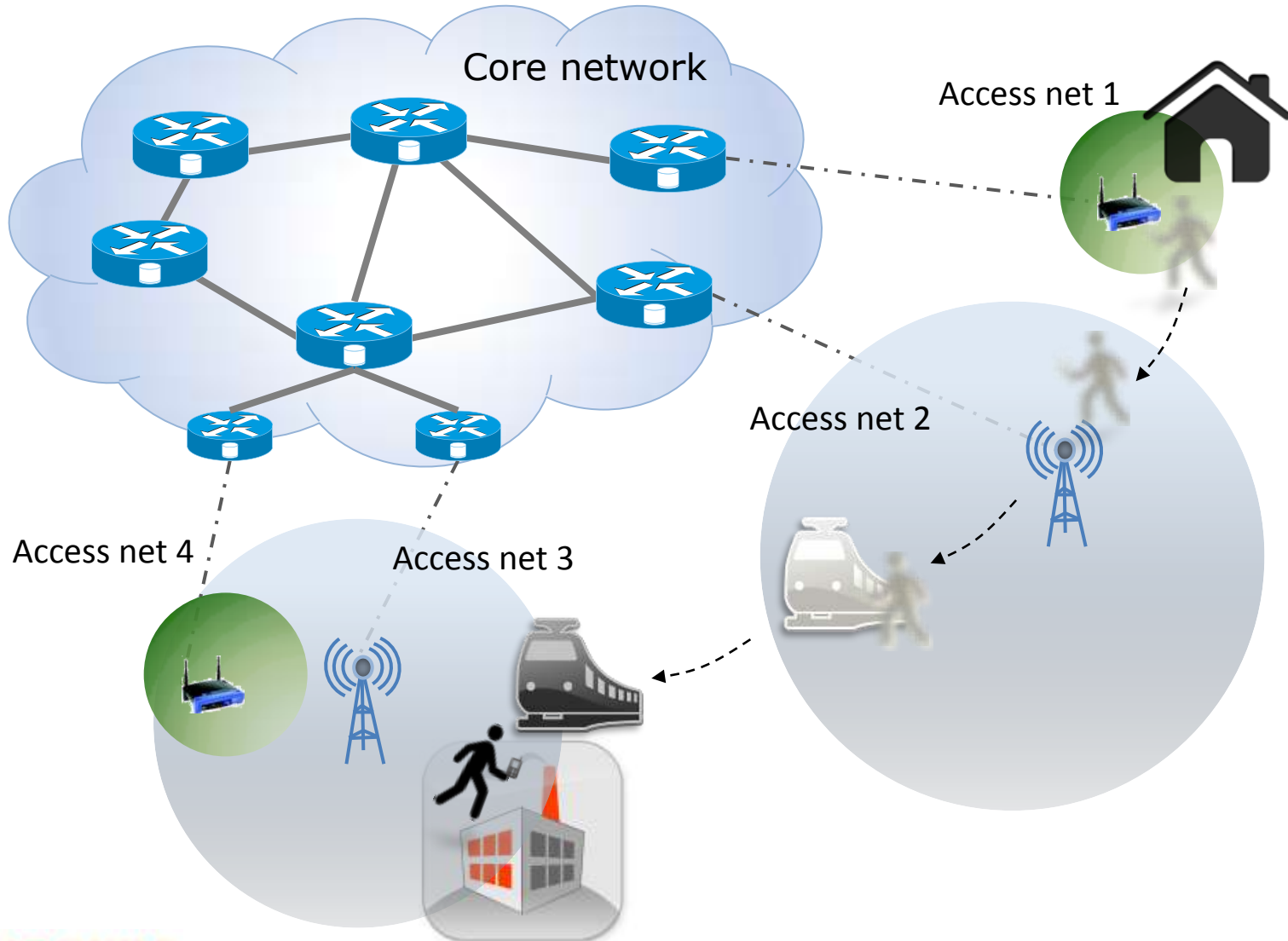# Programming Networks & GENI: MobilityFirst Perspective
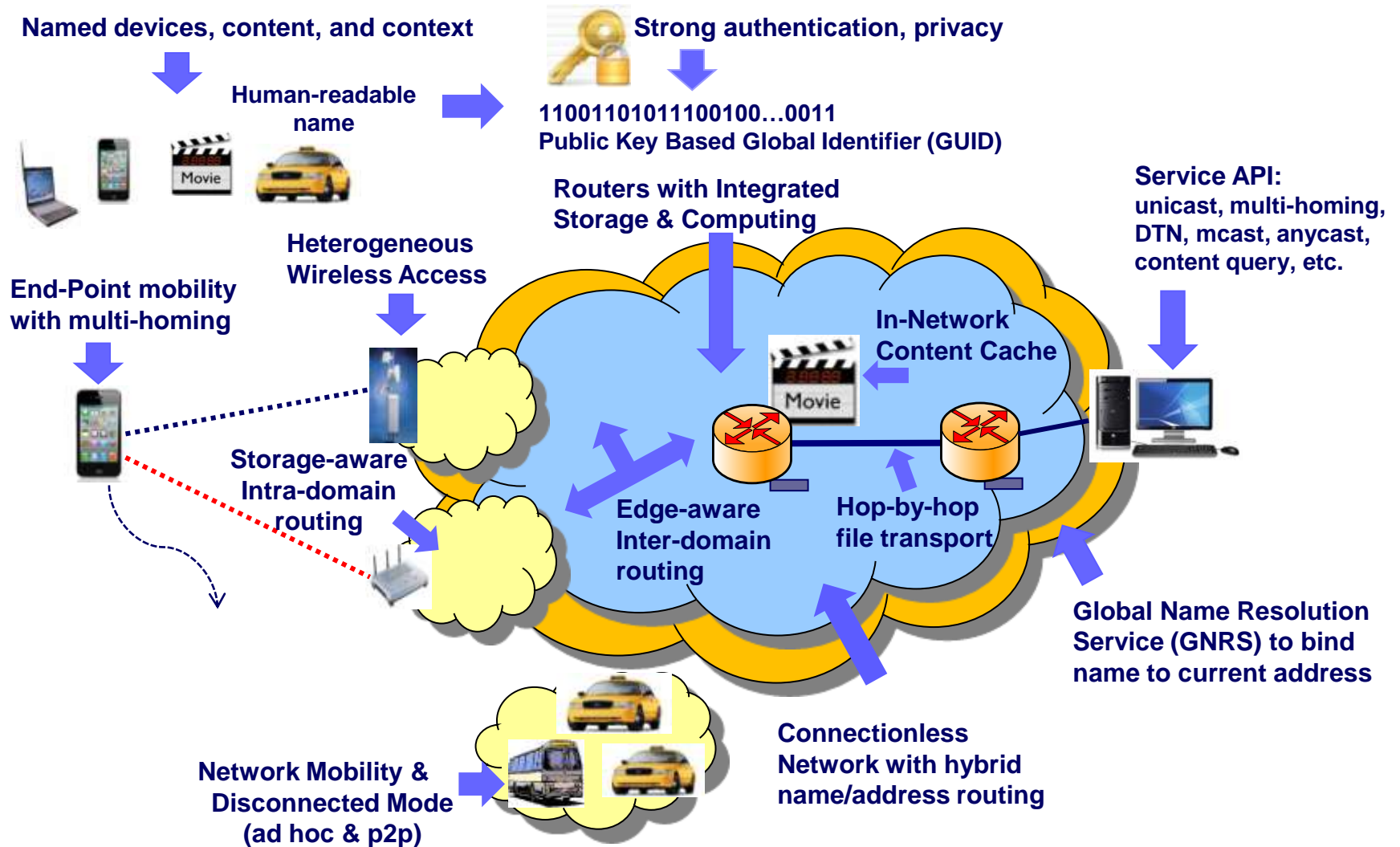
Kiran Nagaraja

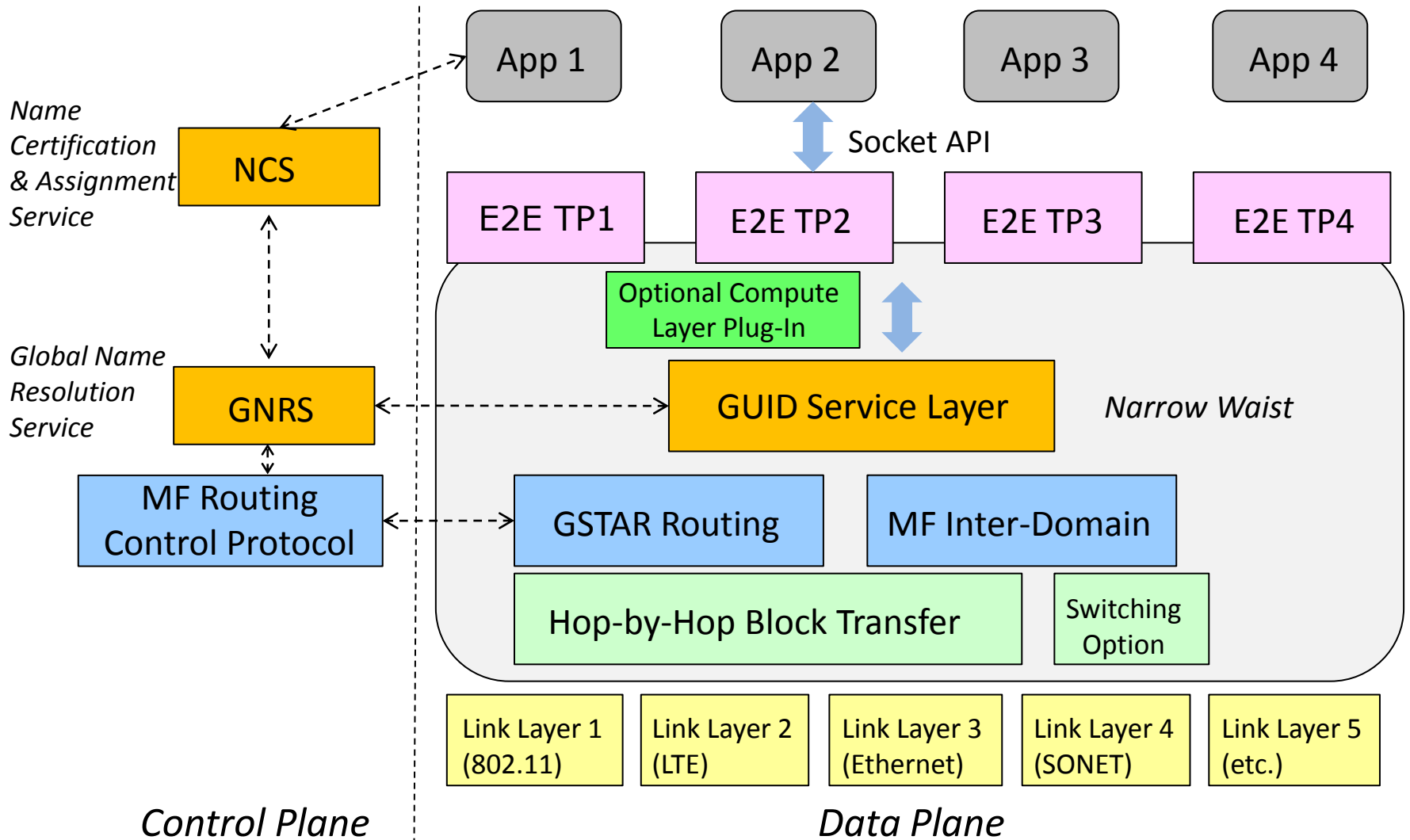WINLAB

Common MobilityFirst Scenario

Core network

Access net 1

Access net 2

Access net 4

Access net 3

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2

MobilityFirst Architecture Summary

Named devices, content, and context

Human-readable name

Strong authentication, privacy

11001101011100100…0011
Public Key Based Global Identifier (GUID)

Service API:
unicast, multi-homing, DTN, mcast, anycast, content query, etc.

Routers with Integrated Storage & Computing

Heterogeneous Wireless Access

In-Network Content Cache

End-Point mobility with multi-homing

Storage-aware Intra-domain routing

Edge-aware Inter-domain routing

Hop-by-hop file transport

Global Name Resolution Service (GNRS) to bind name to current address

Network Mobility & Disconnected Mode (ad hoc & p2p)

Connectionless Network with hybrid name/address routing

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MobilityFirst Protocol Stack

Name Certification & Assignment Service

NCS

App 1 · App 2 · App 3 · App 4

Socket API

E2E TP1 · E2E TP2 · E2E TP3 · E2E TP4

Optional Compute Layer Plug-In

Global Name Resolution Service

GNRS

GUID Service Layer

Narrow Waist

MF Routing Control Protocol

GSTAR Routing · MF Inter-Domain

Hop-by-Hop Block Transfer

Switching Option

Link Layer 1 (802.11) · Link Layer 2 (LTE) · Link Layer 3 (Ethernet) · Link Layer 4 (SONET) · Link Layer 5 (etc.)

Control Plane · *Data Plane*

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Edge – Core – Edge Topology Experiments

WiFi AP

WiMAX BSS

MF Router + Name Resolution Server

Android Client w/ WiMAX + WiFi

Linux PC/laptop w/ WiMAX + WiFi

Vehicular node w/ WiMAX

NA-1, NA-2, NA-3, NA-4, NA-5, NA-6, NA-7

WiFi AP

WiMAX BTS

ProtoGENI + GENI Backbone

BBN
Cambridge, MA

Mesoscale
WiMAX and OF

WINLAB
N. Brunswick, NJ

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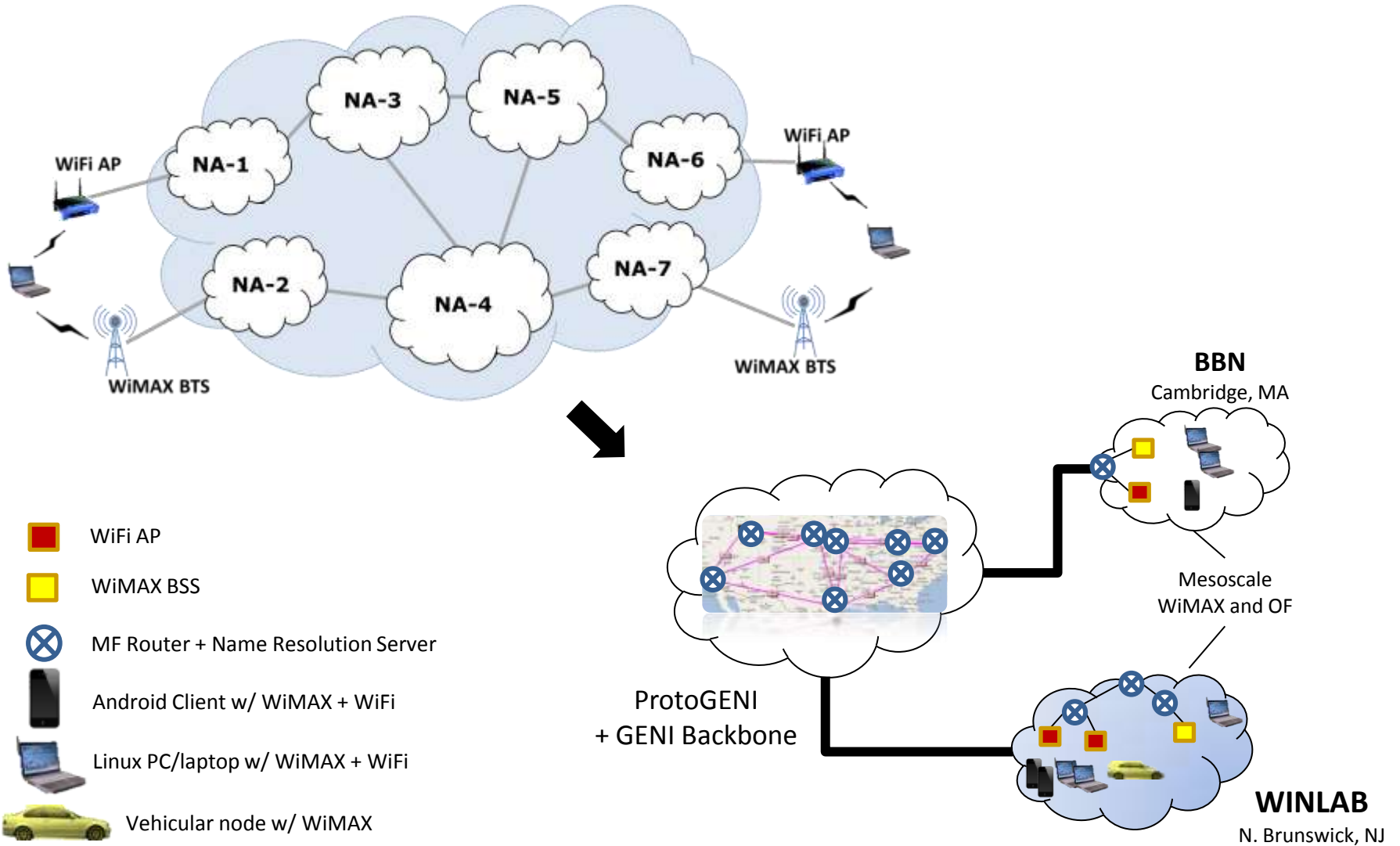
Stitched Topology

Content Delivery to Multi-homed Mobile Devices

NLR path using VLAN 3716
I2 path using VLAN 3715
ProtoGENI node w/ MF Router & GNRS Server
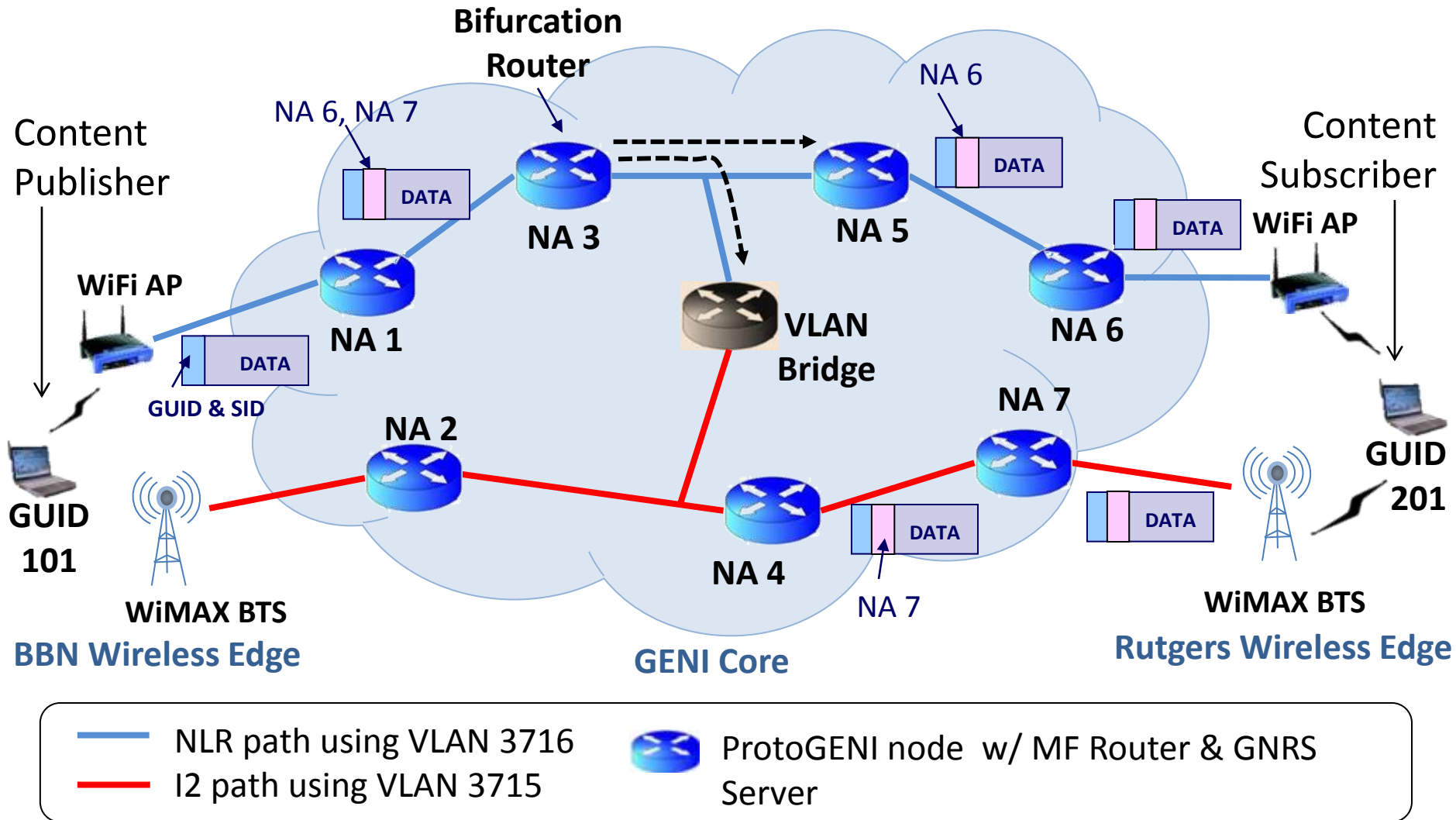
MobilityFirst Protocols in OpenFlow SDNs
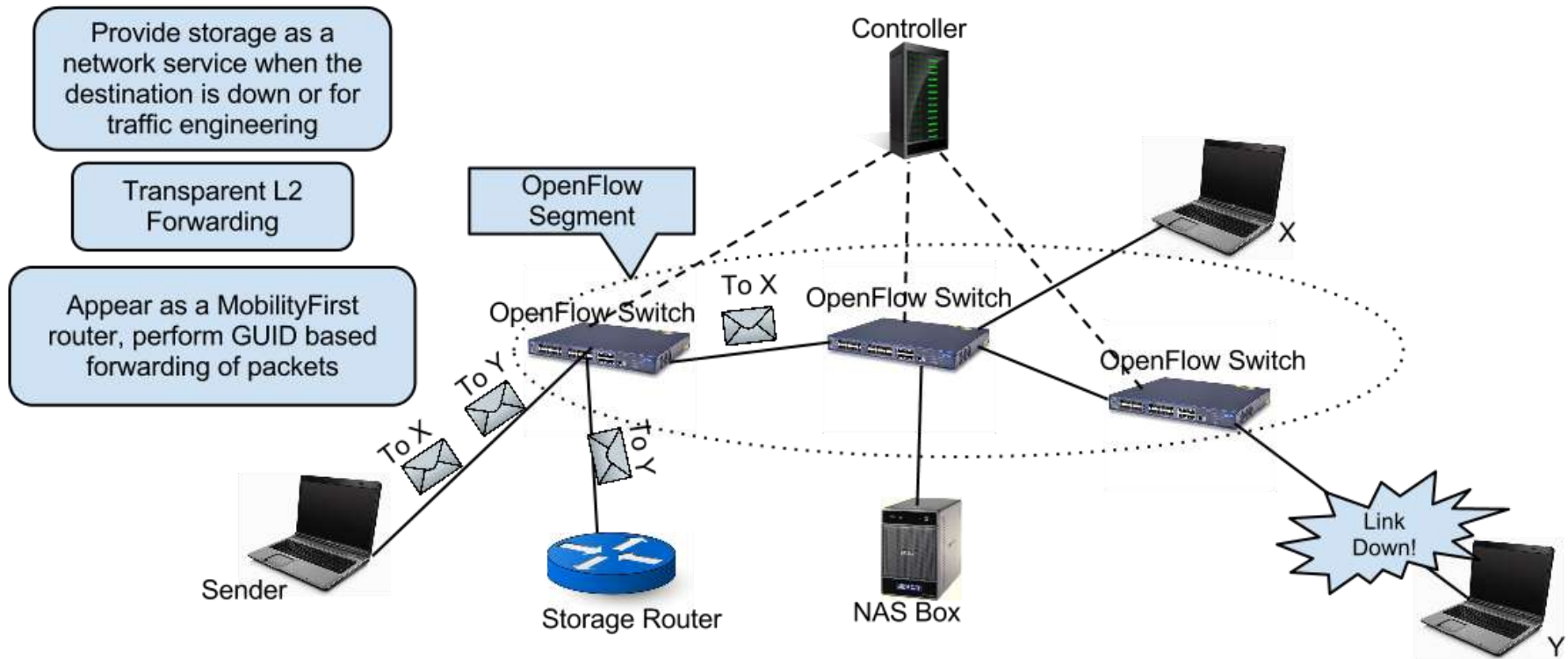
Things that would help

- Wireless edge integration with the GENI core
  - Already underway...

- VLAN translations/bridging

- Support for header rewrites on Openflow switches

Questions?

More information on MobilityFirst:
Search 'MobilityFirst'