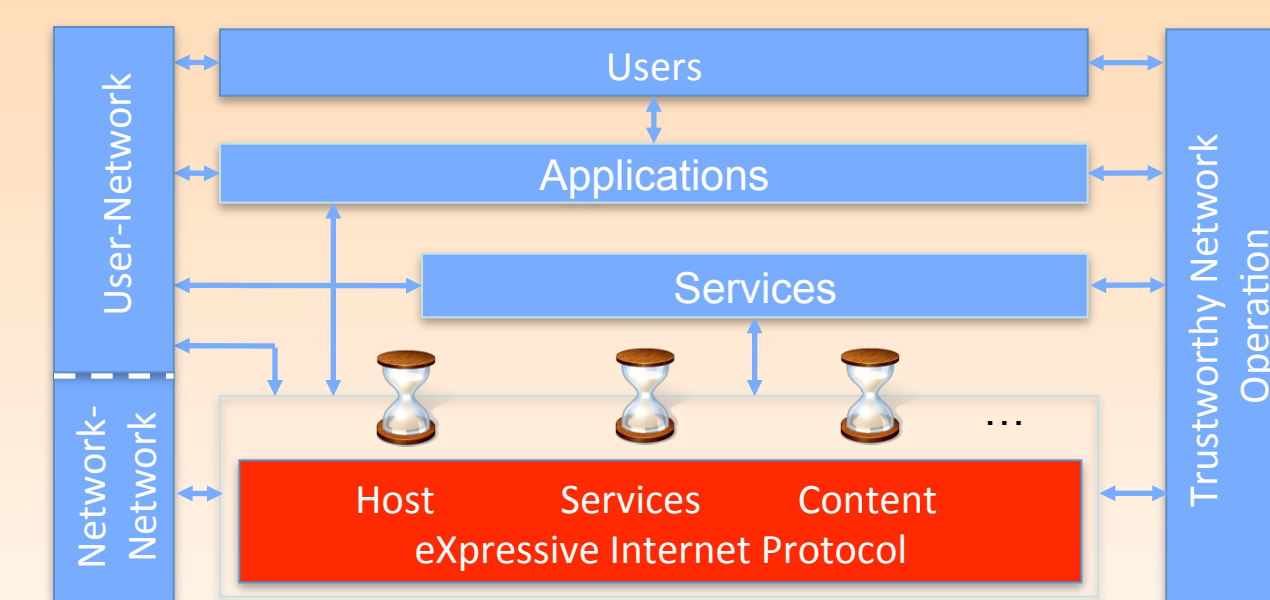# XIA as a Research Platform

Matthew K. Mukerjee, Yuchen Wu, Dan Barrett, Srinivasan Seshan, Peter Steenkiste, and **many others**

Overview

- The eXpressive Internet Architecture (XIA) is a future internet architecture project focusing on evolvability and security.
- Many new architecture ideas can be implemented on top of XIA.

XIA Key Ideas

1. Multiple principal types
2. Flexible addressing
3. Intrinsic security

- We show examples how 1&2 can be used to further research.

Support for Multiple Principals

Unlike today's host-based Internet, applications use one or more *principal types* to directly express their *intent* to access specific functionality. We provide four basic principal examples:

- **Host**
- **Administrative Domain**
- **Service** — e.g., online banking
- **Content** — e.g., a video

What *is* a principal?

Three things must be defined:

1. The semantics of communicating with the principal type
2. Per-hop processing
3. A control plane

Research Opportunities

QoS as a principal type
- Traffic classes in network
- How to handle admissions control?

Mobility as a principal type
- In-network support for client movement
- How to find moved host?

Load Balancing as a principal type
- Opportunistically split load
- What algorithm to use in routers?
- Is coordination needed?

Flexible Addressing

- Addresses in XIA are represented as DAGs (directed acyclic graphs).

Fallbacks

- Provide "backwards compatible" paths
- Facilitate **end-point evolution**
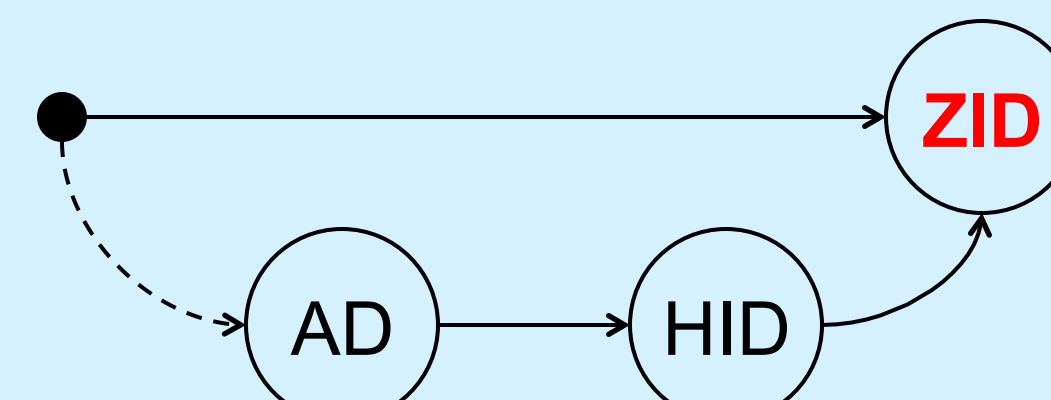- Allow network-side **incremental deployment**

Research Opportunities

- Incremental deployment of new prin. types
- Mobile rendezvous service as fallback
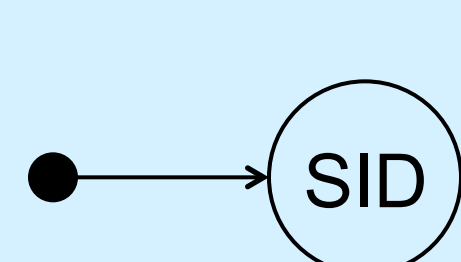
A Simple DAG. This simple DAG expresses only the sender's primary intent: to send a message to a service with ID SID.
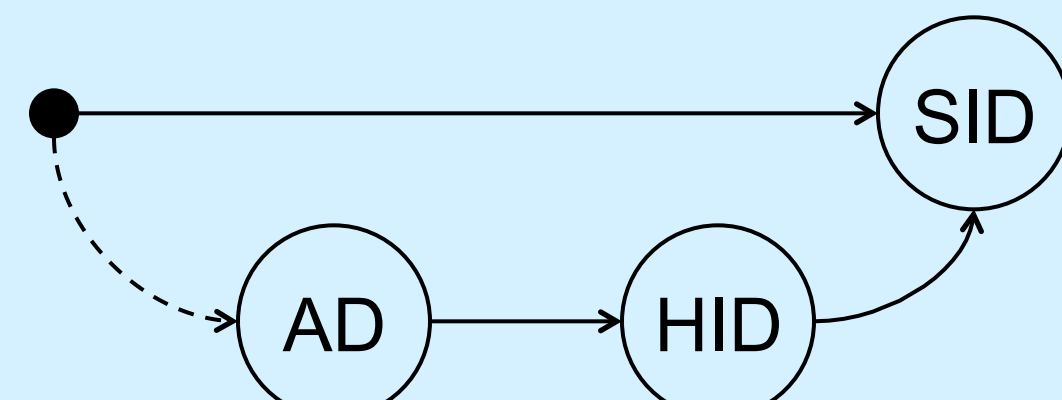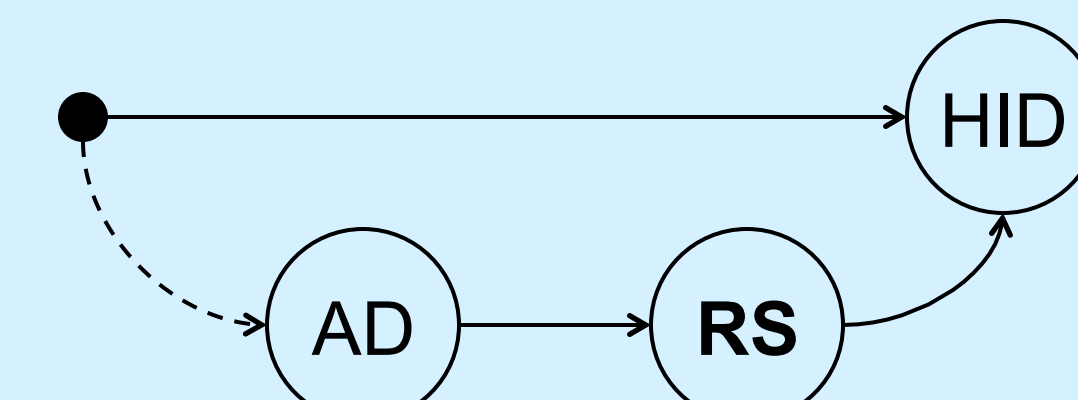
Fallback. The primary intent is still to route to SID, but if a router doesn't support services, it can fall back to AD and host-based routing.

Incremental Deployment. If a new XID (here ZID) is not understood by the entire network path, a fallback will be used, allowing incremental deployment.

Rendezvous. To facilitate mobility, a packet that can't reach a host that moved (HID) can use fallbacks to reach a Rendezvous Service (RS).

Where to get XIA

- XIA is available on on GitHub: http://www.github.com/XIA-Project (open source, apache license)
- Wiki also available on GitHub
- Can run XIA on multinode topologies locally or on physically different machines
- Can run XIA on testbeds such as GENI, planet lab, …
- Support available at xia-users-help@cs.cmu.edu

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