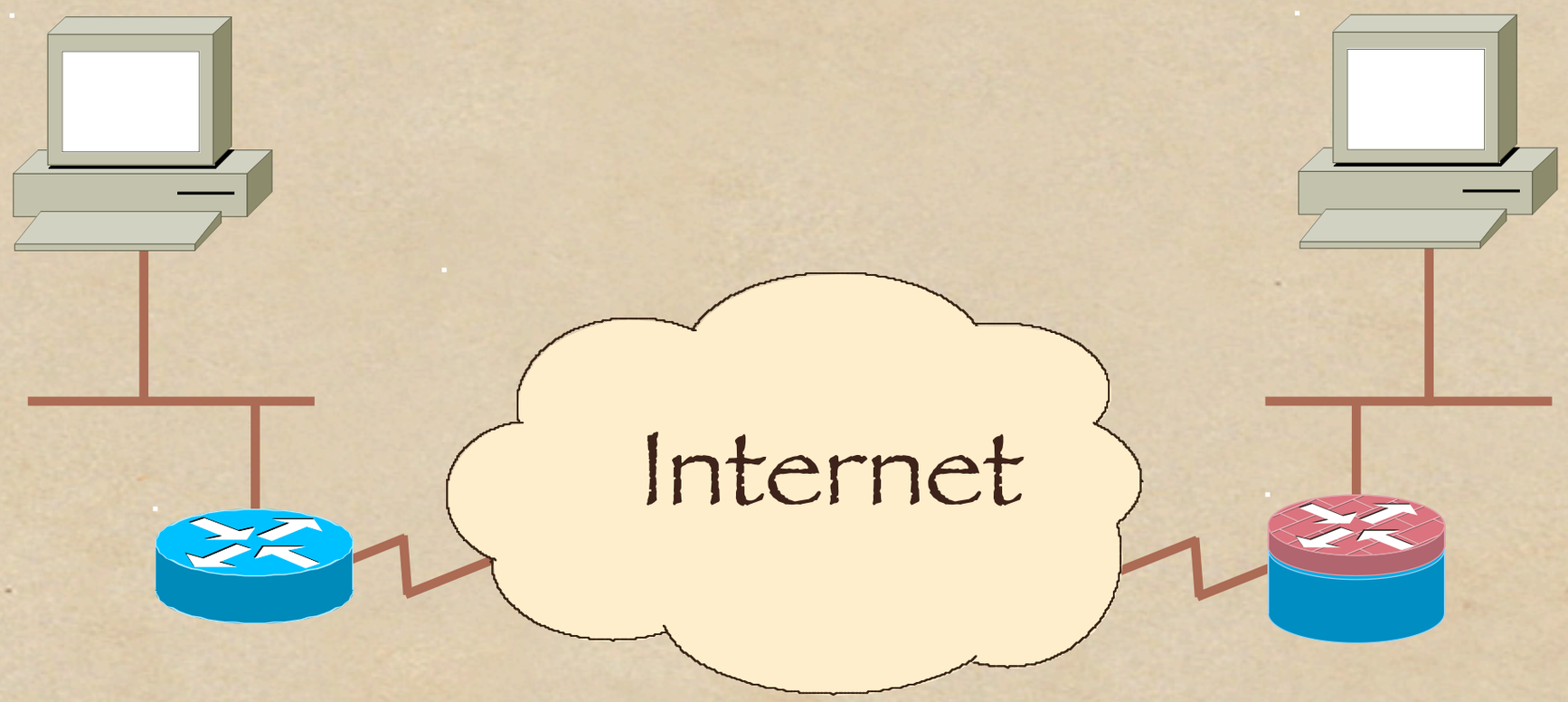
- In some cases, firewalls are used
- People mix up firewalls with NAT

Firewall



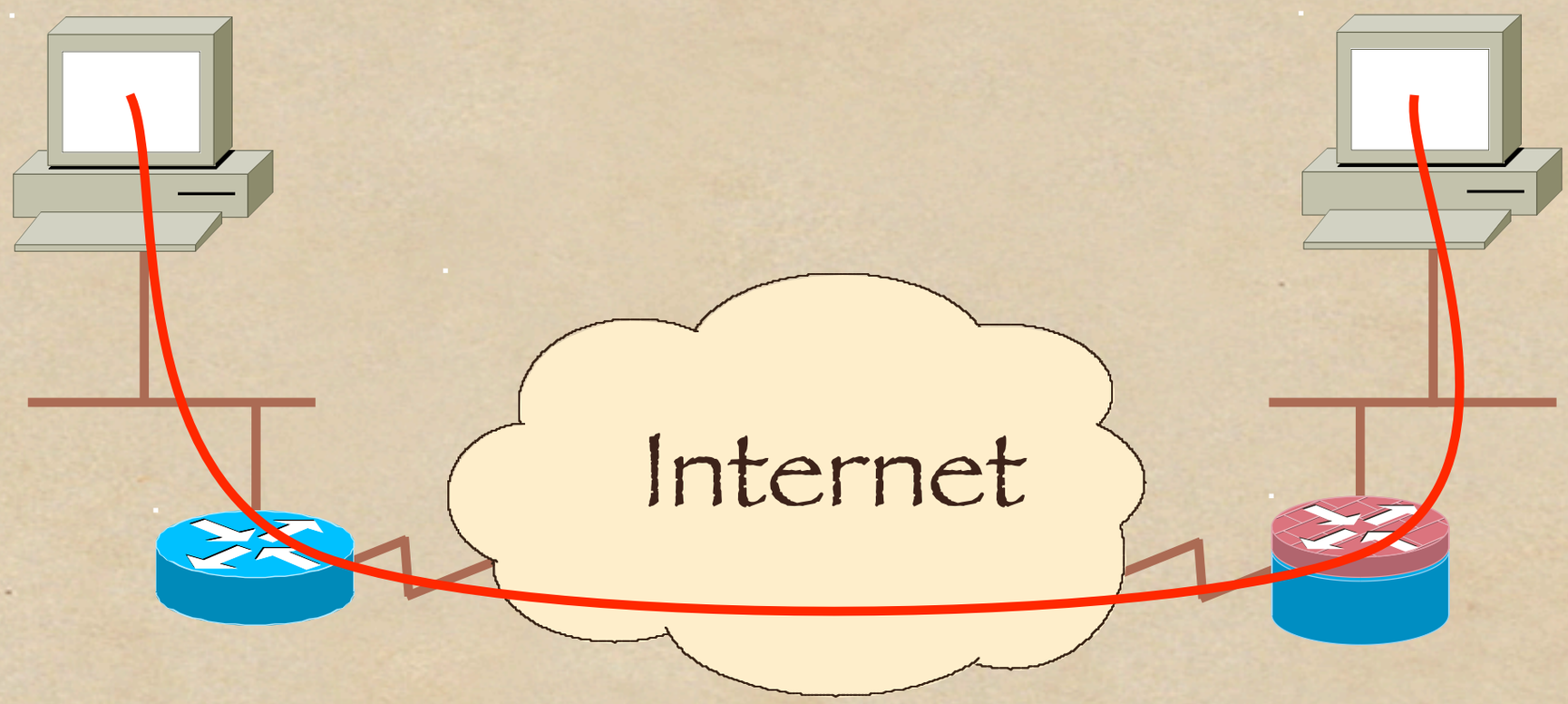
- Security can also be inside endnode

Firewall



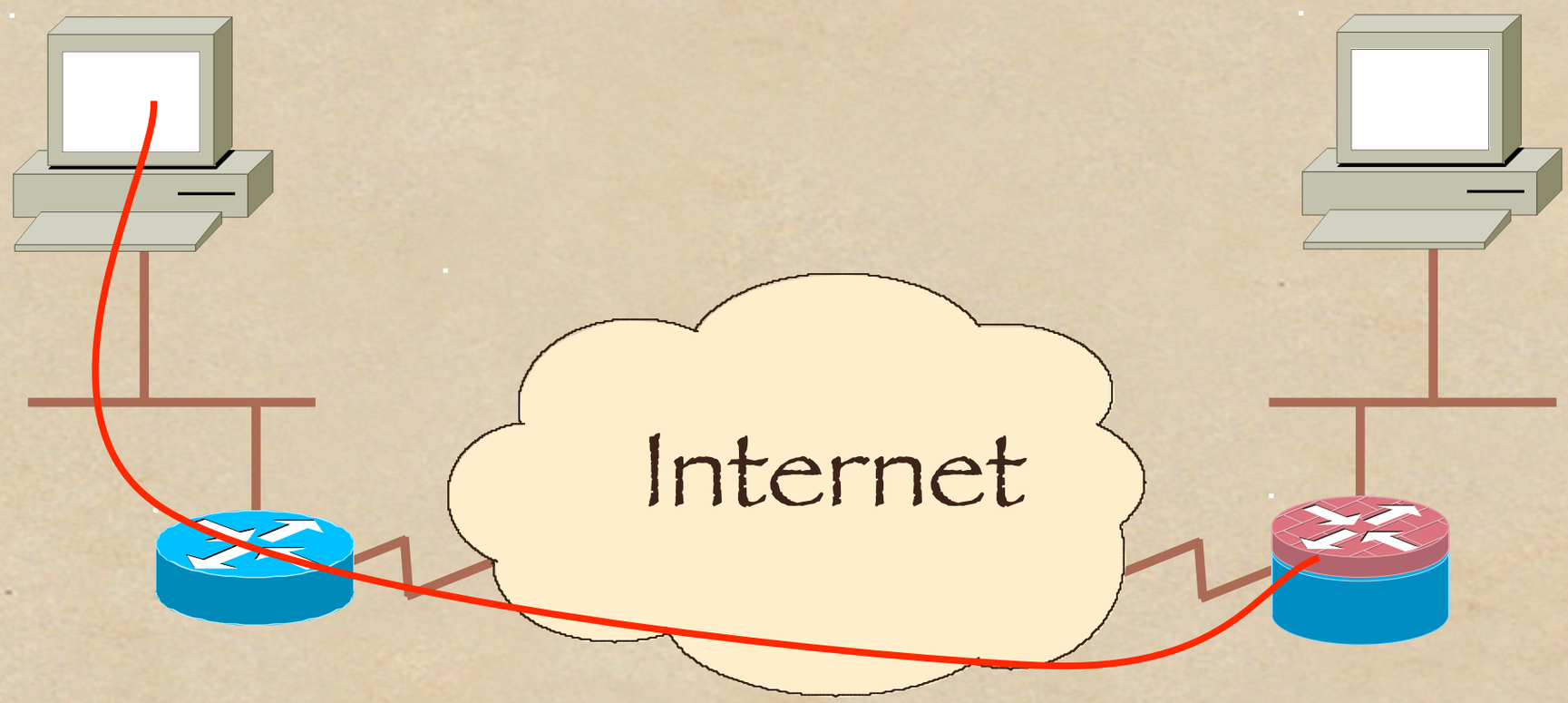
- As part of the connection to Internet

Firewall



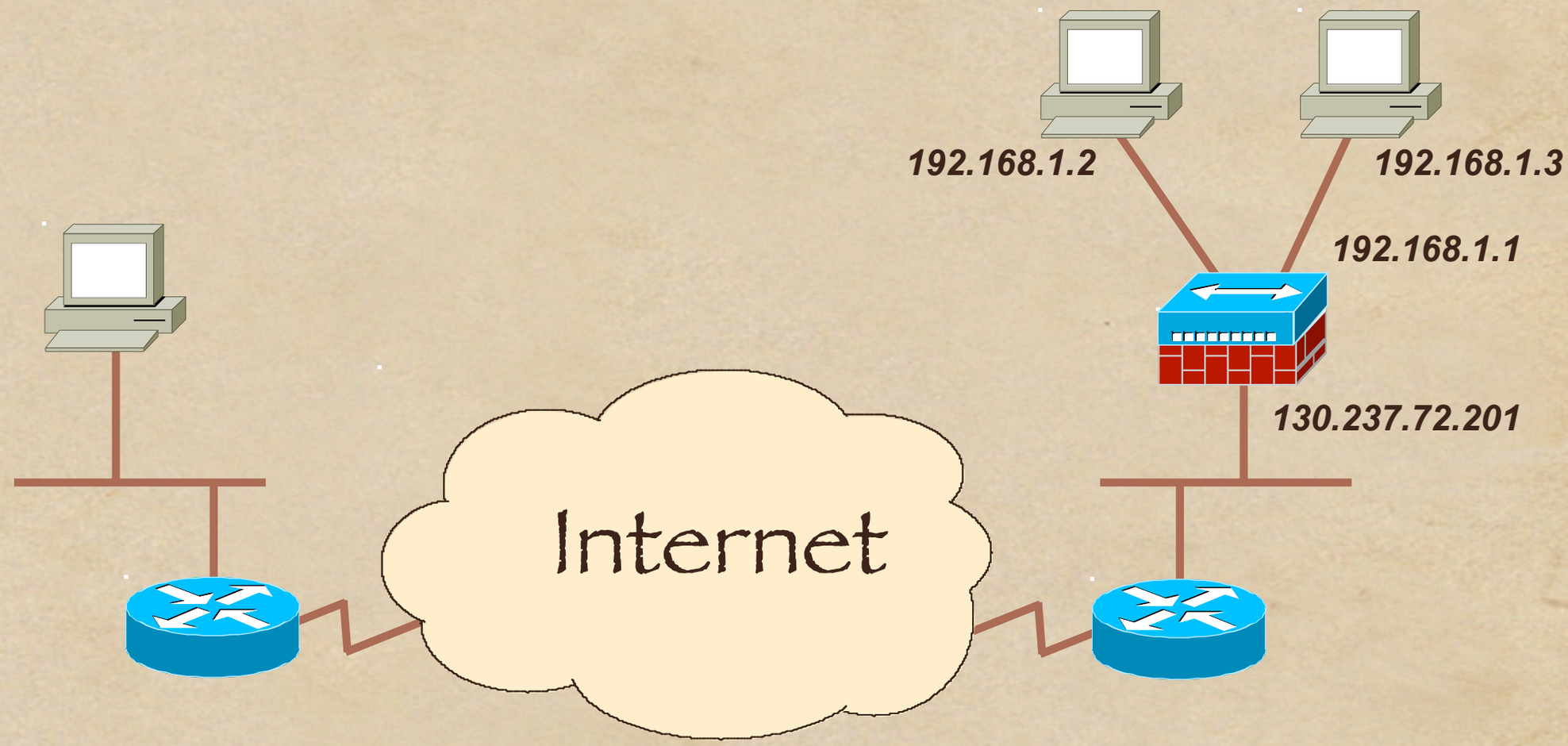
- It is possible to open a connection towards the Internet through a firewall

Firewall



- But, from the Internet, connections are blocked

One address



- The NAT box remembers a connection

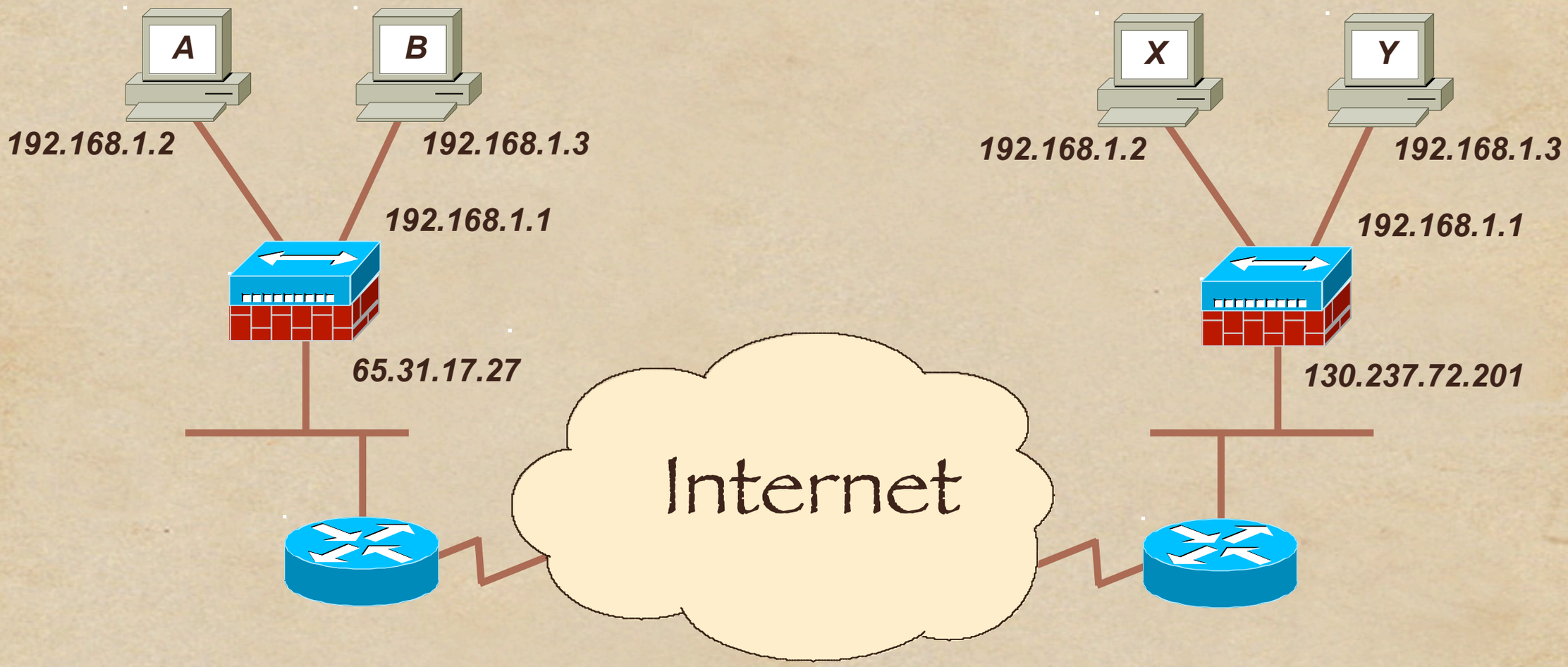
One connection

Outside	Inside
Source: 130.237.72.201:3212	Source: 192.168.1.1:6712
Destination: 67.32.12.3:25	Destination: 67.32.12.3:25
Protocol: TCP	

This sort of works

- When connecting to servers
- A strict client-server relationship

But...



- Can host X connect to host A?

Mapping

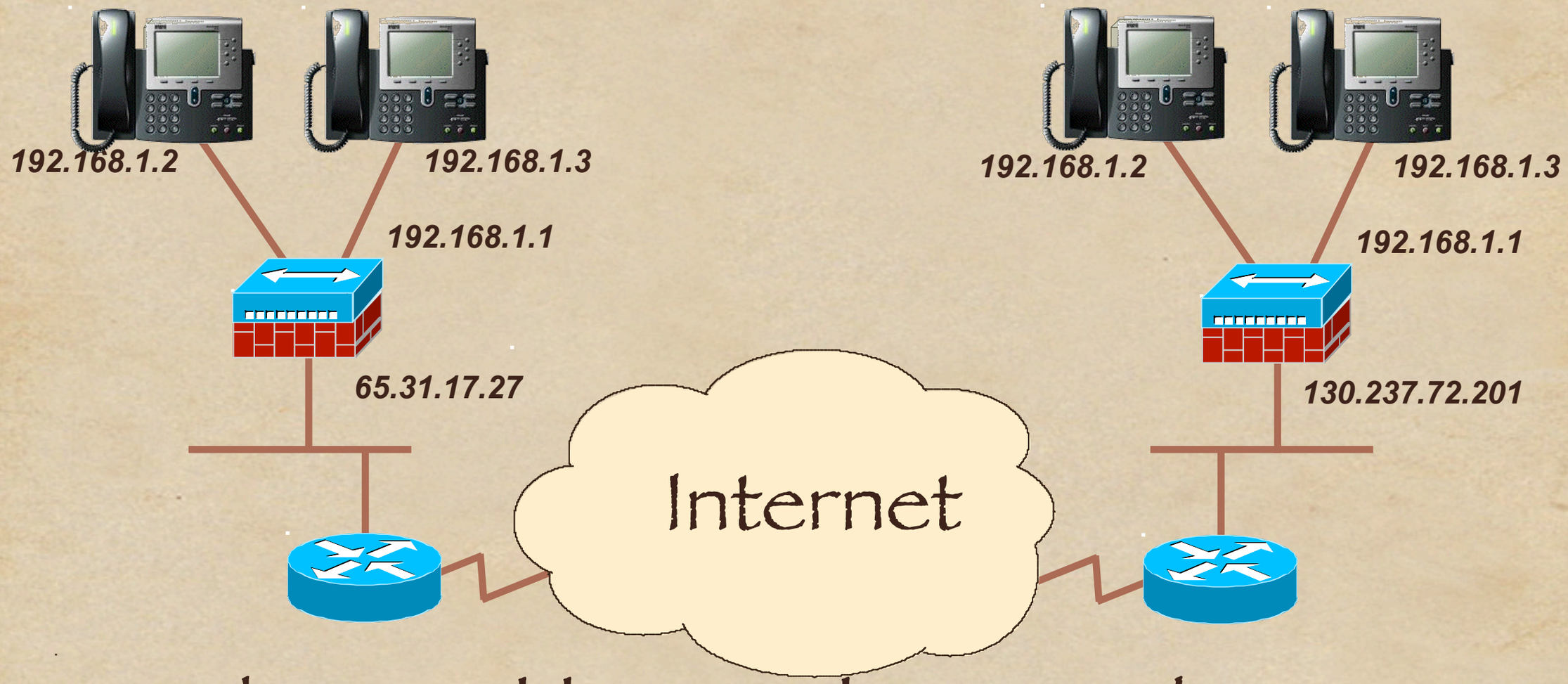
- "If connection is initiated towards outside port 80, forward to 192.168.1.2 on inside, port 80"

- This makes it possible to connect to host A, but not host B

Protocols

- Both SIP and FTP (as two example) have two channels
- Control channel
  - Negotiation of data channel, commands and other signaling
- Data channel
  - Where data is transferred

VoIP



- What IP address and port number is to be used for the actual call?

NAT is not fun!

- The problem is that the client doesn't know what IP address and port number to use
- Those values are allocated in the NAT
- Network configuration is uglier and uglier

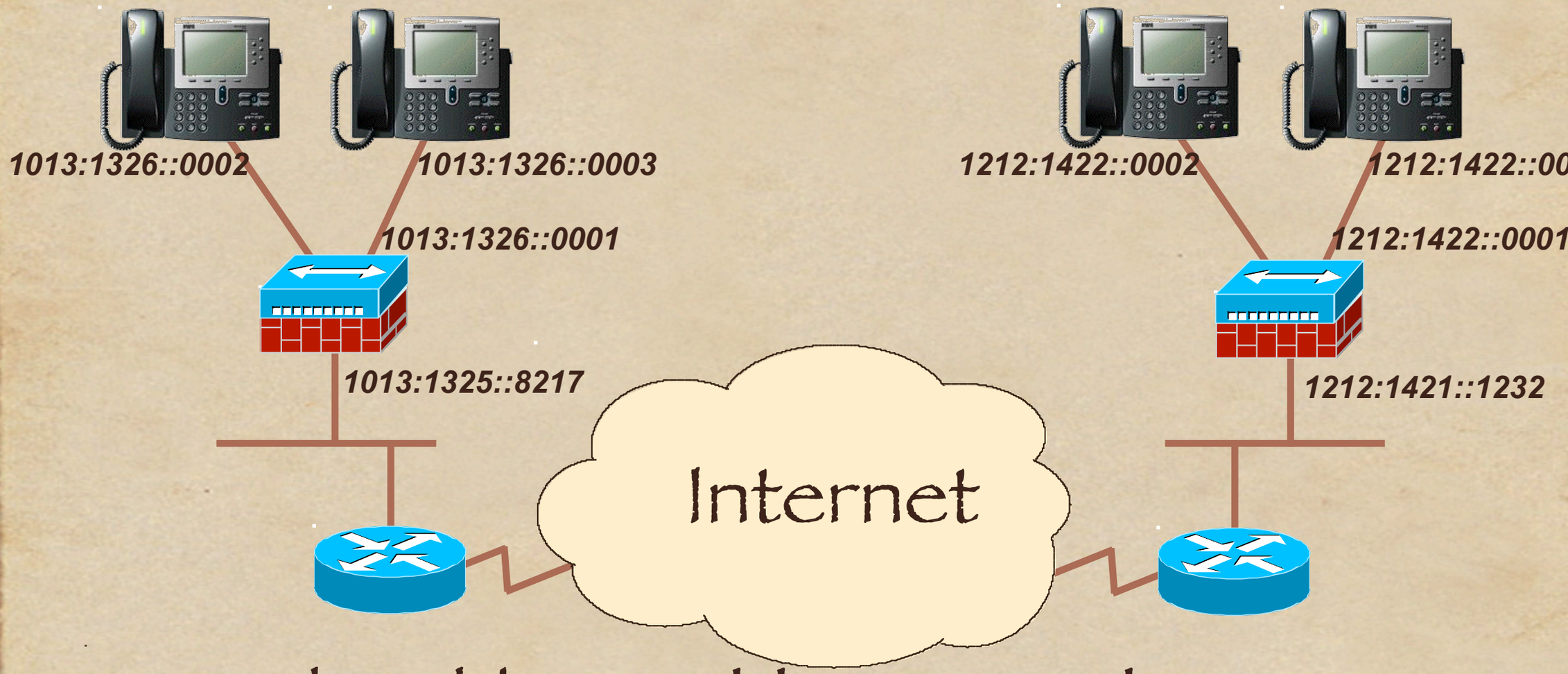
What about IPv6

- Some people claim IPv6 will solve
  - Routing issues
  - Security issues
  - Quality of service issues
  - Addressing issues
- Is that true?

What about IPv6?

- We will have many, many addresses
  - In IPv6 world, we don't need NAT
  - IPv6 give an opportunity for new applications
- Applications have to be changed
  - Contrary to what many people think

VoIP



- With public IP addresses and no NAT, this ends up being so simple

Why not more IPv6?

- It's a Catch-22:
  - People are not asking for it
  - Vendors and ISP's are not implementing
  - It is not deployed

Problems

- IPv6 is nothing extra for the end user
  - "ping" is not that exciting
- ISP can not charge for introduction
  - Still, it cost an ISP money to deploy
- Real IP addresses is THE new thing!
  - Consumer might understand...

Solution:

- Interested parties must start using IPv6
- The European Commission and governments by requiring it on all IP connections they buy
  - http://europa.eu.int over IPv6?
- Applications will help (and need) IPv6 deployment via non-NAT networks

Questions?

Patrik Fältström

Email: paf@cisco.com

Cisco Systems

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