

Linux XIA

An Interoperable Meta Network Architecture to Crowdsource the Future Internet



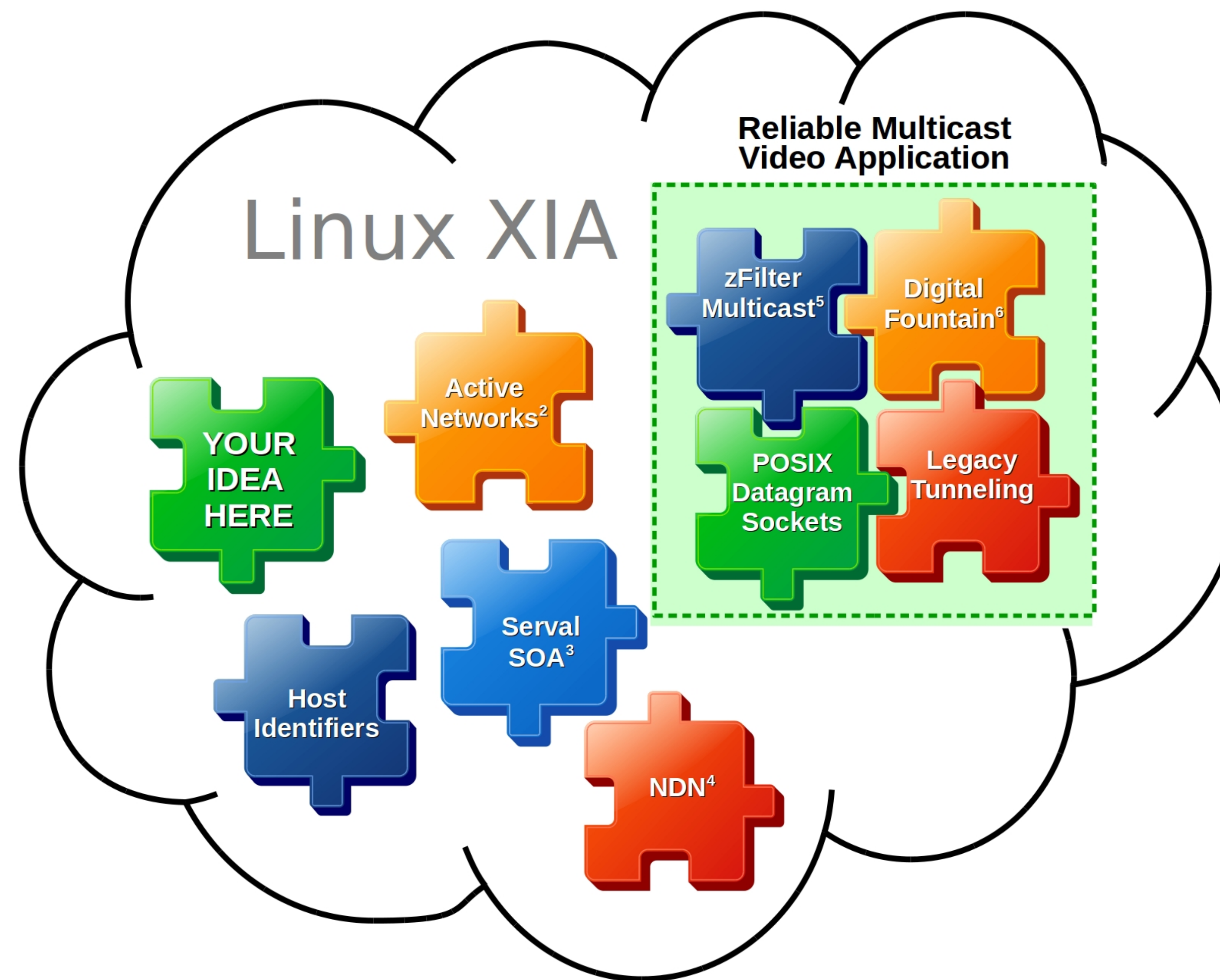
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Motivation

- The legacy Internet is not well-suited to increasingly complex needs: **security, mobility, management...**
- Many future Internet architecture projects have emerged; none have been successful due to the legacy network's **innovation barrier**.
- Previous work has tried to address the barrier, but none have emphasized **collaboration** and **interoperability**.

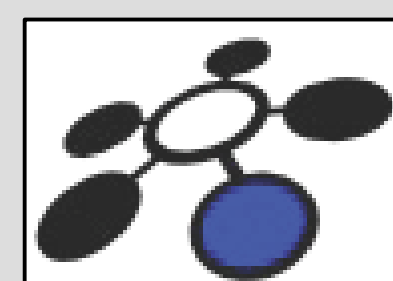
Take-Home Message

Linux XIA can act as a **meta architecture** that is amenable to network evolution by serving as an incubator for networking ideas, old and new.

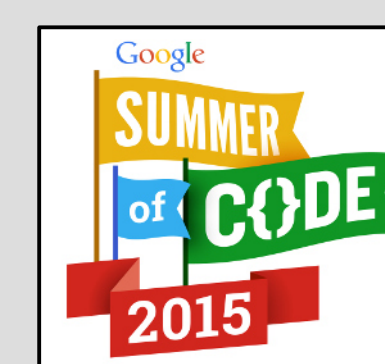


Look for us in...

ANCS'15

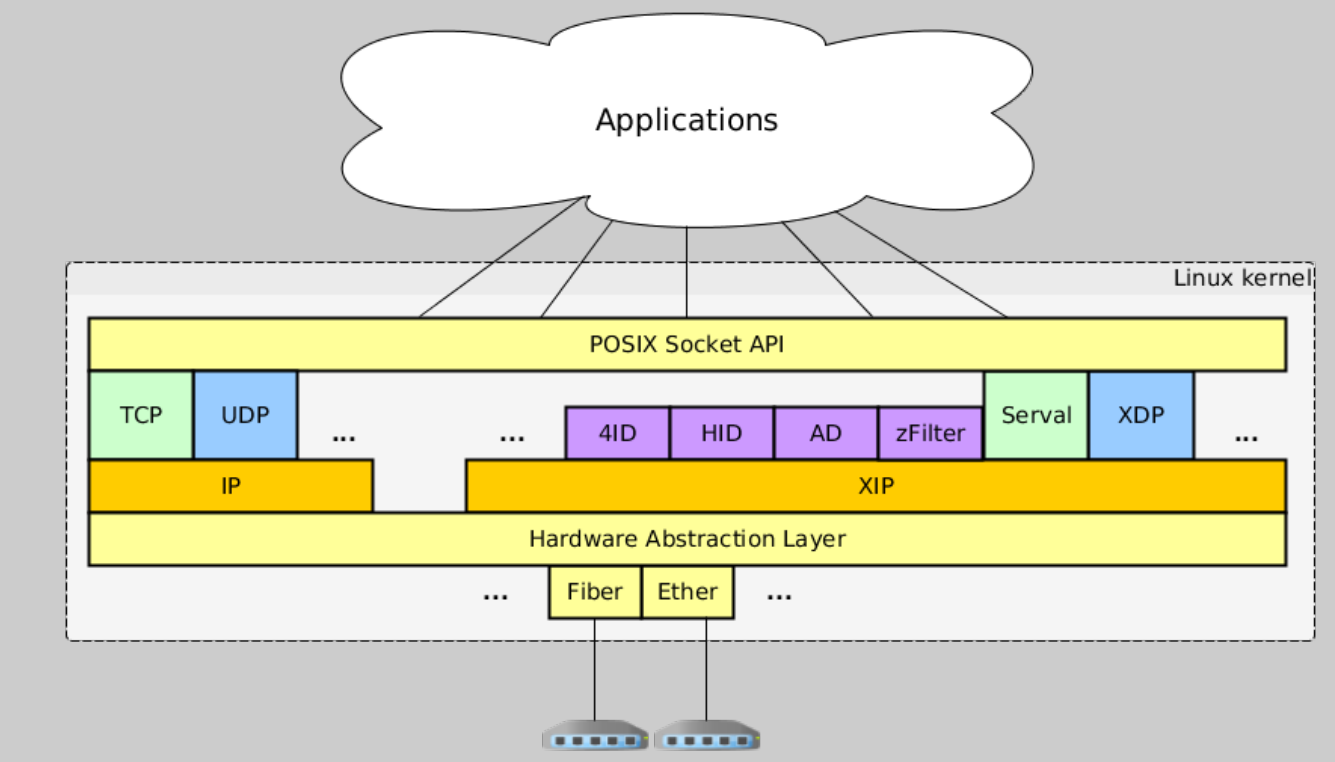


Google Summer of Code



Summary of Work

- Fully **independent** network stack
- **High-frequency** editable routing table
- Efficient routing dependencies
- Support for **POSIX** socket API
- In synch with latest Linux kernel release
- Reasonable **forwarding performance**; comparable to Linux IP in most cases
- Reliable multicast application



eXpressive Internet Architecture

Three key ideas in XIA¹:

- **Principal** types for different usage models: hosts, ASes, content, services, as-of-yet unknown types
- **Flexibility in addressing**: incremental deployment, non-linear addressing scheme (DAGs)
- **Intrinsic security**: cryptographically-derived, self-certifying identifiers

By building the above concepts into a new network-layer protocol, XIP, network **evolution** is enabled.

Future Goals

Short Term:

- Building **applications**: iperf, nginx, Firefox
- Going **upstream** in Linux Kernel
- Implementing **information-centric** networking and advanced **routing techniques**

Long Term:

- Maintain a **level playing field** for technologies old and new
- Enable anyone to **experiment** with networking ideas in a collaborative environment
- **Crowdsource** the future Internet

[1] Han et al. XIA: Efficient Support for Evolvable Internetworking. NSDI 2012.
 [2] Wetherall, D. J. Service Introduction in an Active Network. PhD thesis, Massachusetts Institute of Technology, 1999.
 [3] Nordstrom et al. Serval: An End-Host Stack for Service-Centric Networking. NSDI 2012.
 [4] Jacobson et al. Networking Named Content. SIGCOMM 2009.
 [5] Jokela et al. LIPSIN: Line Speed Publish/Subscribe Inter-Networking. SIGCOMM 2009.
 [6] Byers et al. A Digital Fountain Approach to Reliable Distribution of Bulk Data. SIGCOMM 1998.