IPOP Overlay Networks for Data Sharing and Virtual Clusters in PRAGMA

Renato Figueiredo, Kensworth Subratie, Saumitra Aditya, Kyuho Jeong
University of Florida (UF)
Kohei Ichikawa
Nara Institute of Science and Technology (NAIST)

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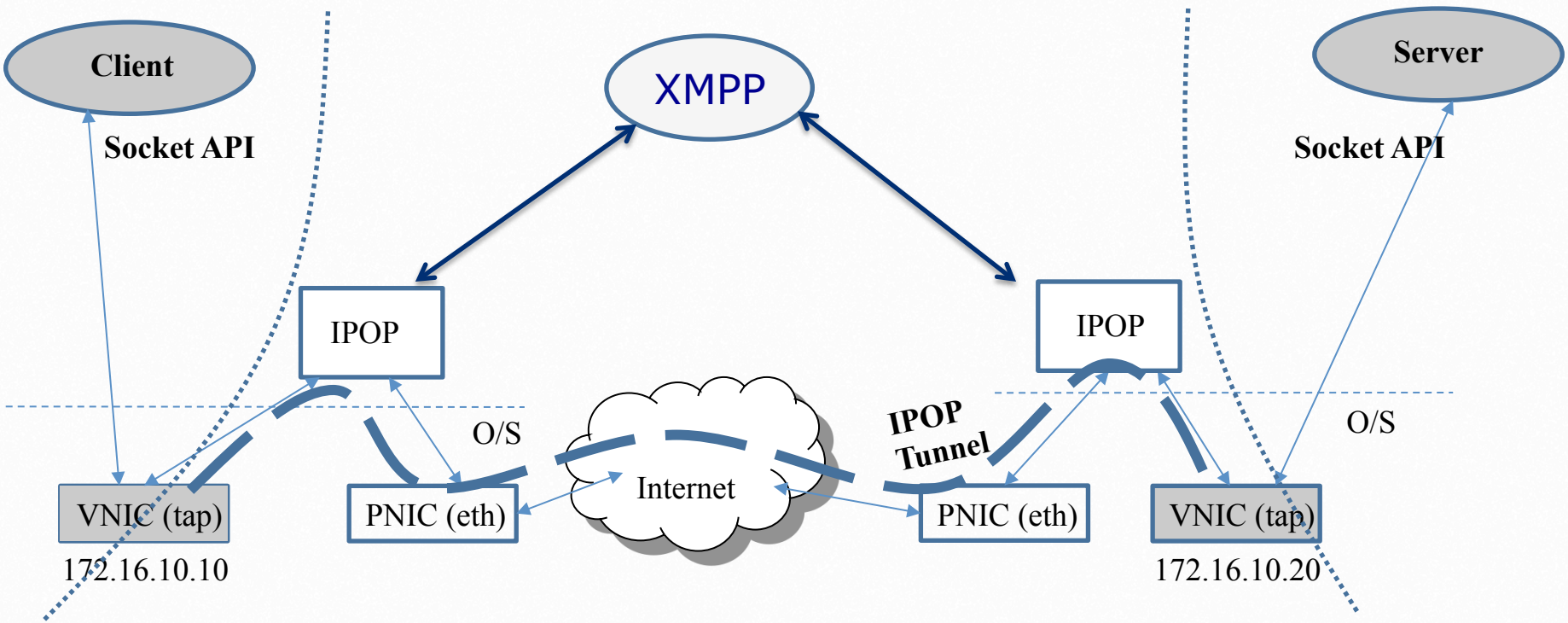
Demo Overview

- IPOP (IP-over-P2P)
  - PRAGMA user-level virtual network overlay
- Application in high-throughput computing
  - Lake expedition
- This demo
  - Data sharing
  - Virtual clusters

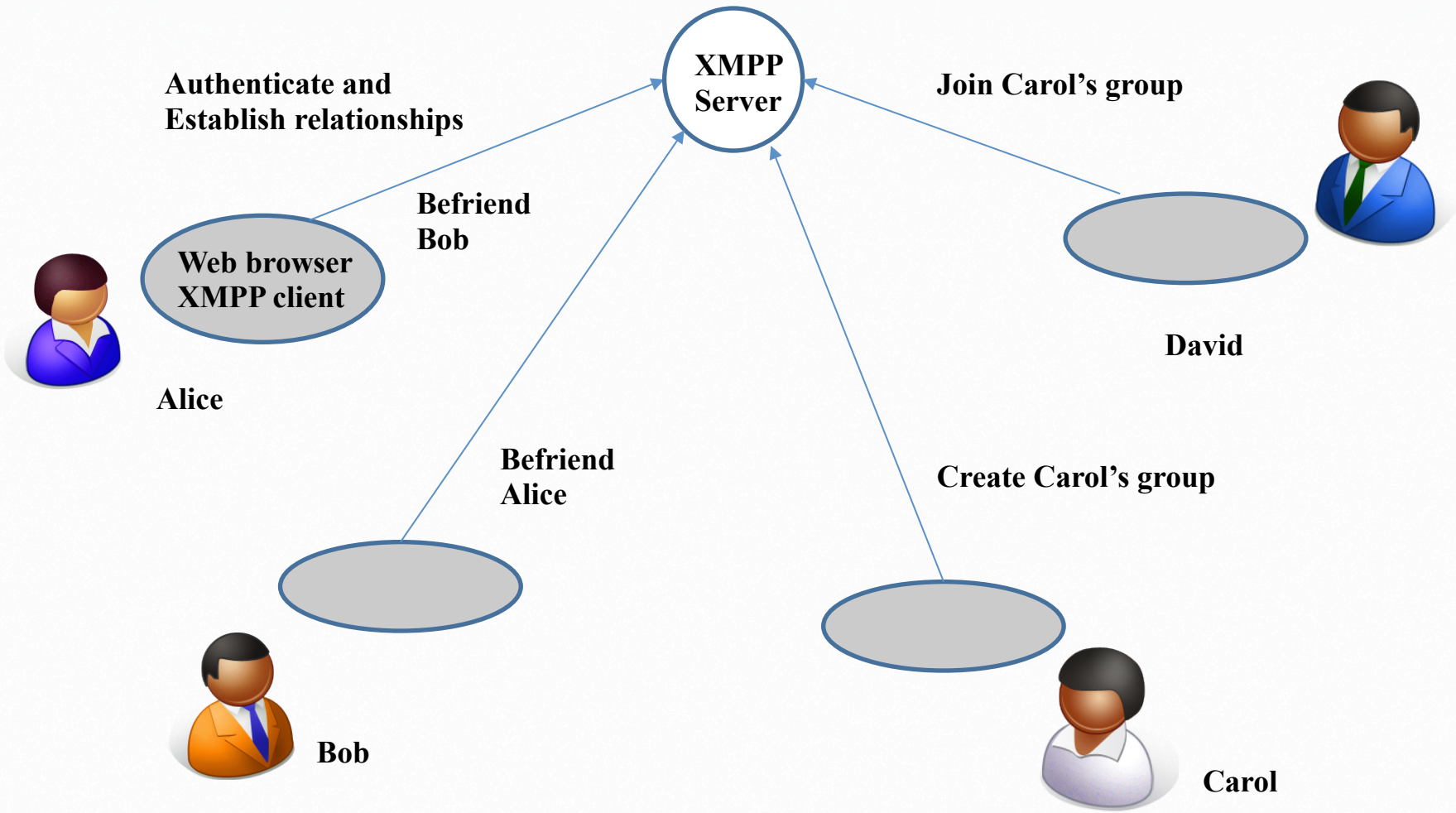
IPOP

- Creates end-to-end peer-to-peer VPN tunnels across the Internet
  - IP-over-P2P (Layer 3; IPv4 and IPv6)
  - Switch-mode (Layer 2; Ethernet)
  - User-level – no changes to hosts, network devices
- P2P links support NAT, firewall traversal
  - STUN (direct P2P)
  - TURN (through relay)
  - DTLS – security layer
- Devices join/discover via online social network
  - XMPP protocol (e.g. eJabberd)

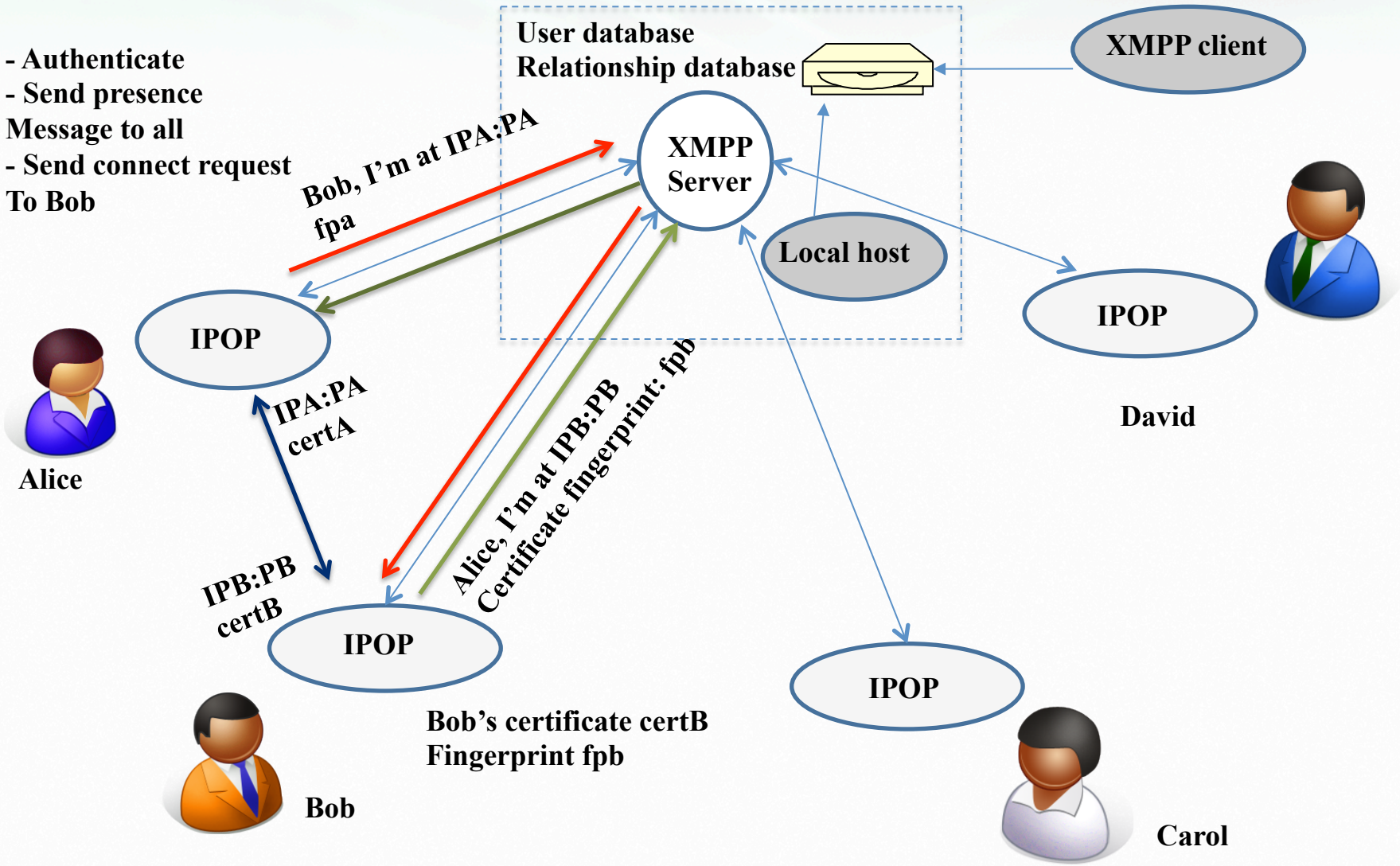
Application's Viewpoint



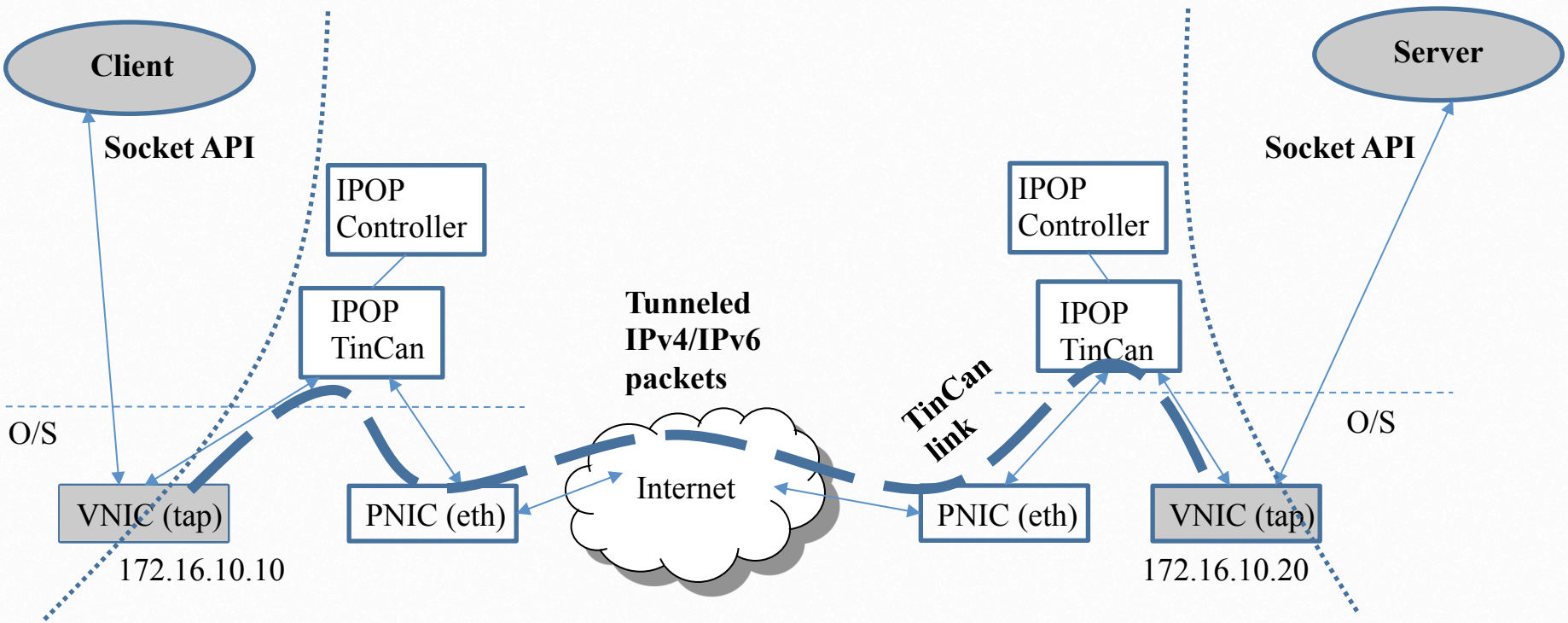
Managing users



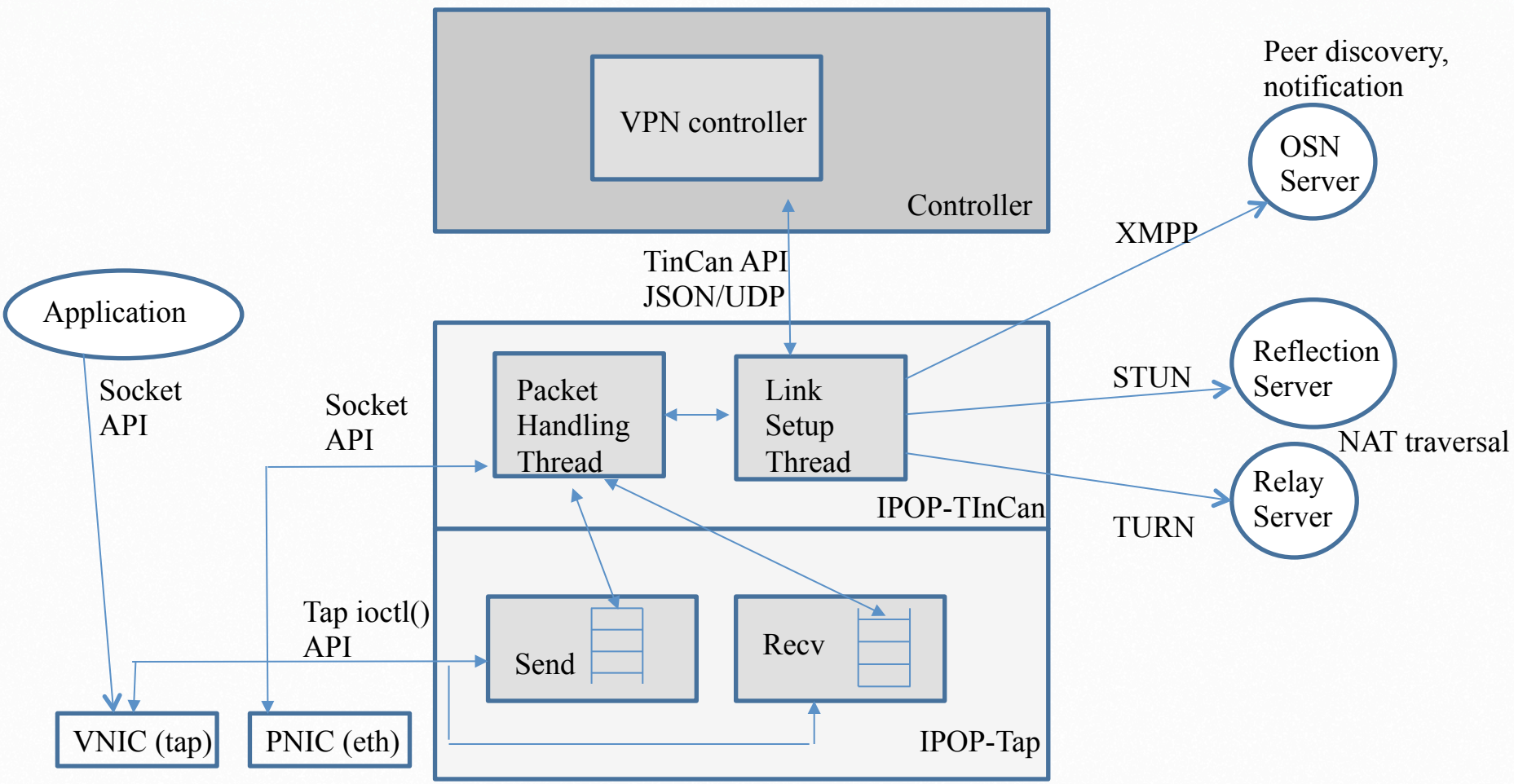
Endpoint discovery



Datapath and Control



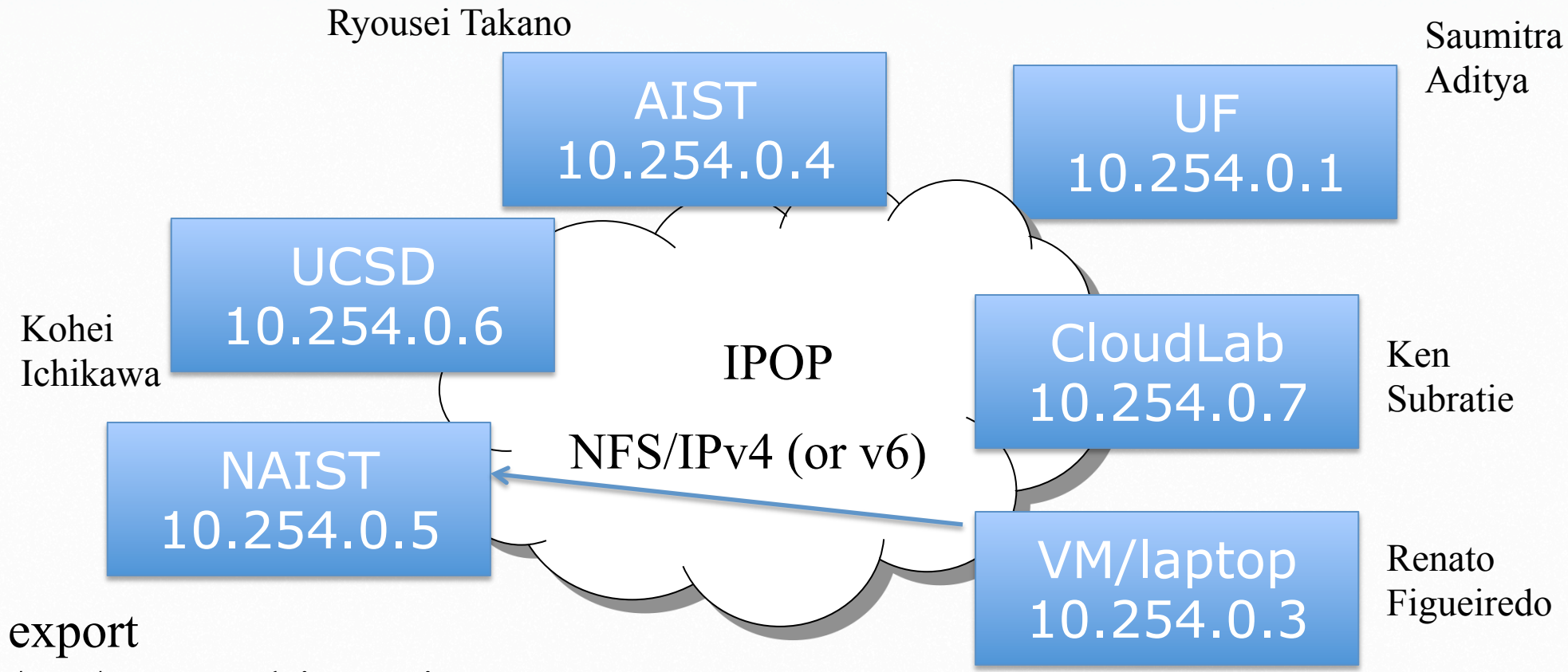
IPOP-TinCan Architecture



Data Sharing

- Use case:
  - Controlled data sharing across PRAGMA sites – “trust envelope”
  - Simple deployment: e.g. VM NFS server
- Initial focus: core mechanisms for establishing network channels for data sharing
  - Basis for future work: object stores, replication, meta-data catalogs

PRAGMADrive network



export
/opt/pragmadrive.naist
10.254.0.0/24

mount
10.254.0.5:/opt/pragmadrive.naist
/mnt/pragmadrive.naist

Data Sharing

- Demo

Virtual Clusters

- Use case:
  - Facilitate the deployment of multi-institution virtual clusters
  - Simple deployment: e.g. distributed VM workers join a remote Rocks front-end
- IPOP switch mode: core mechanisms for handling of layer-2 frames
  - PXE, DHCP, ARP

Rocks virtual cluster deployment over IPOP