Effect of NATs on P2PSIP Overlay Architecture

draft-matthews-p2psip-nats-and-overlays-00

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Think about NATs from the beginning!

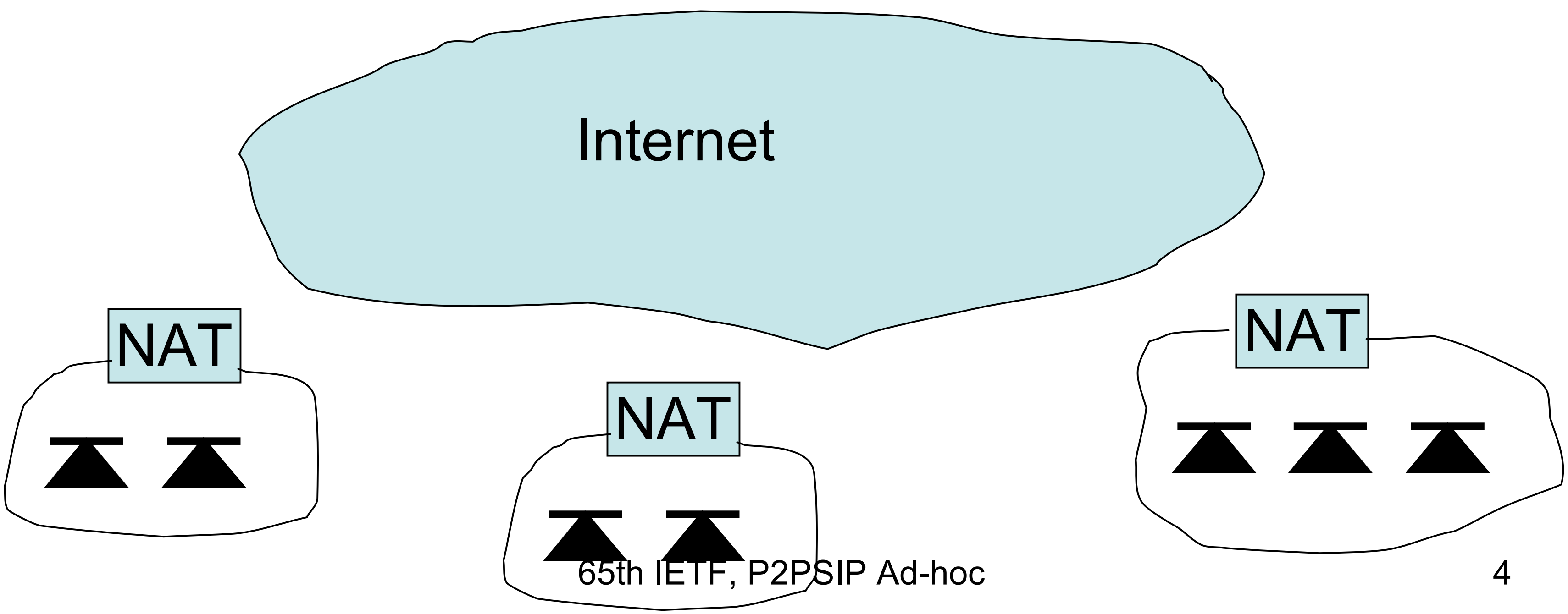
- NATs have a very big effect on overlay architecture.
- Many things break in the presence of NATs
  - Including many DHT algorithms
- Must always think about the effect of NATs on our design.

What is this draft?

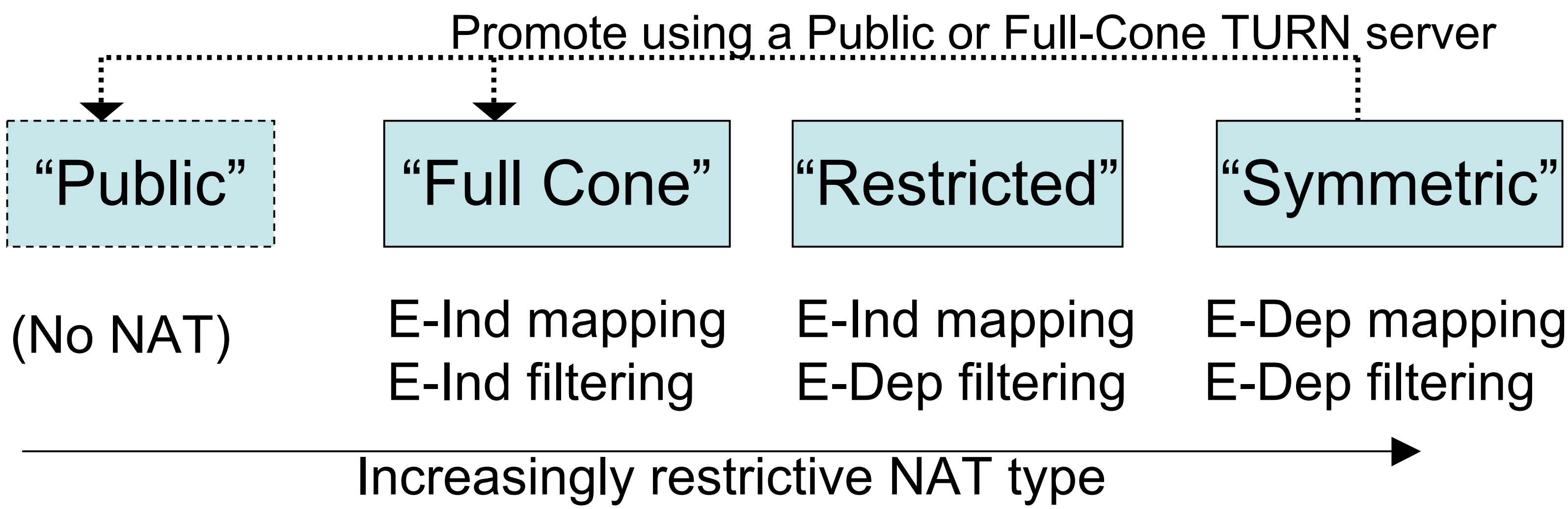
- Examines the effect of NATs on the structure of the overlay network
  - Does **not** present a complete P2P system, but just considers the NAT Traversal aspects.
- Is an “Explore the Design Space” document
- Two parts:
  - List of assumptions
  - Consequences of these assumptions

How many peers have public IPv4 addresses?

- Assumption: **All** peers **may** be behind (various different) NATs.
  - But need a helper node with a public address (as discussed later)

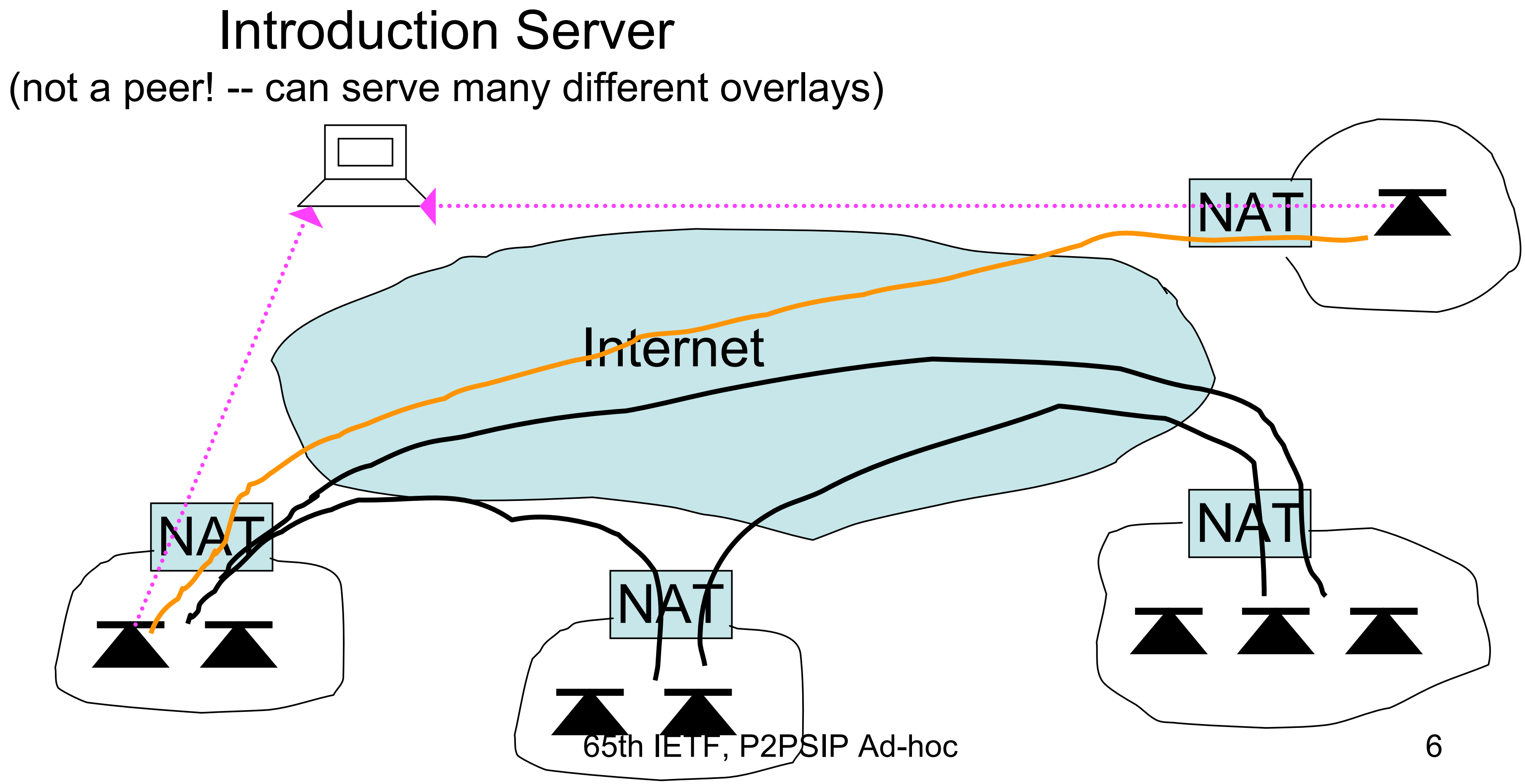


NAT Properties



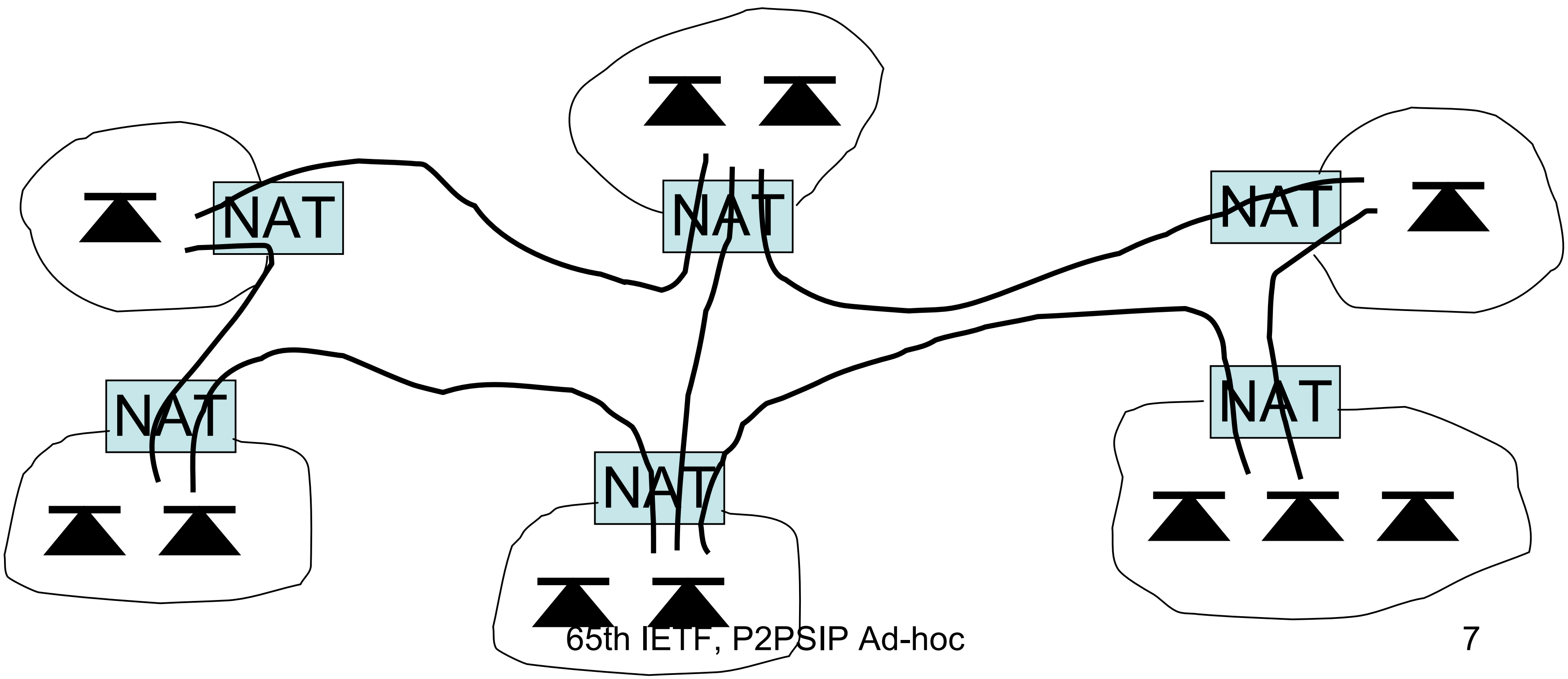
- Use TURN to "promote" peers behind symmetric NATs to public or full-cone status.
- Then assume all NATs are restricted-cone.
  - Worst case once symmetric NATs are promoted

How does a new node join the overlay?



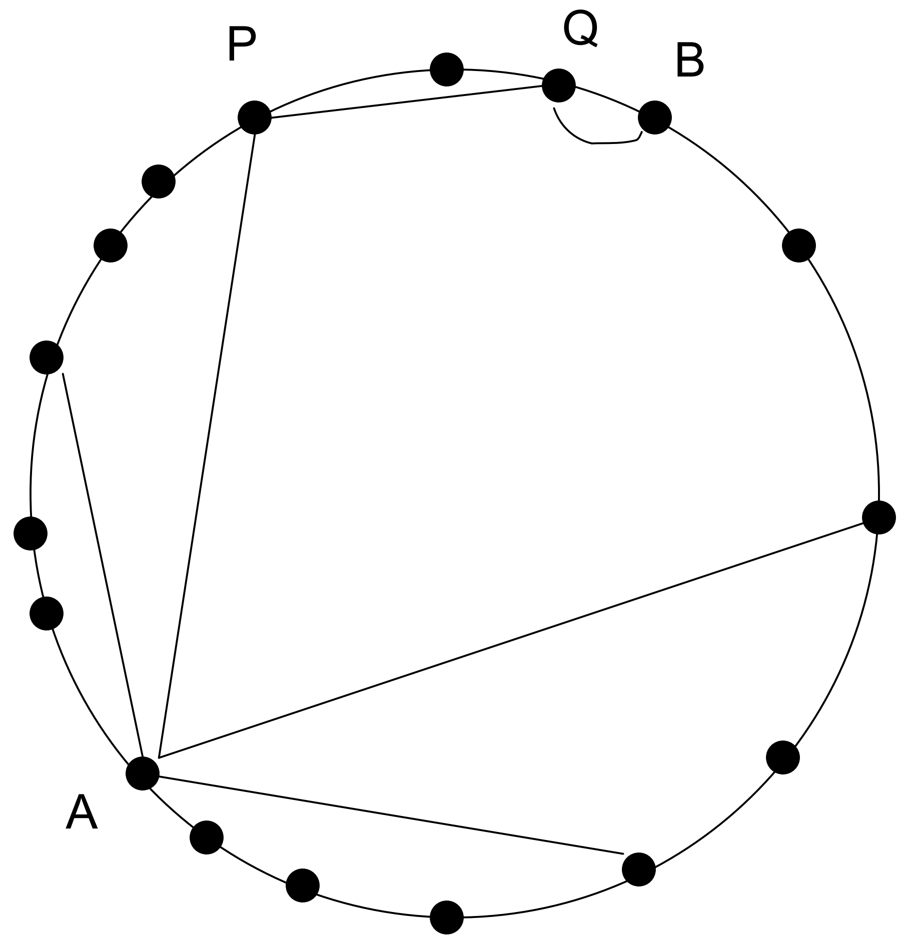
Partial mesh of connections

- Message sent from one peer to another may have to travel over multiple overlay hops
- Need some sort of message routing



Possible Forwarding Algorithm

- Peers are placed on a ring using SHA-1 (á la Chord)
- Connections between peers follow an exponentially increasing distance rule (similar to but not exactly like Chord -- see draft).
- Peer A forwards message addressed to peer B by forwarding to its directly connected peer P whose hash is closest to the hash of B.
- Message will reach B in max log N hops.



Summary

1. Must consider NATs from the beginning
2. For some usage scenarios, all peers may be behind NATs.
3. In these situations, will have a partial mesh of connections between peers.
   - Need some sort of routing algorithm.