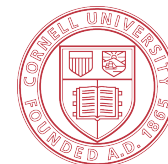
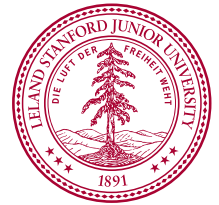


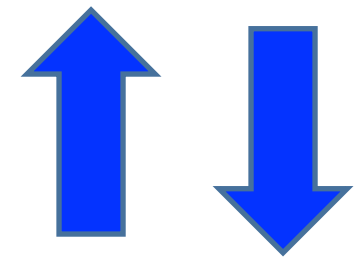
NEBULA Future Internet



Cornell University

“Long tail” of apps not on Internet...

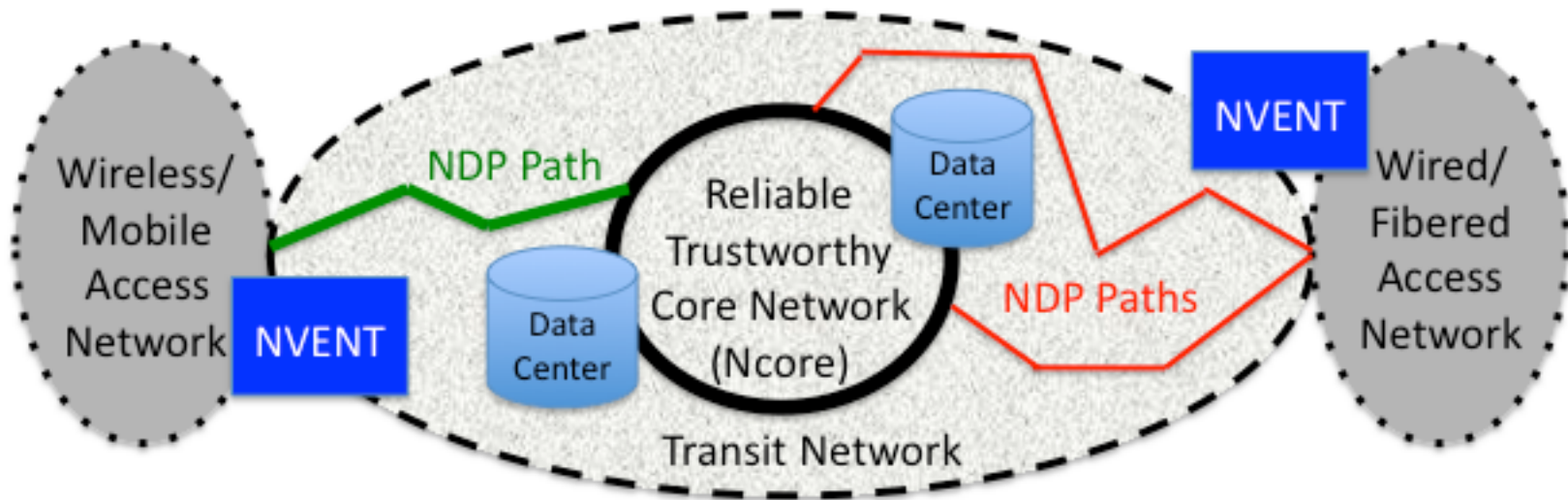
- E.g., food, exercise, meds for managing personal health
 - Interact w/cloud for recommendations & reminders
- **Research questions:** resilience, adversary models, policies, economics, *etc.*



Future Internet requirements

1. Route Control
2. DoS resilient
3. Byzantine resilient to ISPs & users
4. Highly reliable
5. Flexible; upgradable w/o disrupting traffic
6. Supports cloud and "big data"; consistent with mobility, sensors
7. No economic or policy barriers to deployment

NEBULA structural model

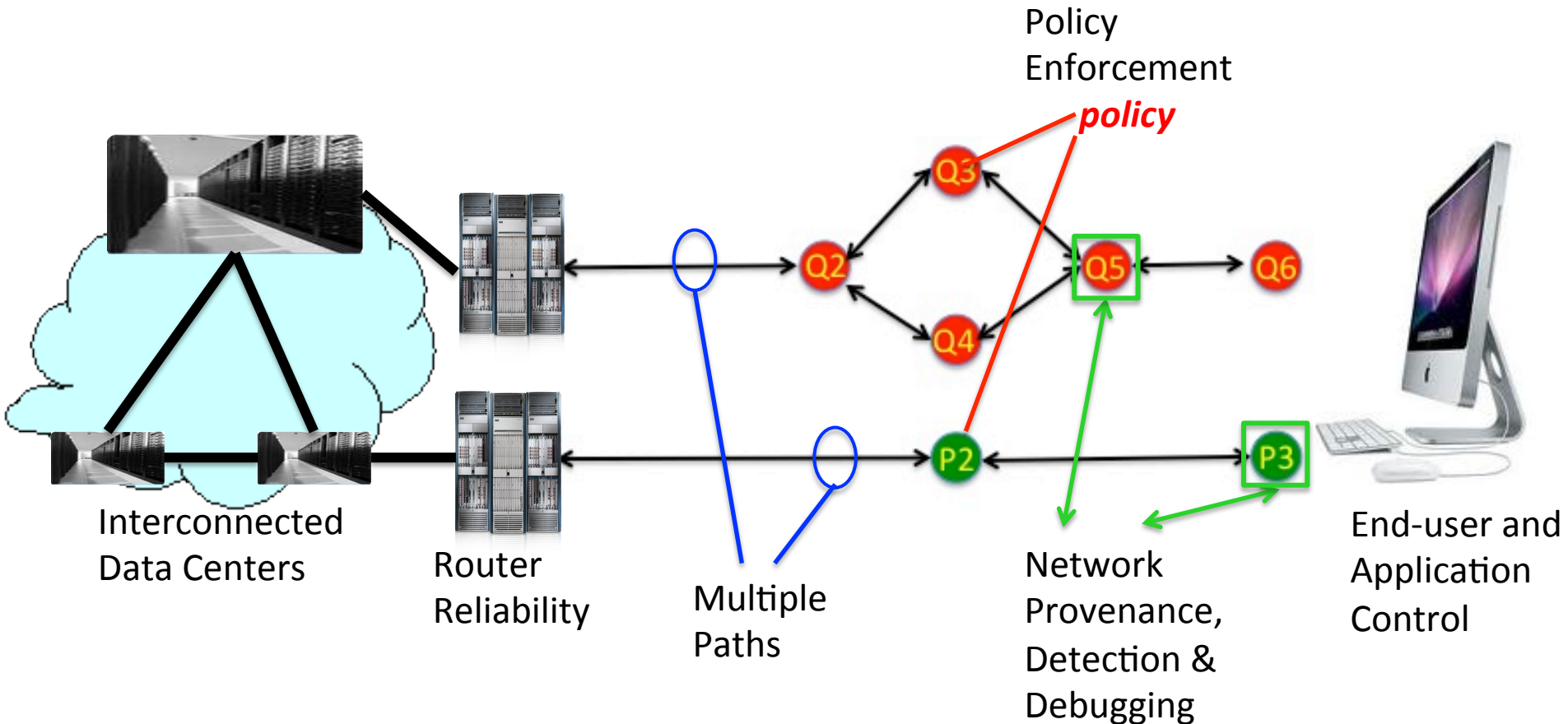


NDP – NEBULA Data Plane – distributed path establishment and policy enforcement

NVENT - NEBULA Virtual and Extensible Networking Techniques – extensible control plane (extensibility + policy)

NCore – NEBULA Core – redundantly connected high-availability routers (availability) 4

Algorithms + redundancy = resilience

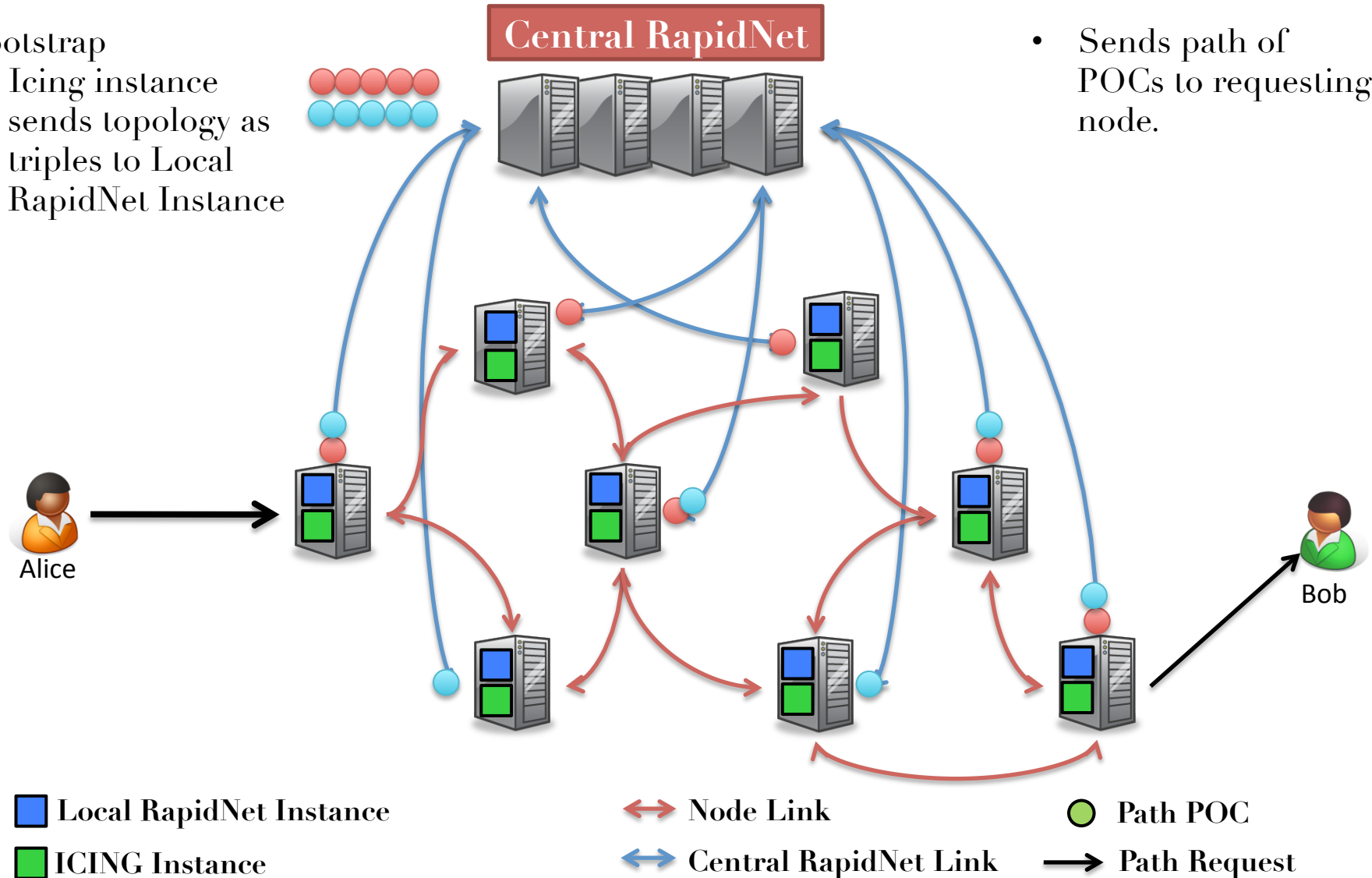


Nebula NVENT ICING and RapidNet Integration

Bootstrap

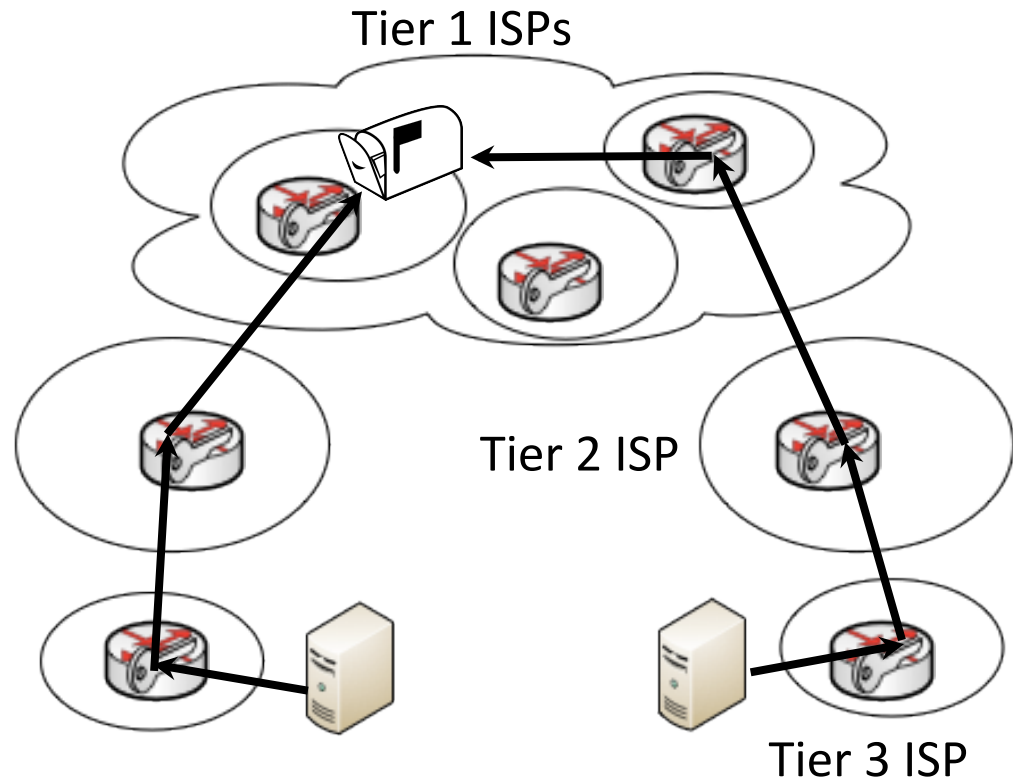
- Icing instance sends topology as triples to Local RapidNet Instance

- Sends path of POCs to requesting node.



TorIP: Capability-Based Mailboxes

- Receivers should only receive packets they request
- Mailboxes support a put/get interface
- Data follows reverse path of get request



Deployment Desiderata

- Programmable Switches
 - For, e.g., Icing link-layer, TorIP relays
- Rich topology
 - Multiple paths for experiments
- Flexible control and measurement
 - Test resilience to wide variety of problems/attacks
 - Support NEBULA advances in diagnosis/debugging
- Accessible data center(s)