I3: Internet indirection infrastructure.

Point to point abstraction

↳ not suitable to support other communication primitives.

- Multicast-
- Anycast-
- Mobility
- Content centricity?

Why mismatch? Point-to-point assumes one ~~data~~, sender, one receiver at fixed well known locations

How do current approaches solve it? Indirection

IP Multicast group

Home agent / foreign agent in mobility.

Create indirection as the primitive

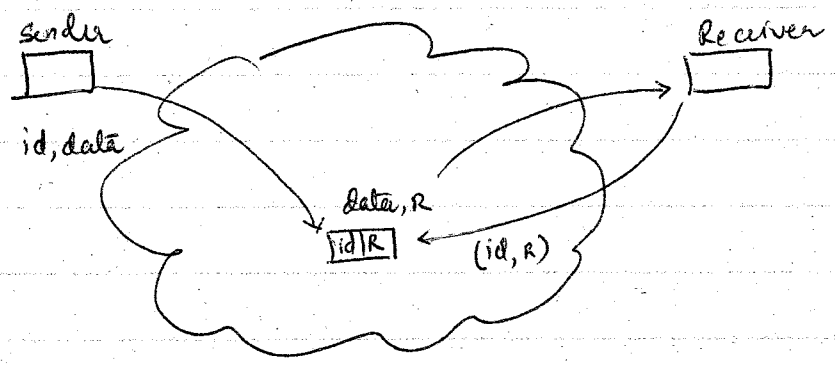
Build an efficient indirection layer on top of IP.

Build using an overlay → no need to change IP

→ incrementaley deployable.

I3 basics. Packets have id

to receive id, receiver R maintains a trigger (id, R)



Service model: API: sendpacket(P)
insertTrigger(t);
removeTrigger(t) → optional

Best-effort delivery, just like IP.

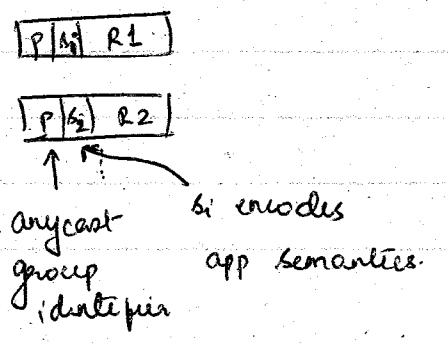
Triggers periodically refreshed by end-hosts.
ID → 256 bits.

How to support various services.

Mobility: update with new mapping

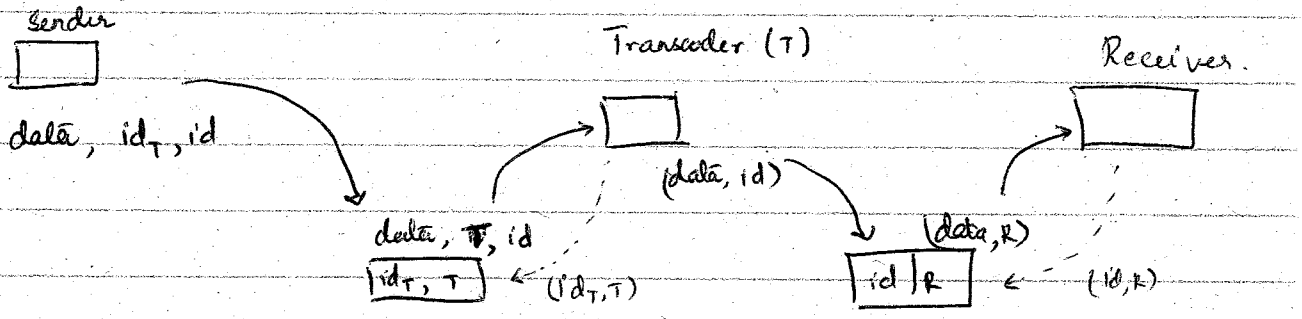
Multicast: - receivers insert triggers with the same identifier.
- can dynamically switch unicast to multicast.

Anycast - use longest-prefix match instead of exact match

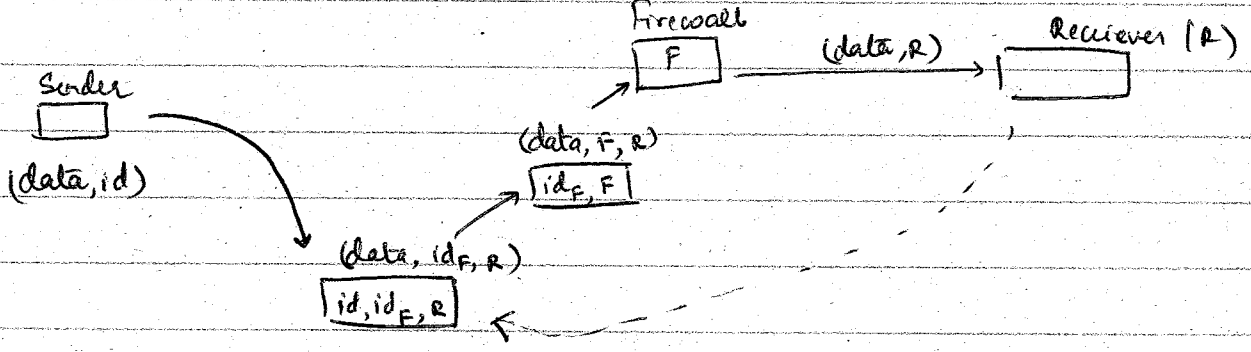


Service composition, sender initialed.

- use a stack of ids. to encode a sequence of operations to be performed.



Receiver initialed:



Implement-ation / practice

- collection of infrastructure nodes
- ID space is partitioned across nodes
  - A node is responsible for a region of ID space.

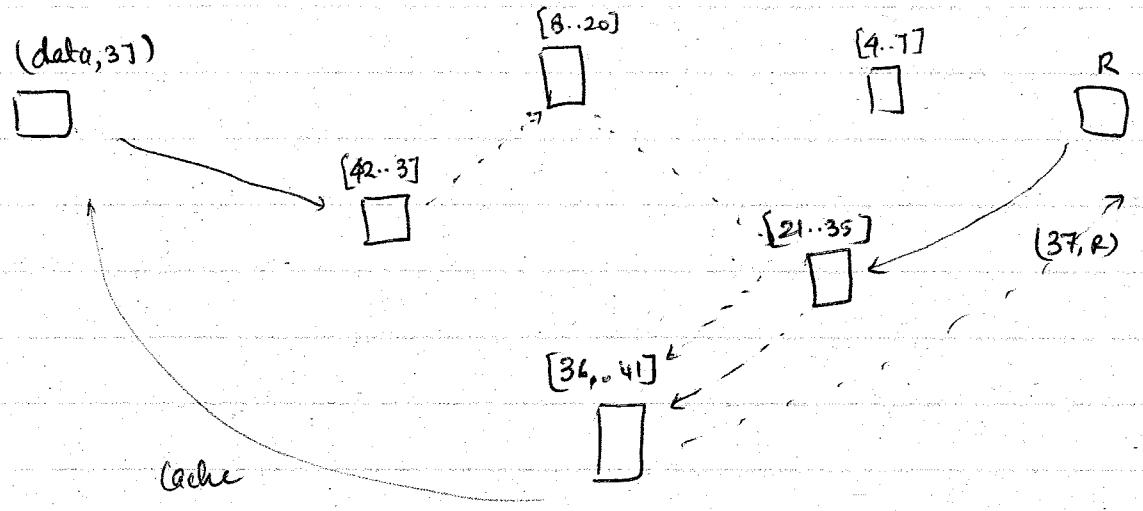
Use chord to route triggers and packets to nodes responsible for their IDs.

- O(log N) hops.

Example: ID space [0..63]

partitioned across 5 nodes

Each host knows one I3 node



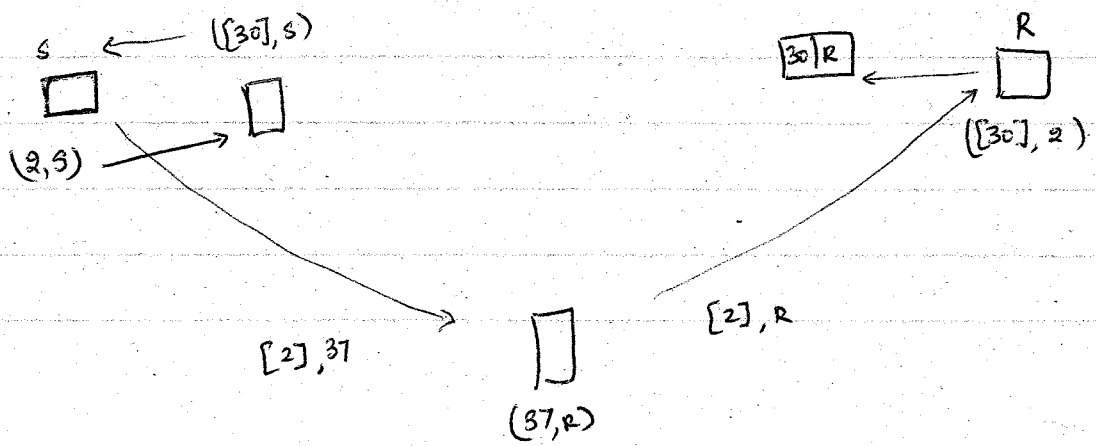
Optimization, path length.

Sender, receiver caches i3 node mapping a specific ID.

Triangle routing:

- Use well known trigger for ~~sad~~ initial rendezvous

- Exchange a pair of private triggers well-located
- Use private triggers to send data traffic



Security challenges

- Eavesdropping - private triggers + PKI
- loop
- Confluence
- Dead end.

Trigger hijack → (id, x) (x, s)

DOS attacks → challenges to verify that trigger was inserted by end-host claiming to insert

→ Resource allocation

→ loop detection.