Exploring New Principals and Use-Cases in Linux XIA

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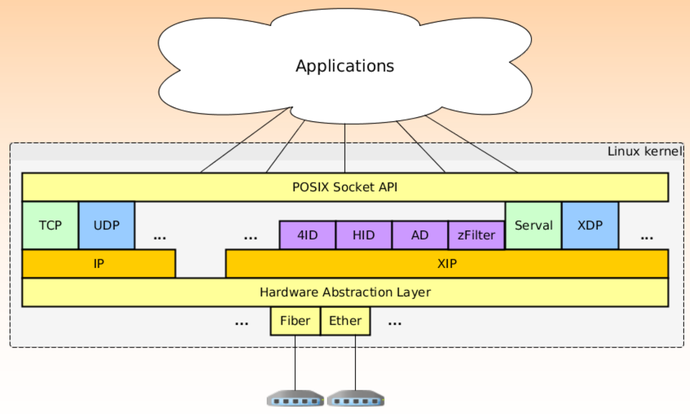


Motivation

Discover new XIA functionality and a killer XIA application

Expose interesting new principals, use cases, and DAG addressing techniques

Fast Packet Processing

Recent work (netmap [1], DPDK [2], ...) moves packet I/O to user space

Advantage: better performance
Disadvantage: kernel bypass limits routing, filtering, flow reconstruction, ...

Balanced solution: an XIA principal could enable kernel processing *and* more performant delivery to user space using techniques in literature (mmap'd buffers)

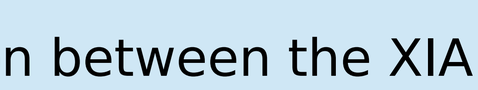
Improving communication between the XIA stack in the kernel and applications could **reduce latency** and **increase throughput**

[1]: “netmap: a novel framework for fast packet I/O.” L. Rizzo, ATC'12.
[2]: Data Plane Development Kit. http://www.dpdk.org.

Centralized DAG Generation

Potential solution to “where do DAGs come from?” problem; makes XIA more **application friendly**

Is SDN applicable here?

Could provide a centralized way to:
- Map user choices to DAGs
  “facebook.com” → 

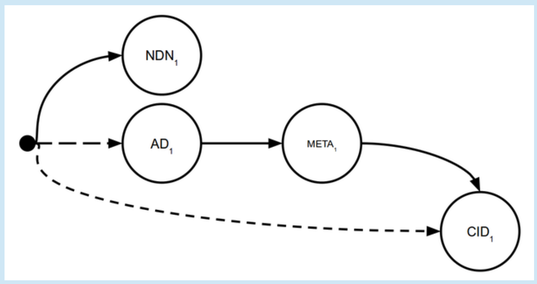
- Insert network policies into DAGs


Information-Centric Networking

XIA can allow more **choice** in ICN:

- **Network core**: NDN-style, CID-style, ...
- **Network core** and **edge**: meta-information [3]
- **Network edge**: content selectors (version, pub.)

DAG fallbacks can flexibly, evolvably mix and match these various choices:



[3]: “Economic Incentives in Content-Centric Networking: Implications for Protocol Design and Public Policy.” P. Agyapong, CMU. (XIA-related PhD dissertation.)

Random Intermediate Forwarding

Idea for principal type: before forwarding to the intended destination, packets visit a **random intermediate** node

Using a “random intermediate” could:
- **Anonymize** the source of a packet
- **Load balance** traffic in the network
- Help identify/stop **DoS** attacks

Enhanced Service Chaining

Recent work [4] has explored the benefits of using **service identifiers** in service chaining

XIA uses service identifiers (SIDs and others) *and* generalizes service chaining to more flexible combinations using DAGs

XIA service chaining could be **scalable**, **generalizable**, **dynamic**

[4]: “Exploiting ICN for Flexible Management of Software-Defined Networks.” M. Arumaithurai et al, ICN'14.

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