6.033 Spring 2017

Lecture #12

- **New Technologies on the Internet**
  - **File-sharing (BitTorrent, DHTs)**
  - **VoIP (Skype)**
  - **Video Streaming**

Internet of Problems

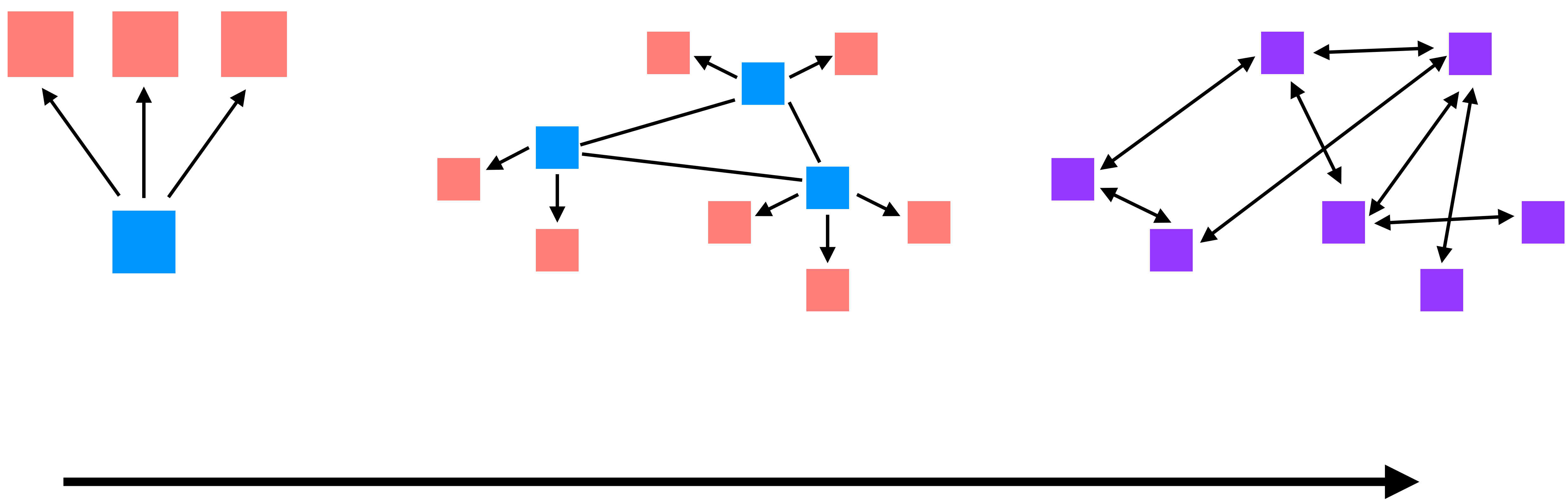
How do we **route** (and address) scalably, while dealing with issues of policy and economy? → **BGP**

How do we **transport** data scalably, while dealing with varying application demands? → **TCP, in-network resource management**

How do we **adapt** new applications and technologies to an inflexible architecture? → **P2P Networks, CDNs** (and more)

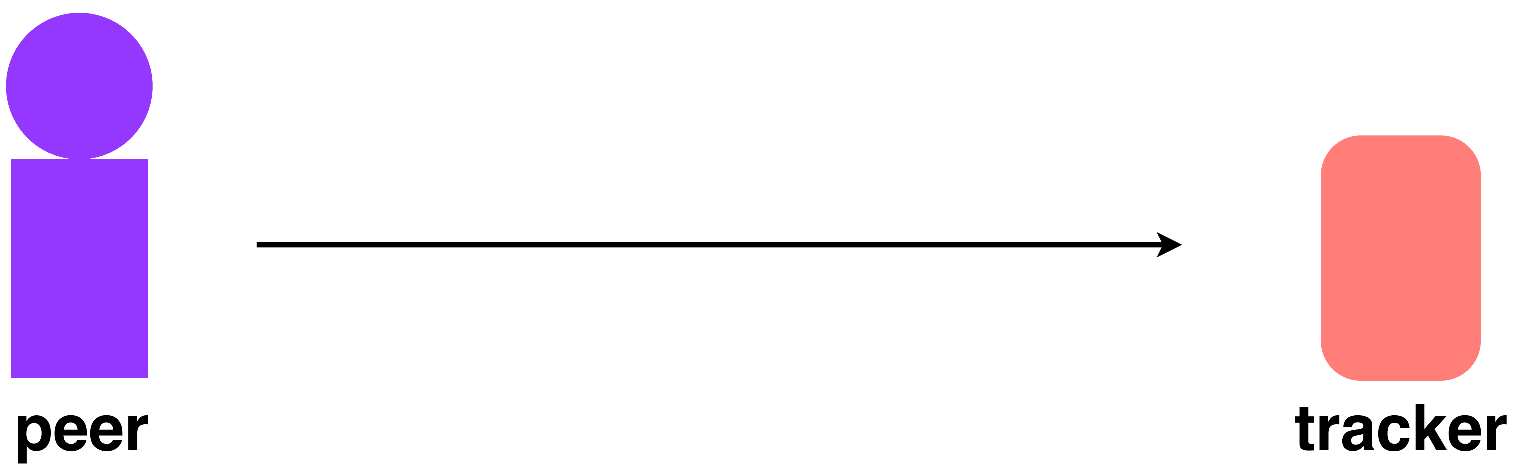
File-sharing Techniques

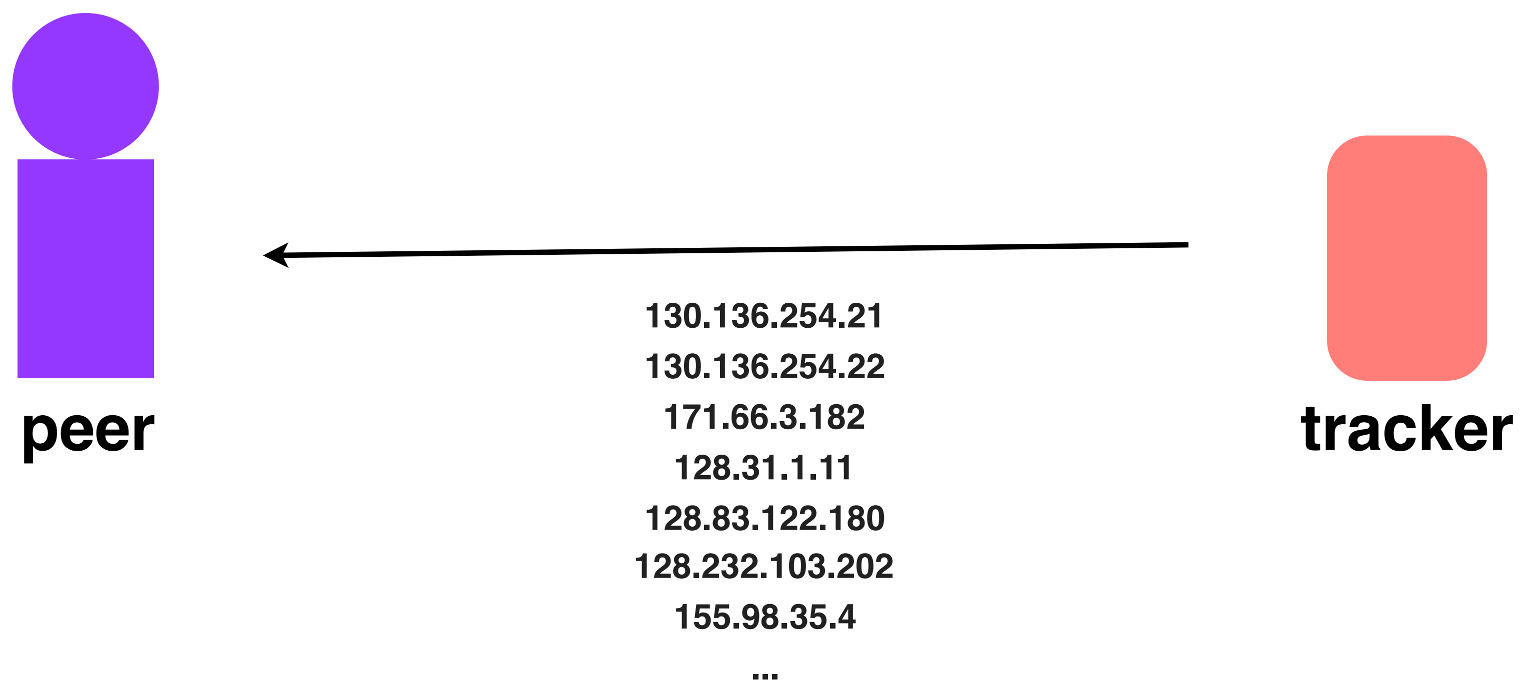
client-server **CDNs** **P2P**

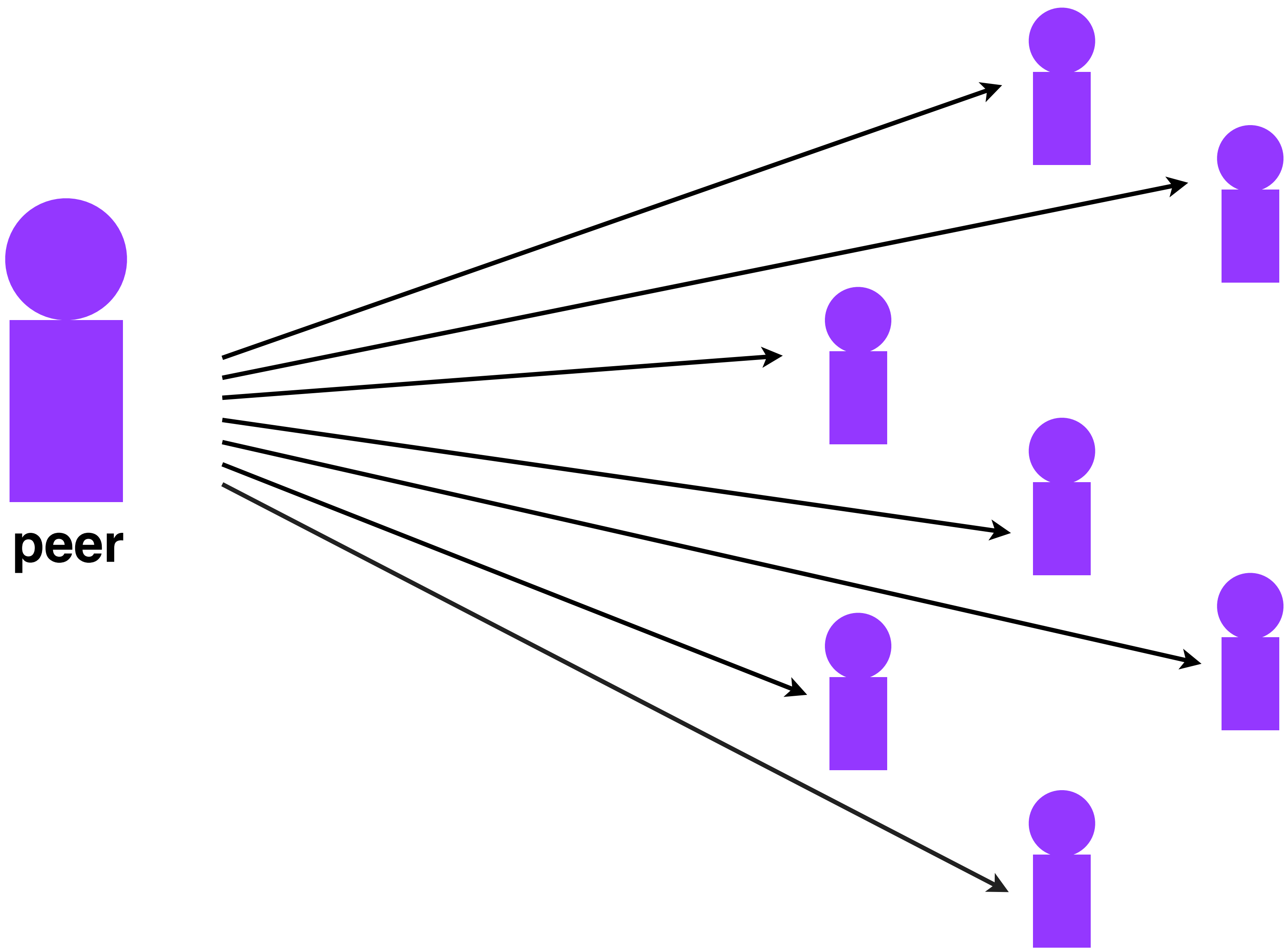


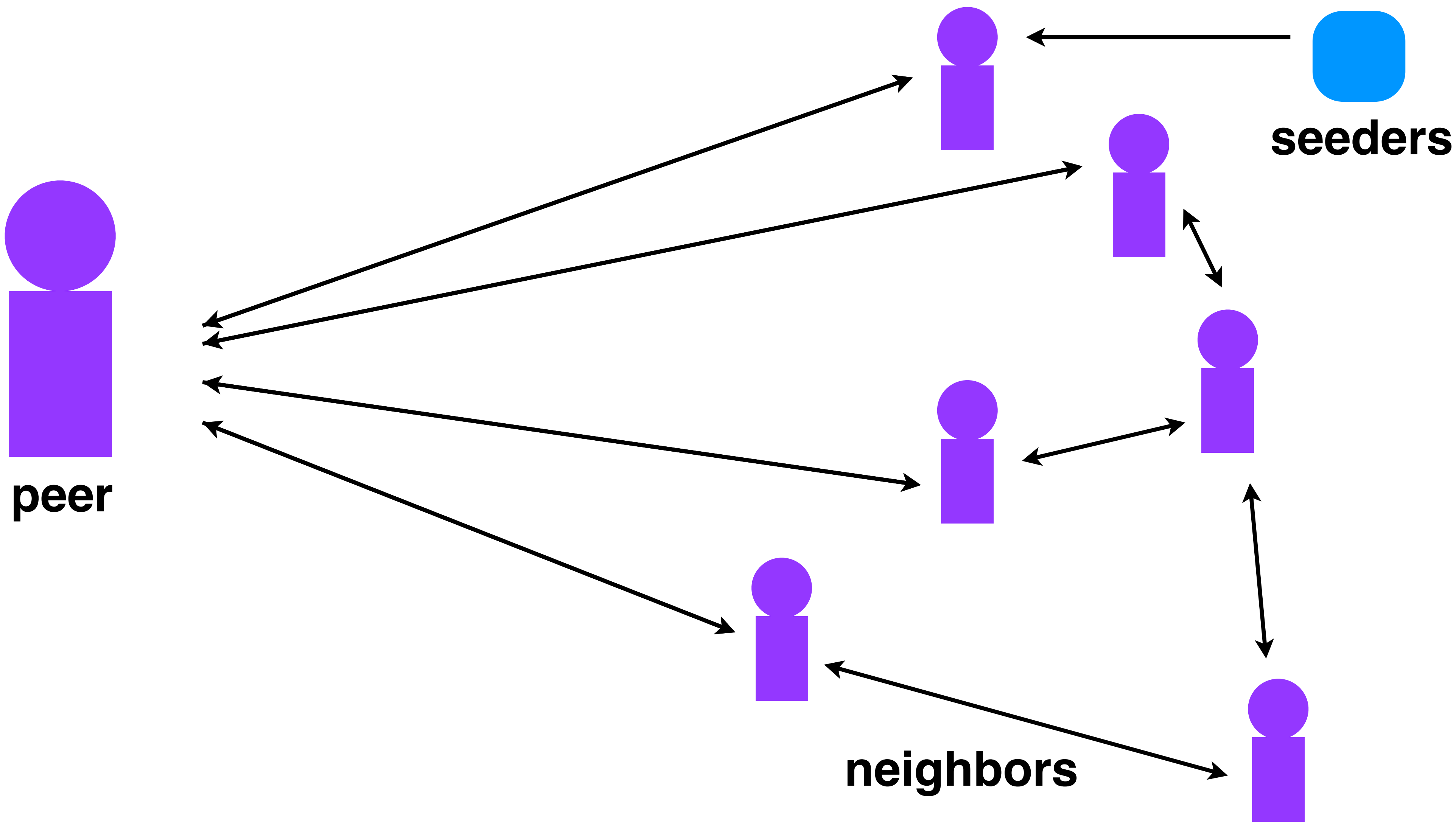
scalability increases
(in theory)

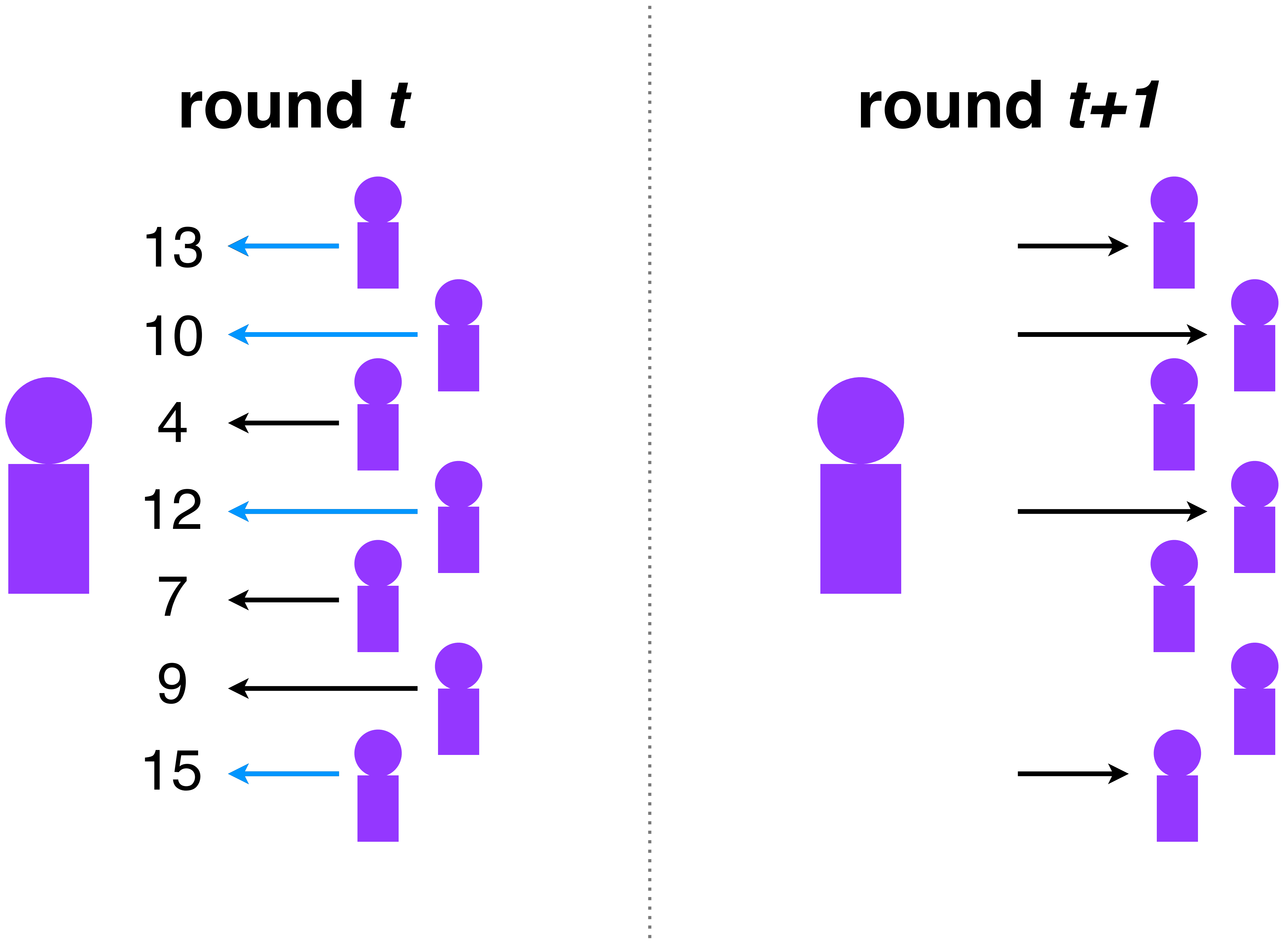
problem: how do we incentivize peers in a P2P network to upload?


peer
tracker


peer
tracker
130.136.254.21
130.136.254.22
171.66.3.182
128.31.1.11
128.83.122.180
128.232.103.202
155.98.35.4
...


peer


seeders
peer
neighbors



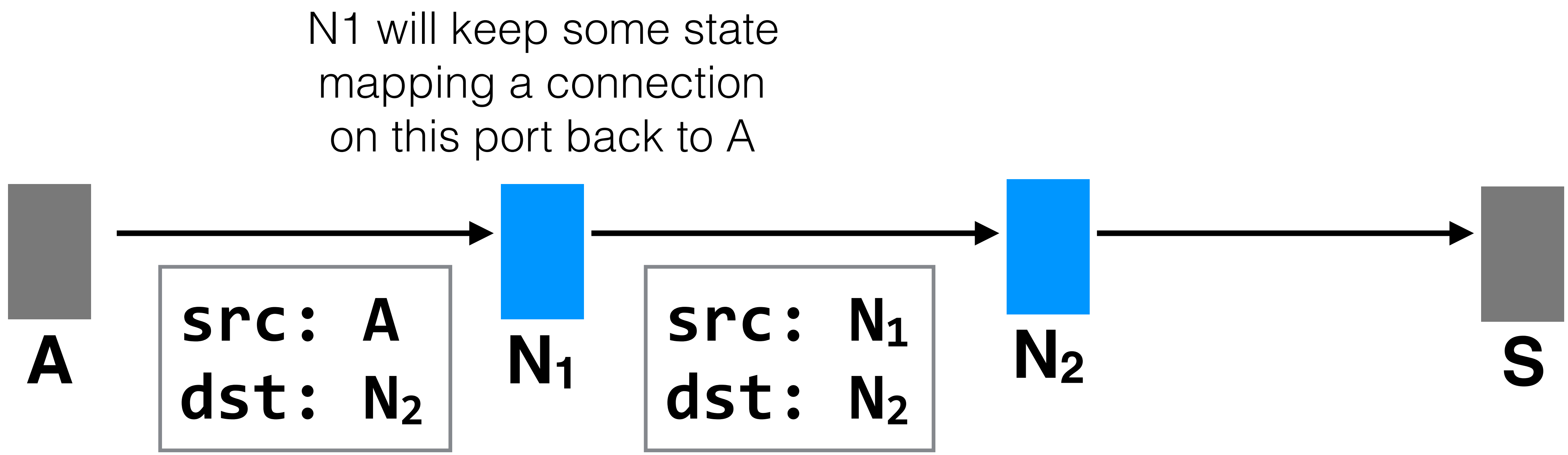
round t
round t+1
13
10
4
12
7
9
15

problem: the tracker is a central point of failure

VoIP

(Voice over IP)

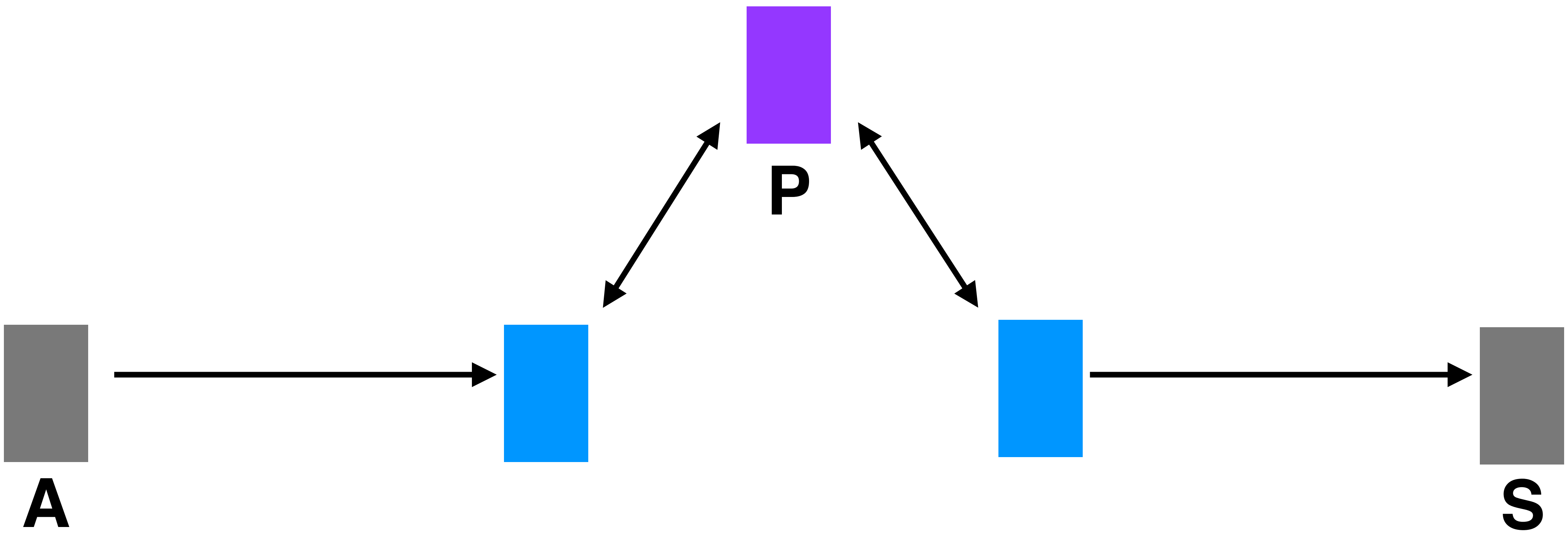
problem: S's IP is private
(can't route to it, and can't figure out that it's "behind" N_2)



skype provides a directory, so assume we can get N_2's IP

N1 will keep some state
mapping a connection
on this port back to A

problem: N_2 has no idea who this packet is meant for



solution: A and S route their communication through P (who has a public IP)

video-streaming

is it just like file-sharing?

- **P2P Networks** are, in theory, infinitely scalable. They can improve performance for some applications, and provide a way to overcome certain aspects of the Internet's architecture. **Incentivizing** peers to behave is an important problem.

- **CDNs** don't scale in the same way that P2P networks do,but are more appropriate for some applications, and provide some features that a P2P network can't (more on that in Thursday's recitation).