HIP RG Presentation:

HIP and P2PSIP

draft-matthews-p2psip-hip-hop-00

Philip Matthews

Alan Johnston, Eric Cooper, Gonzalo Camarillo

What is P2PSIP?

- New working group (first meeting was March 2007).

- Task: Protocol suite for p2p overlays for multi-media communication.

P2PSIP Status

- Currently in the early stages of investigating the problem.

- HIP-HOP is one of 6 different proposals for how to do P2PSIP.

  – One other proposal also uses HIP

  – Some preliminary discussions about ways to bring the two proposals together.

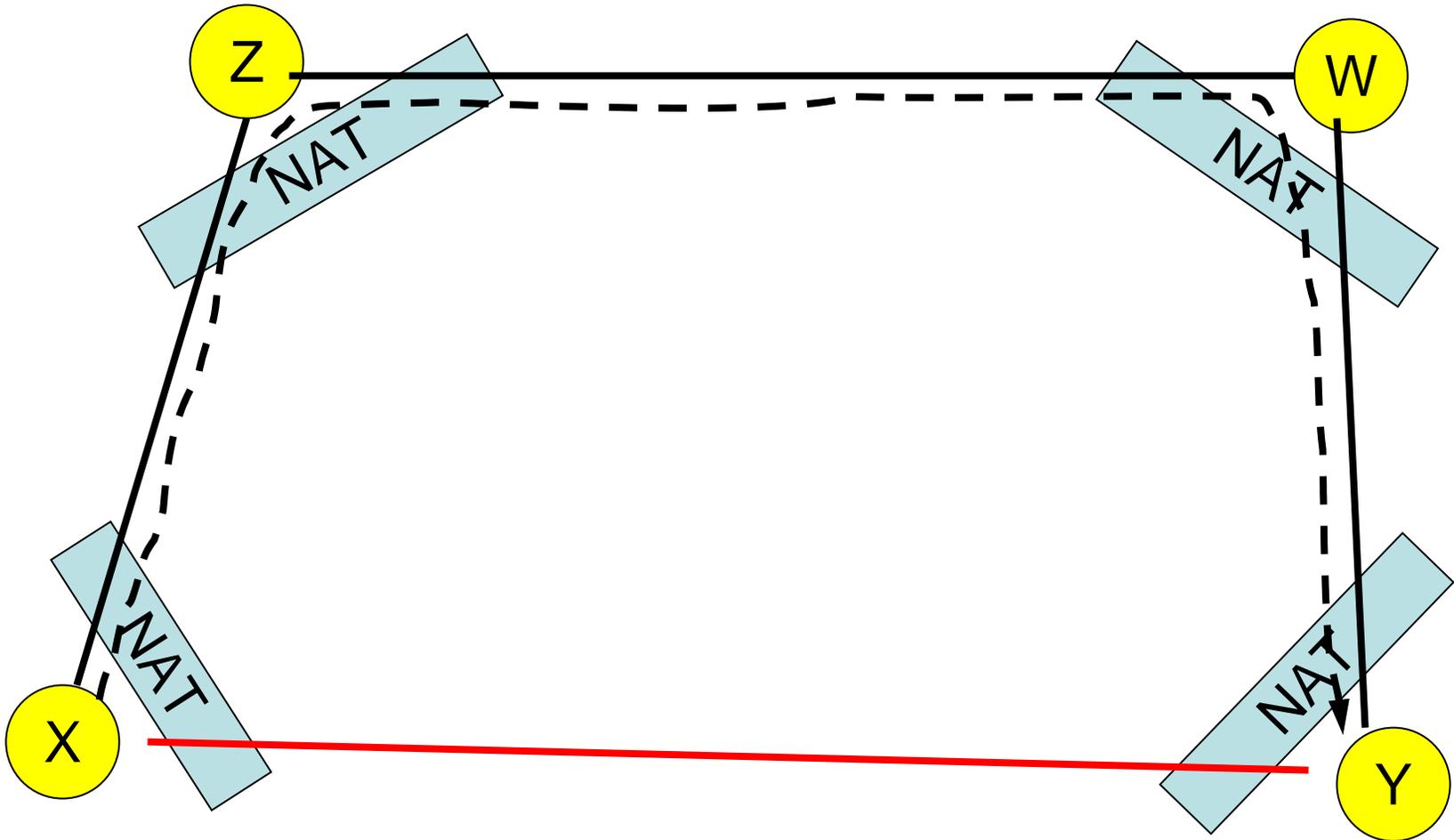 – Other non-HIP proposals could be modified to run over HIP-HOP.

HIP-HOP in brief (1)

- P2P overlay consists of peers with a partial mesh of HIP associations between peers.

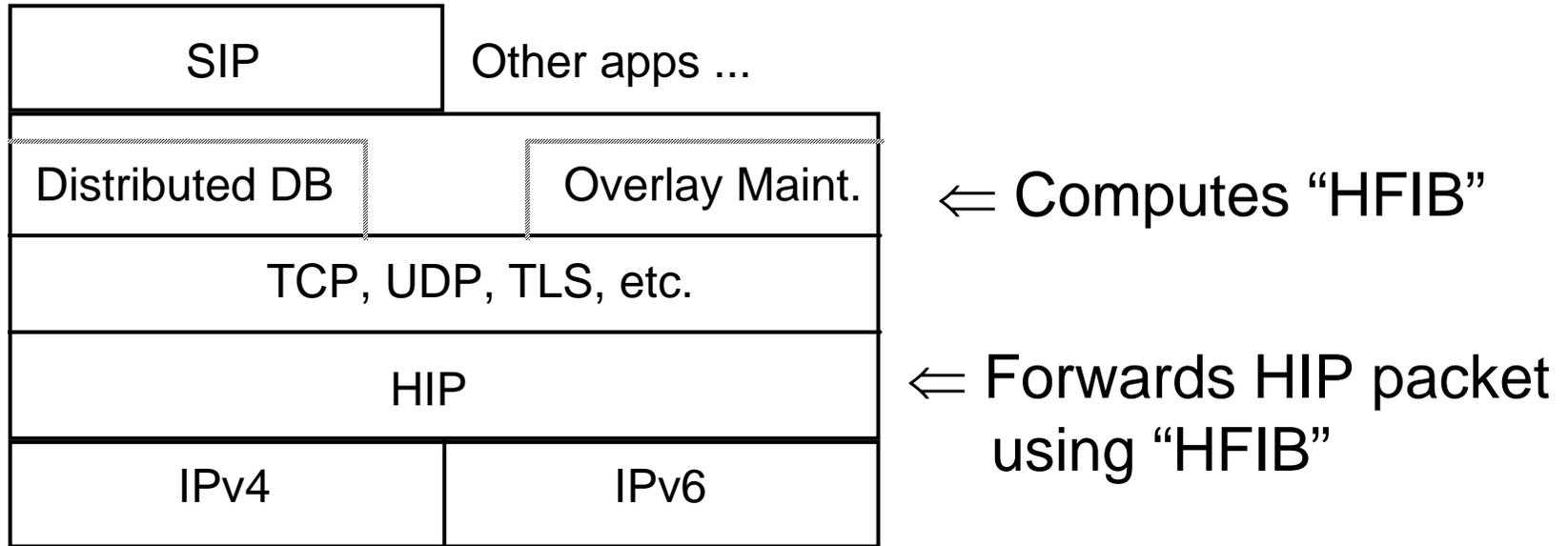- Each peer uniquely identified by a HIT ("Peer ID").

HIP-HOP in brief (2)

- Do overlay routing at HIP layer by routing on destination HIT in HIP header.
  - Somewhat similar to Hi^3 and NodeID proposals
  - Extension of RVS and Miika Komu's HIP Relay
- Use "key-based" routing like that used in DHT algorithms
  - At each hop, forward to direct neighbor that is "closest" to destination
  - No routing protocol (e.g., OSPF) required.
- Can route HIP packets in this way
- Use this to set up new HIP associations to peers behind NATs.

Example

Protocol Stack

SIP	Other apps ...

Distributed DB		Overlay Maint.

$\Leftarrow$ Computes "HFIB"

TCP, UDP, TLS, etc.

HIP

$\Leftarrow$ Forwards HIP packet using "HFIB"

IPv4	IPv6

- Distributed DB: likely a DHT protocol
- Overlay Maint: forms and maintains overlay. Downloads a "forwarding table" to the HIP layer.

HIP-HOP status

- Draft presents high-level direction, but not all details worked out yet.

  – Looking for people interested in helping out.

- Plan is to submit a number of documents to HIP WG to properly propose our ideas (likely for Vancouver).

- Also doing prototype with Gonzalo's group at Ericsson

  – Are other implementations interested?

HIP-HOP Status (2)

- Our opinion: compelling use for HIP
  - Solves "Chicken-and-egg" problem.
- Will be discussed more on Thursday morning at P2PSIP meeting: HIP experts encouraged to attend.

Backup slides

Distributed Transport Layer

- Allows a peer to send a message to any other peer.
    - Specify dest peer using peer ID
- **Critical point**: Must work even when dest peer is behind a NAT or Firewall (FW).
- Not specific to SIP: can be used for other applications.
- Our draft: Build using HIP.
    - Nice usage of HIP
    - No chicken / egg problem.

P2PSIP needs: Peer IDs

- P2PSIP requirements:
  - Must uniquely identify a peer
  - Must be evenly distributed throughout range (for DHT reasons)
  - Ideally: can not pick specific value (c.f. Sybil attack)
- Our draft: use HI / HIT as Peer ID
- Bonus properties:
  - Looks like IPv6 address
  - Nice cryptographic properties

P2PSIP needs: Overlay Connections

- P2PSIP requirements:
  - Must provide secure communications
  - Must work through NATs
- Our draft: Use HIP associations
- Bonus properties:
  - Mobility
  - Can run all transport protocols over a HIP association

NAT/FW problem in P2PSIP

- Existing p2p overlays rely on "superpeers" with public IP addresses.
  - These help other peers that lie behind NATs or FWs.

- P2PSIP: Considering overlays where *all* peers potentially behind NATs/FWs.

Solving NAT/FW problem

Need:

1. Way for joining peer to connect to **some** peer in the overlay.

2. Way to add additional connections (given at least one connection).

Proposed solution for (2) requires, in turn:

3. Way to route packets along existing connections through intermediate peers to a destination peer.