

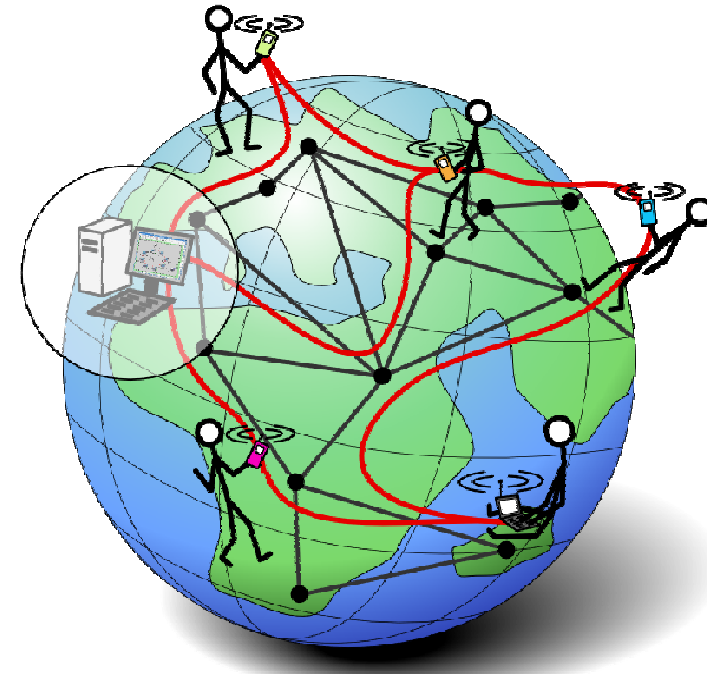
## Motivation

Today's applications must cope with

- wireless access and mobility
- growing heterogeneity (networks, protocols, devices, applications, ...)
- middle-boxes (NAT, Firewalls, ...)

resulting in...

- tricky end-to-end connectivity
- complex application development



## Existing Approaches

- ⊘ not autonomous
  - require infrastructure support (e.g., agents, rendezvous/directory server, gateways, etc.)
- ⊘ not self-organizing
  - need manual configuration
  - not automatically reconnecting
- ⊘ not dynamically dealing with protocol and network heterogeneity
  - do not work across different protocol domains (IPv6, IPv4)
  - do not adapt to network reconfiguration
- ⊘ assume end-to-end connectivity

## Ariba Features

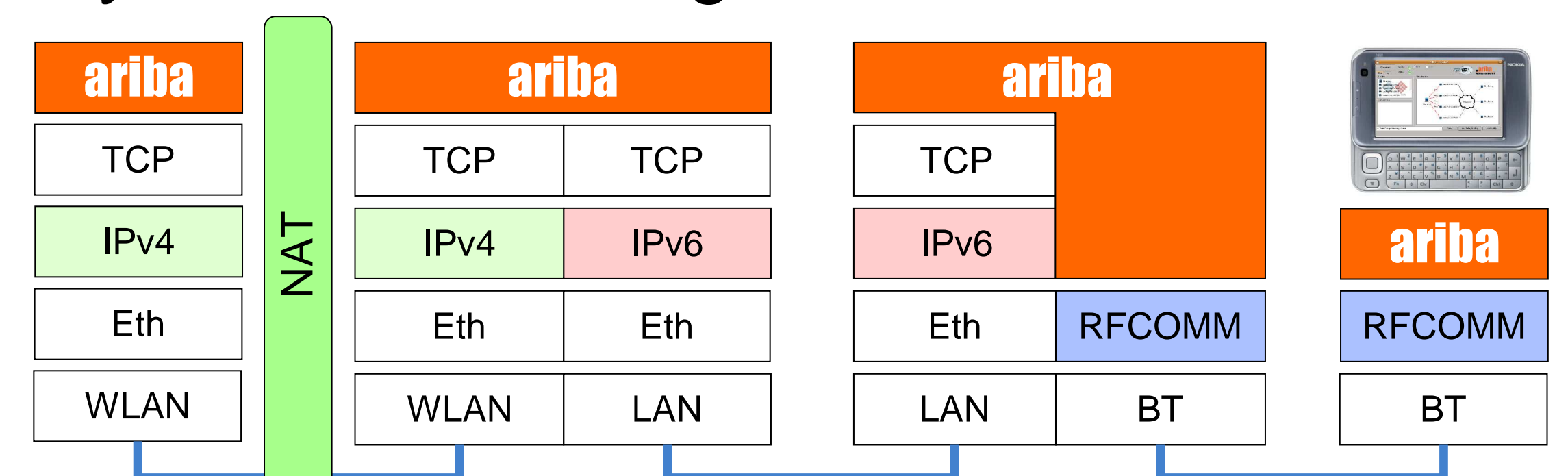


Main contributions

- Self-organizing transport connectivity across different heterogeneous networks
- Integrated solution with ID-based addressing providing a virtual network per application context
- Eases service and application development and deployment

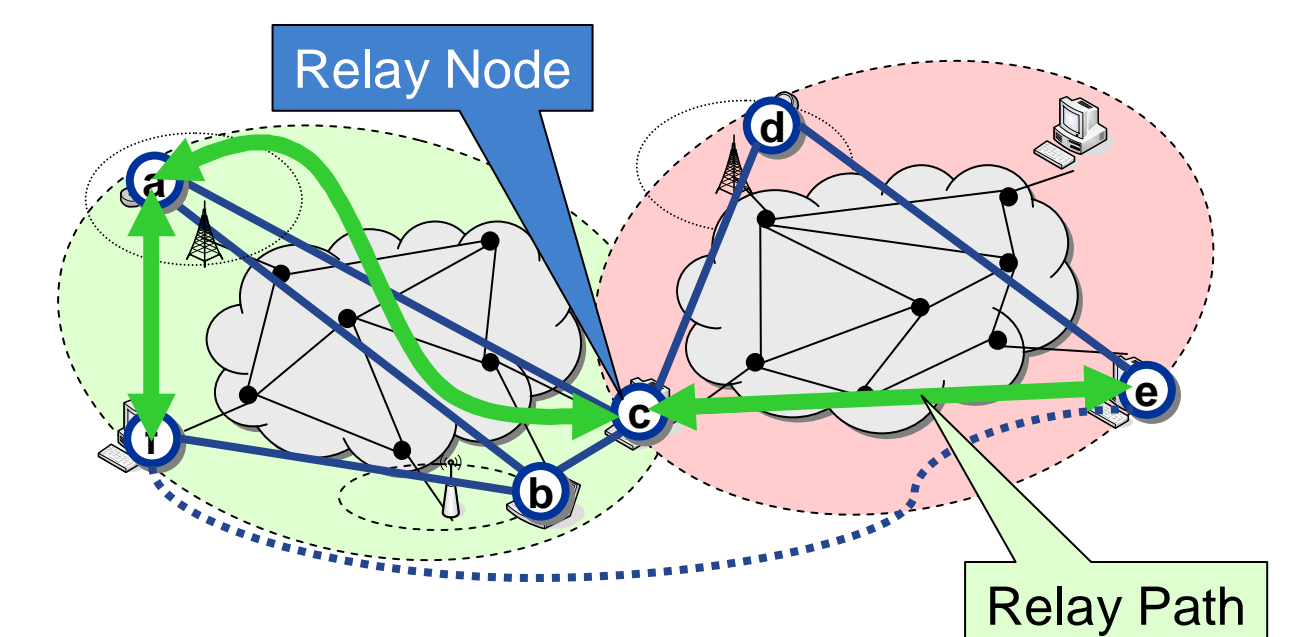
### Selected Mechanisms

- Overlays across heterogeneous networks



- Relay paths

- autonomous detection of suitable relay nodes
- continuous maintenance and optimization



## Demonstration Scenario

### Application

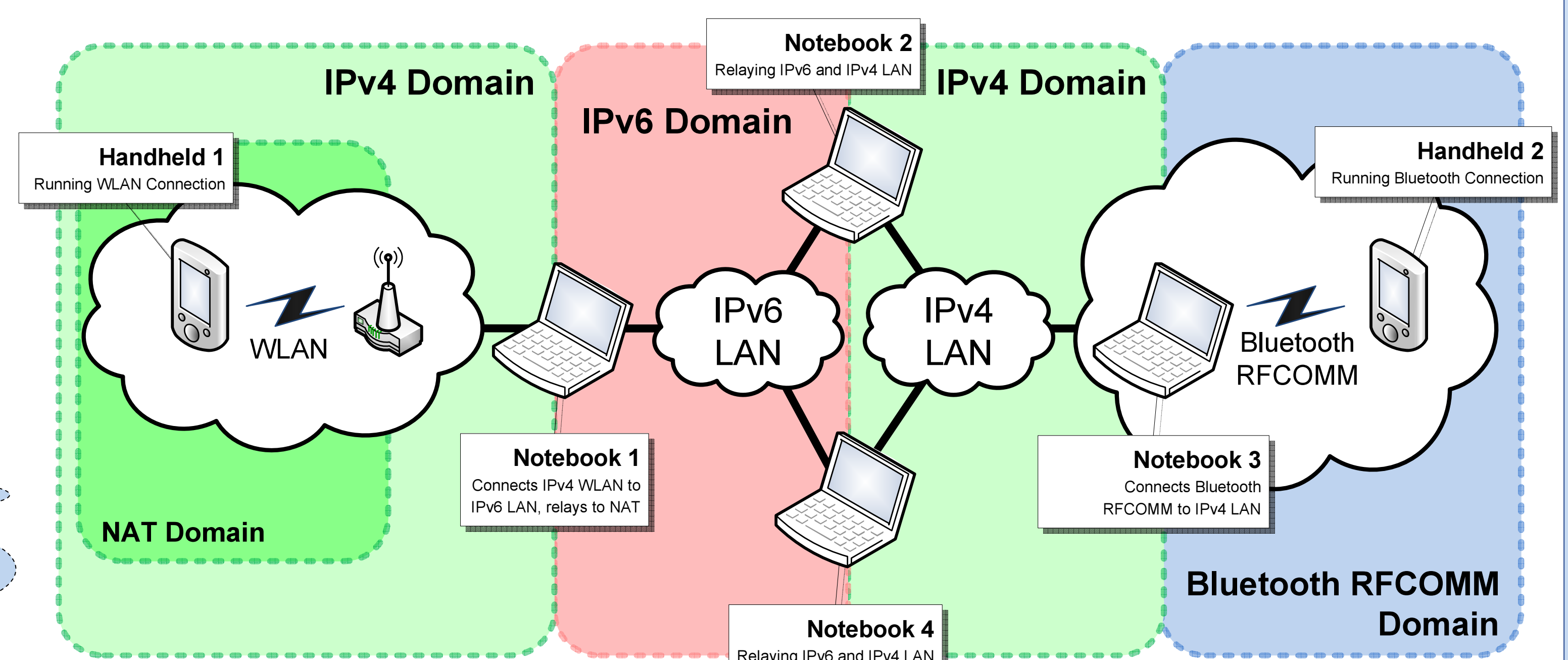
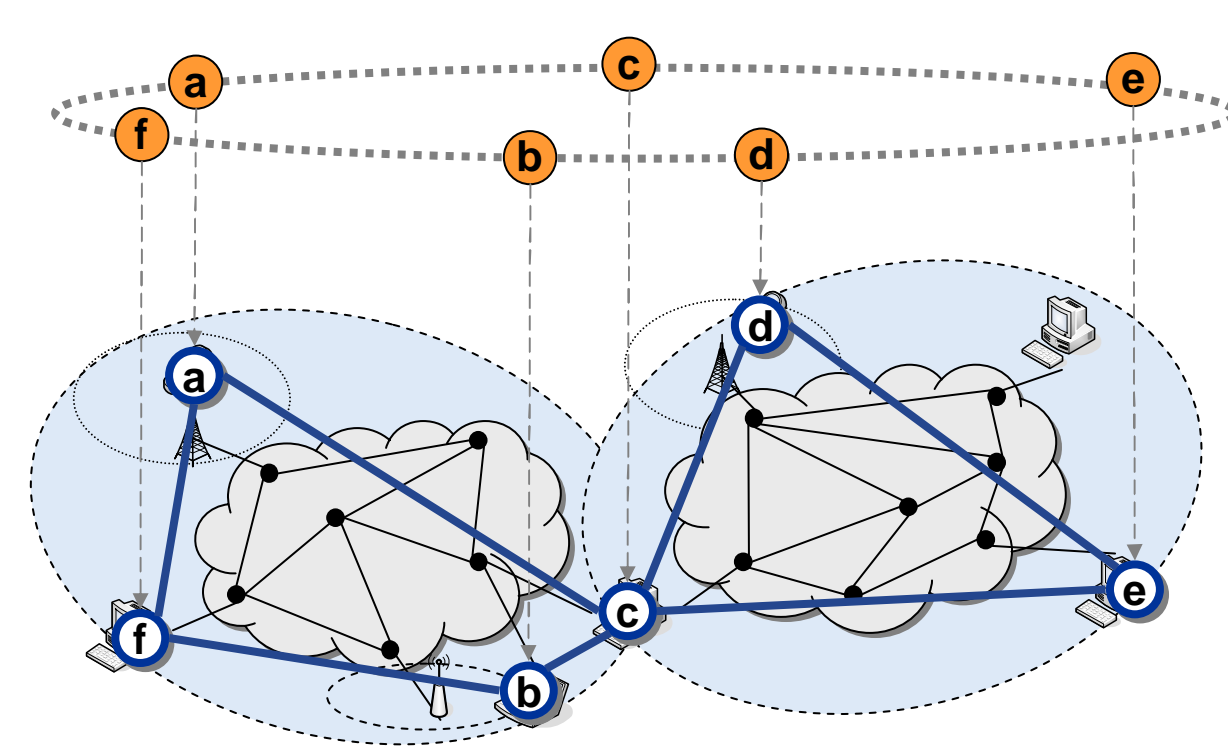
- Easy-to-use networking API
- Transparency for network obstacles like mobility, heterogeneity, middle-boxes
- Persistent node identifiers

### Service

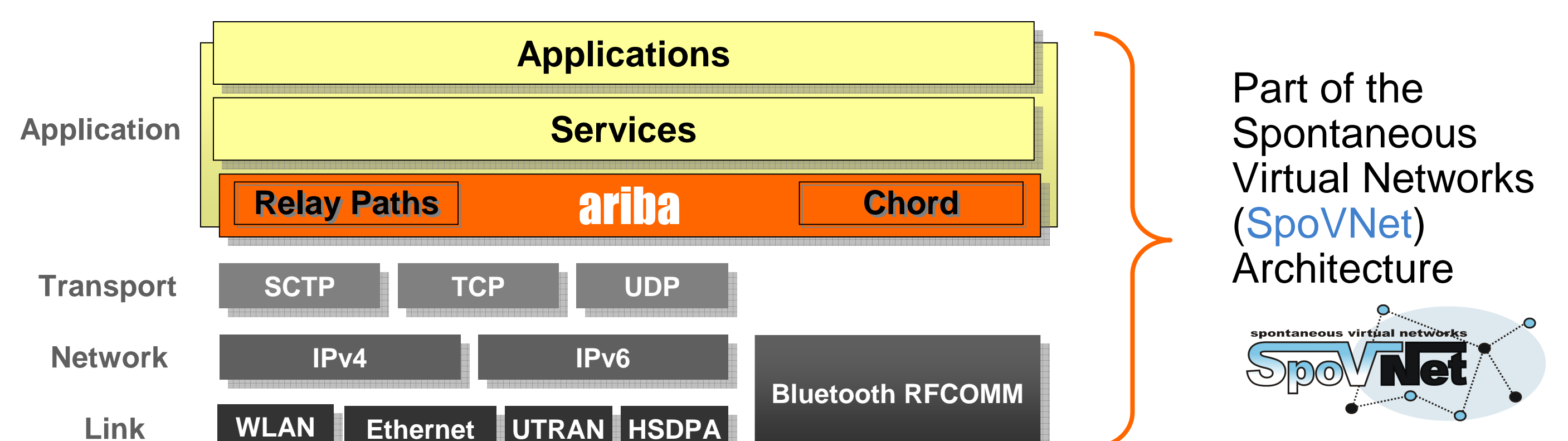
- Group communication service
  - based on protocol NICE
- Hierarchical dissemination structure



- Chord-based control overlay
  - provides basic connectivity
- Virtual Links and Relay Paths
  - handle network heterogeneity
  - end-to-end connectivity
- Bootstrapping
  - discover peers by using mDNS, Multicasting, BT-SDP



## Architecture in a Nutshell



[1] Ariba Virtual Network Substrate. <http://www.ariba-underlay.org>

[2] R.Bless, C.Hübsch, S.Mies, and O.Waldhorst. The Underlay Abstraction in the Spontaneous Virtual Networks (SpovNet) Architecture. In Proc. 4th EuroNGI Conf. On Next Generation Internet Networks (NGI 2008), Apr. 2008

[3] S.Mies, O.Waldhorst, and H.Wippel. Towards End-to-End Connectivity for Overlays across Heterogeneous Networks. In Proc. Int. Workshop on the Network of the Future (Future-Net 2009), co-located with IEEE ICC 2009, Dresden, Germany, June 2009

[4] O.Waldhorst, C.Blankenhorn, D.Haage, R.Holz, S.Mies. Spontaneous Virtual Networks: On the Road towards the Internet's Next Generation. it - Information Technology Special Issue on Next Generation Internet, 50(6):367-375, Dec.2008. <http://www.spovnet.de>