

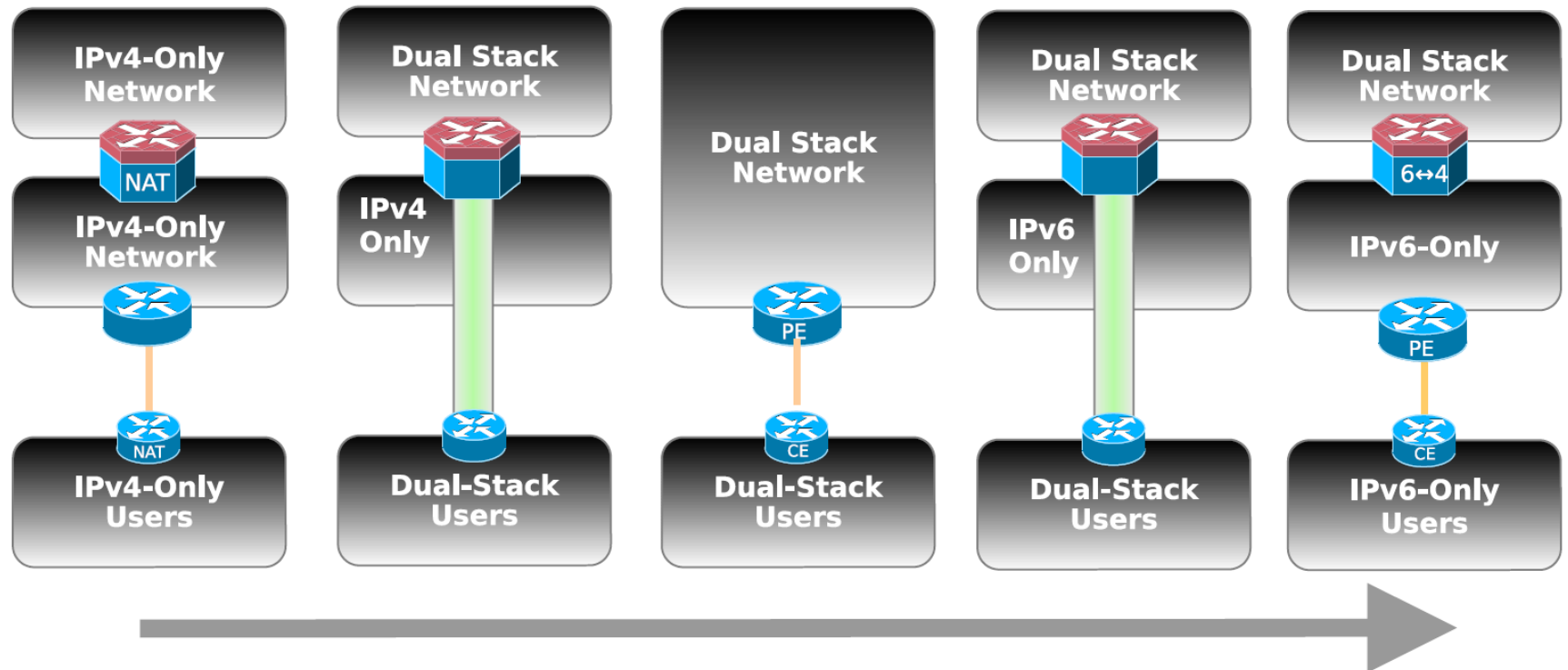
A Software Defined Approach to Unified IPv6 Transition

Collaborators

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 - Diego Lopez
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- **University**
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IPv6: Status Quo and Challenges

- Current state of IPv6 transition
 - **Many** solutions and multiple scenarios co-exist, e. g. 4-6-4, 6-6-4, etc.
 - **Slow** transition



Motivation & Rationale

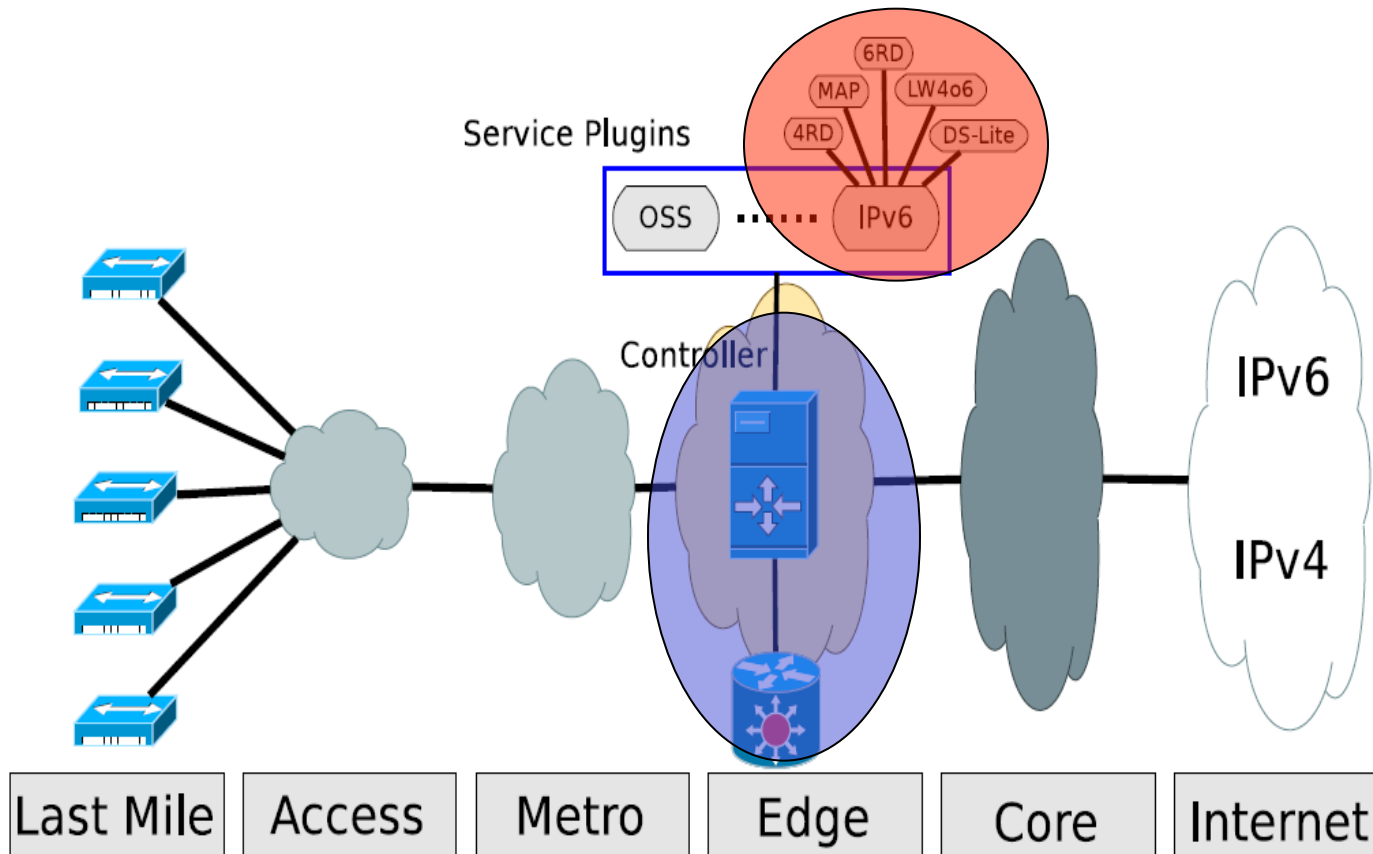
- Design a ***low-cost, unified*** approach to IPv6 transition
 - Low-cost: a virtual CPEs(e.g. vRGW) or a SDN enabled CPE can cover different scenarios of IPv6 transition. carriers do **NOT** have to upgrade/manage CPEs to support a specific IPv6 transition scheme
 - Unified: the design should be compatible (or accommodate) existing and future IPv6 transition schemes
- Users / applications should be able to decide for themselves ***when and how*** to start the IPv6 transition

SD-IPv6: A Low-Cost, Unified Approach to IPv6 Transition

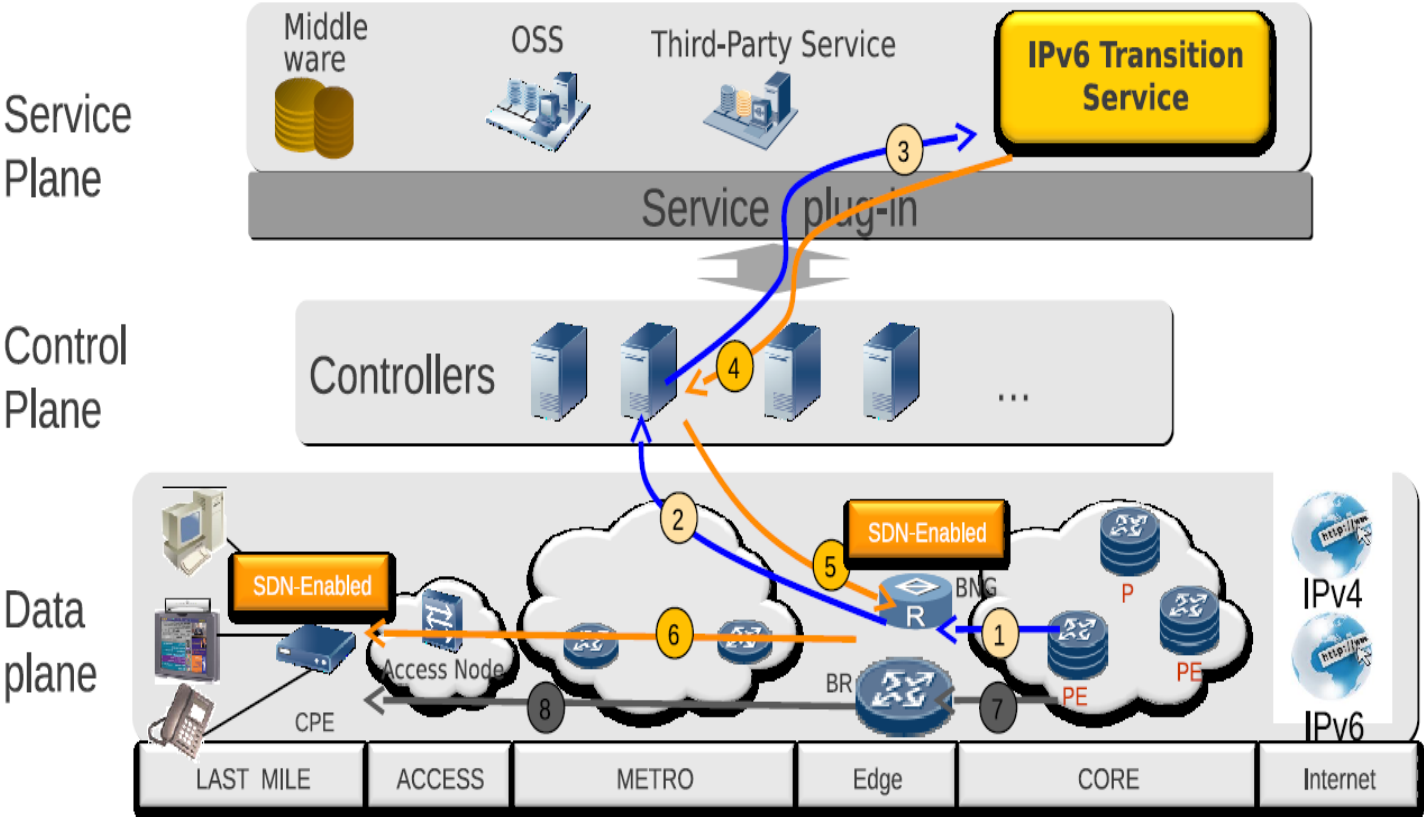
- Leverage the SDN capability to
 - **Decouple** network equipment (i.e., data plane) and ***operating*** specific IPv6 transition schemes (i.e., control plane)
 - By leveraging SDN's separation of control / data plane
 - **Decouple** network equipment and ***implementation*** of specific IPv6 transition schemes
 - by leveraging SDN's NBI to efficiently implement IPv6 apps
 - **Decouple** network equipment and ***deployment*** of specific IPv6 transition schemes
 - As a result of the above two enablers

SD-IPv6: Architecture

- Network equipment is SDN compatible
- IPv6 schemes are implemented as SDN apps
 - SDN apps communicate with SDN controller via NBI

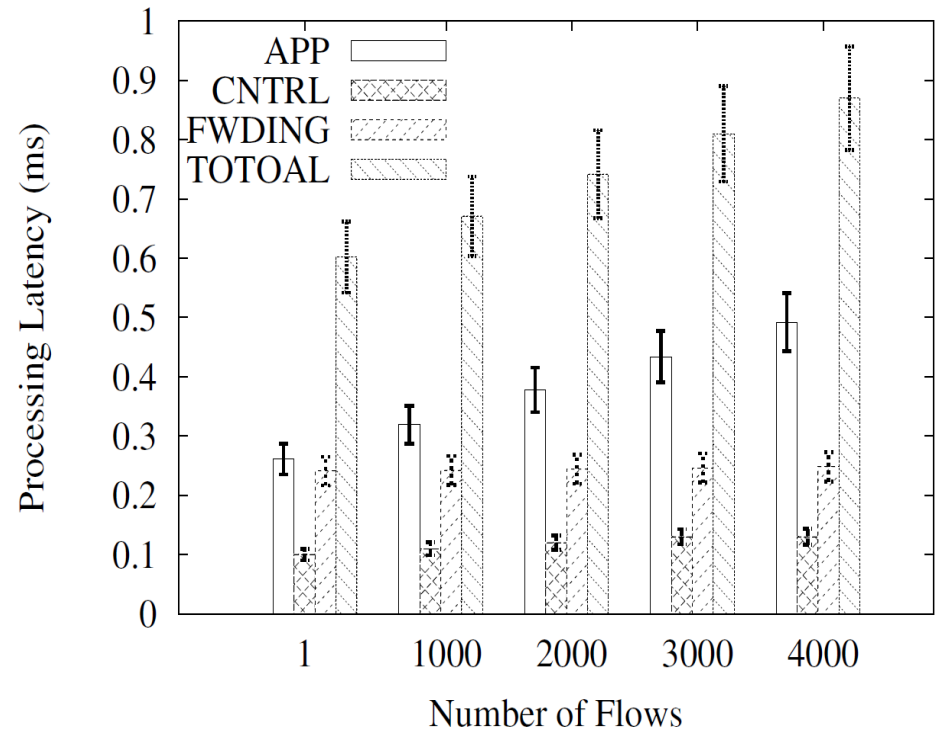


SD-IPv6: Data / Control Flow



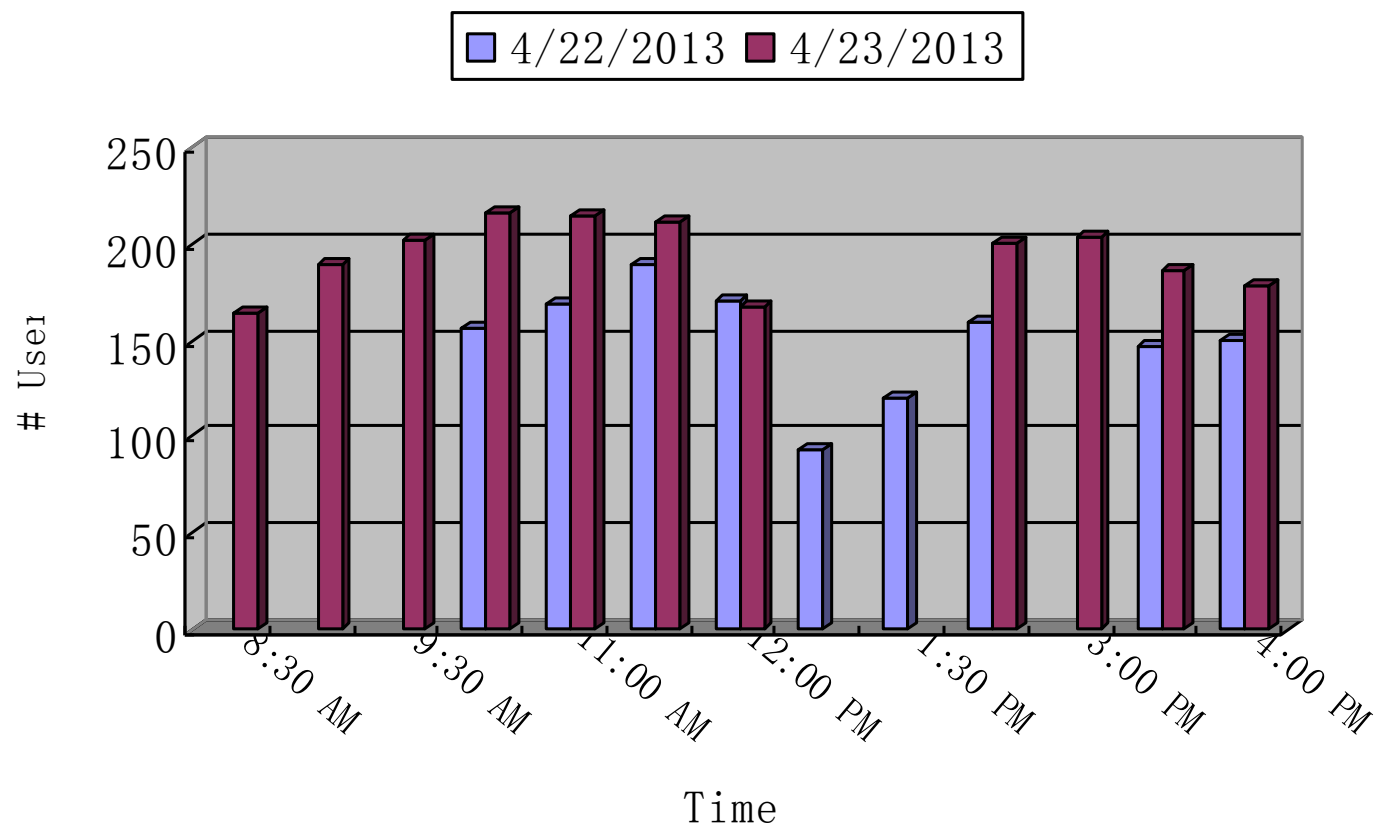
Evaluations I: Lab Experiments

- Experiment setup
 - Use flow generators to generate a varying number of flows
 - Use commodity hardware
- Result
 - SD-IPv6 can handle a reasonably large number of flows with *very high cost-performance efficiency*



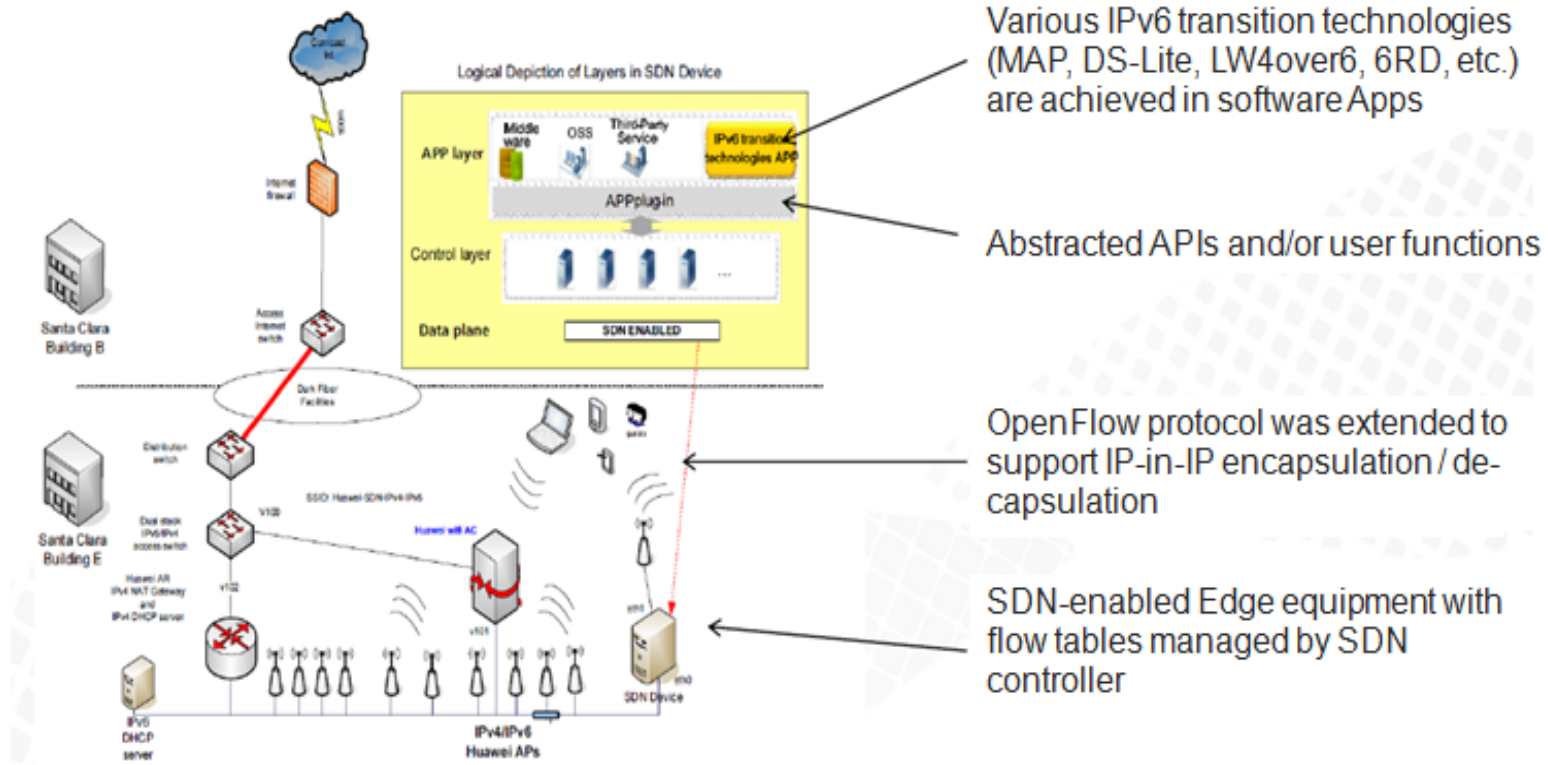
Evaluations II: Live Experiments

Provide live Internet access for 270+ participants of ETSI Network Function Virtualization 2nd meeting on April 22–23, 2013

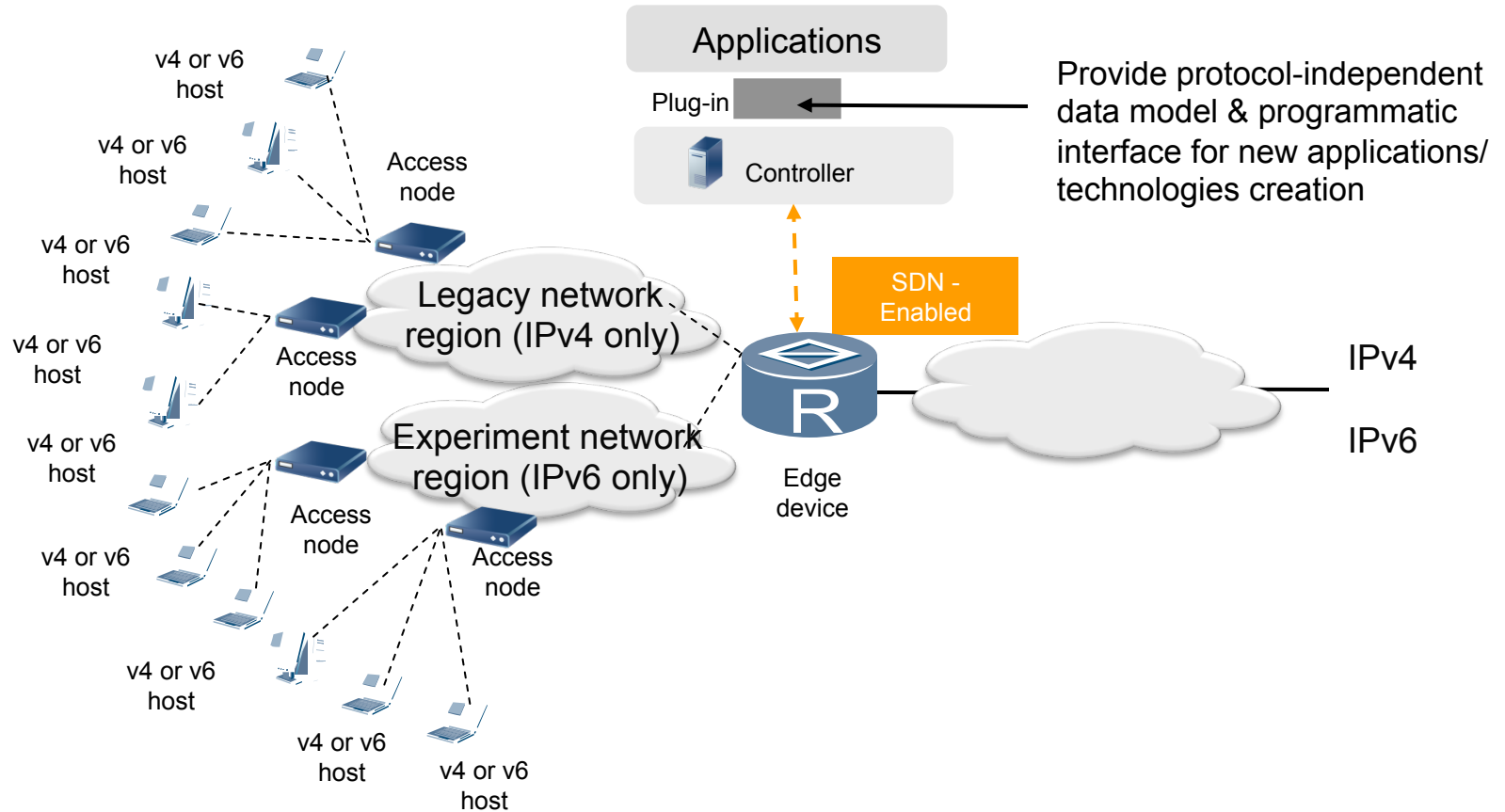


Deployments I: Santa Clara

We have deployed an SDN-IPv6 trial in an enterprise campus in Santa Clara. The following drawing is the network diagram.



Deployments II: Shenzhen



App

IPv6 transition App, called “SDN IPv6” and available for download at <http://www.huawei.com/en/mobile/app/> and Google Play, and also at Apple Store soon.

Visitors can watch the configuration of SDN-IPv6 deployed in Santa Clara via the App. Administrator can modify the configuration of SDN-IPv6 via the App.

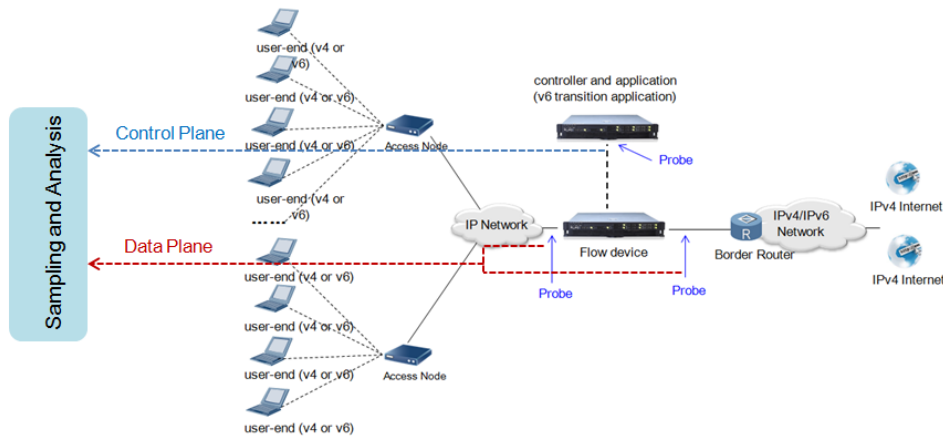
Metrics & Tools

Provide live Internet access for 800+ participants of SDN-IPv6 Internet Access for the Global Open Networking and SDN Conference 2013 in Beijing on Aug 29-30, 2013

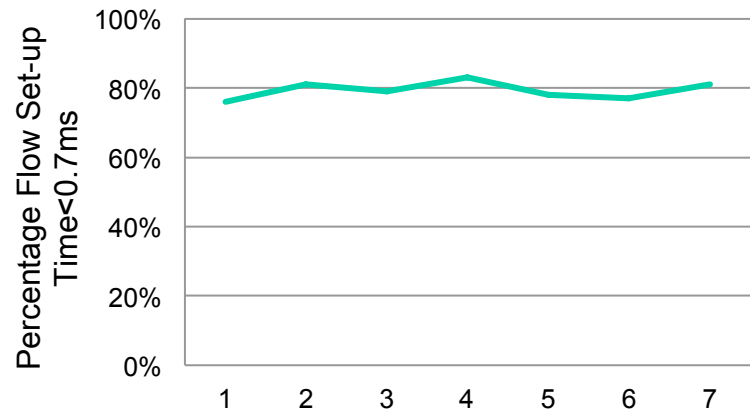
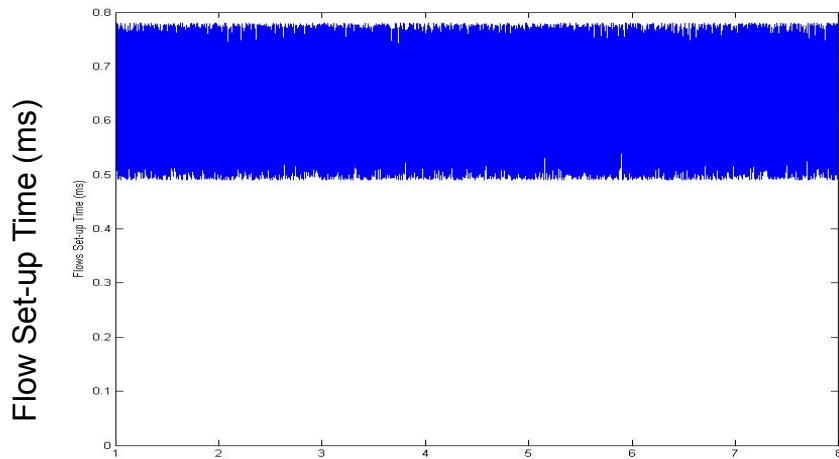
The following metrics and tools are summary from this live experiments.

SDN IPv6 Deployment

Metrics & Tools (1)



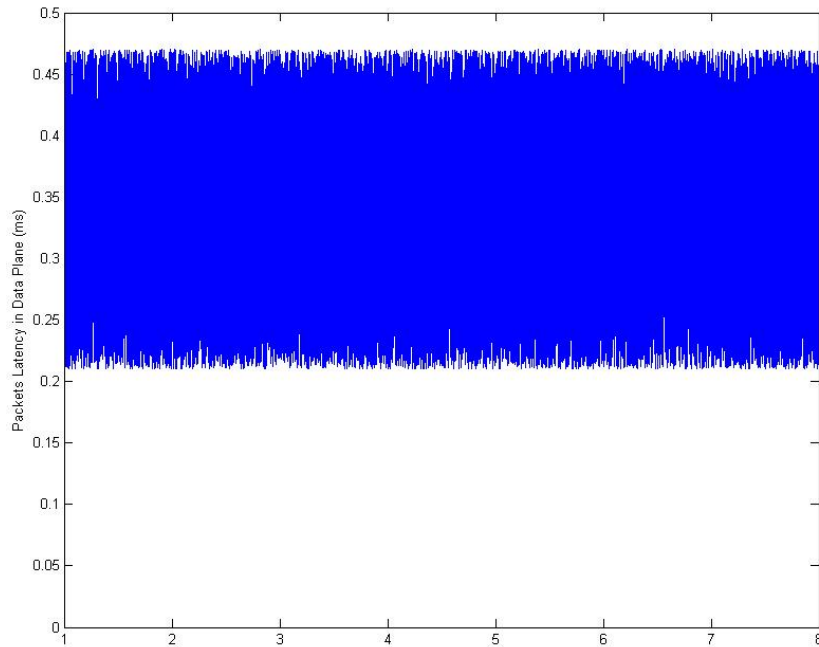
Monitoring for SDN IPv6



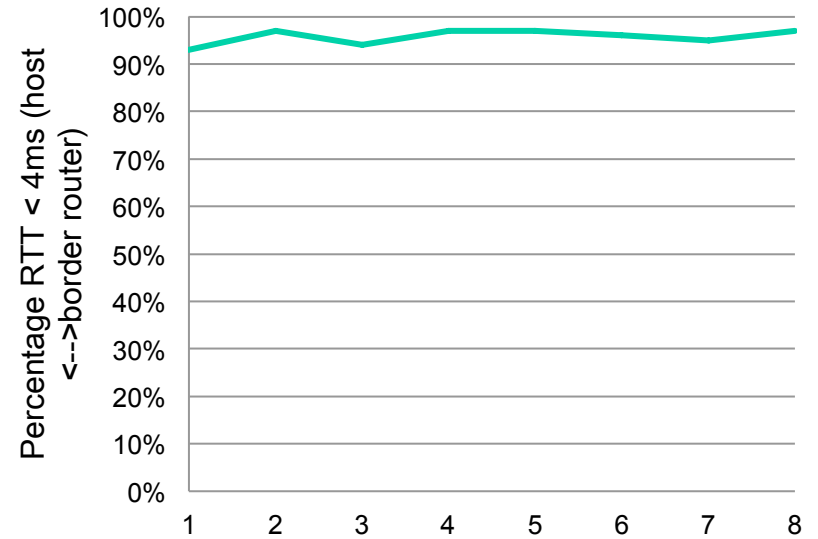
Flow Set-up Time

SDN IPv6 Deployment

Metrics & Tools (2)



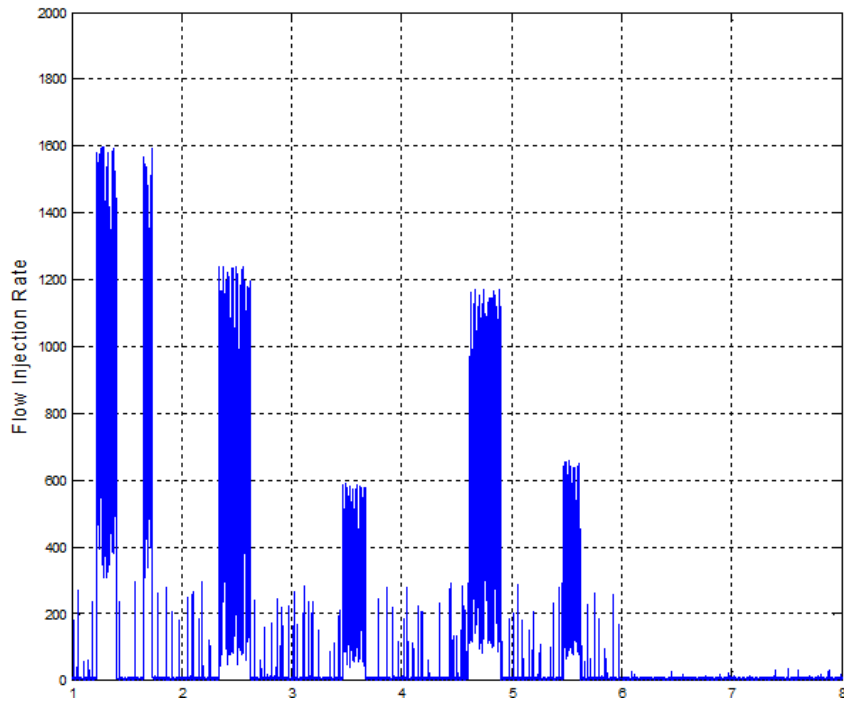
Packet Latency in Data Plane



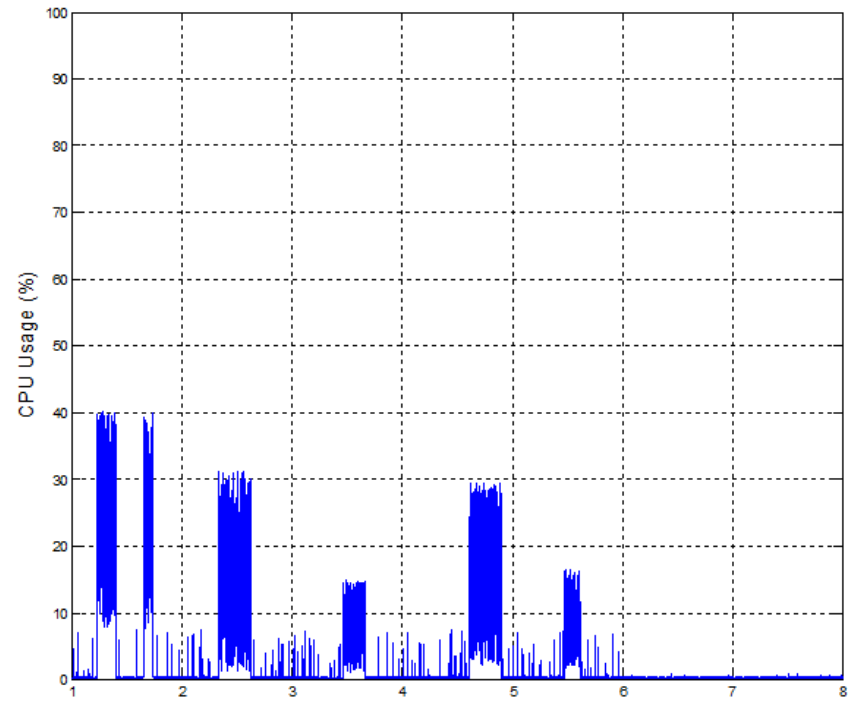
Percentage RTT < 4ms

SDN IPv6 Deployment

Metrics & Tools (3)



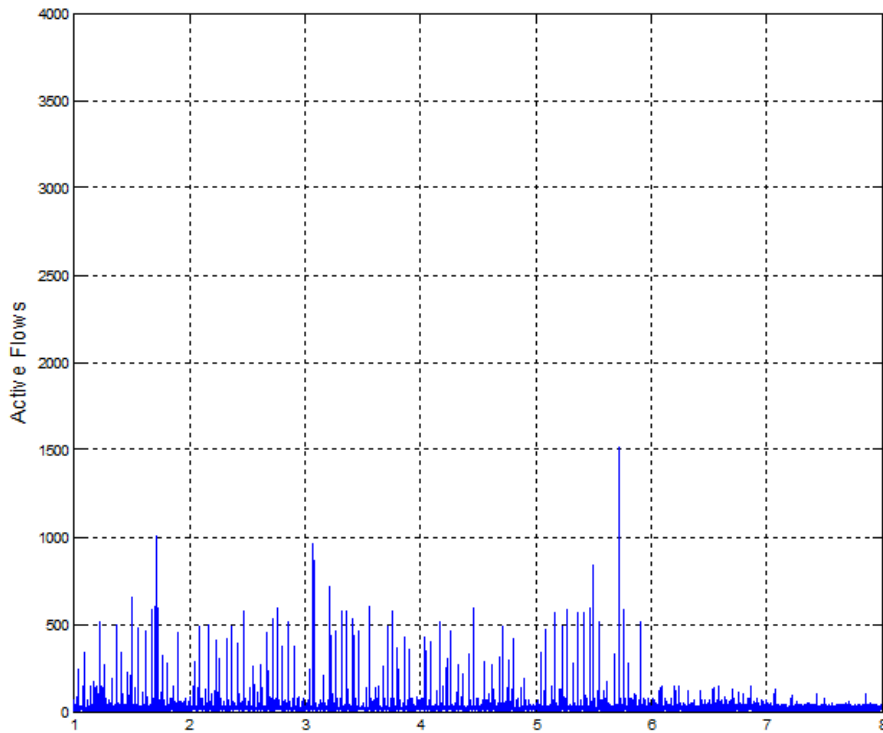
Flow Injection Rate



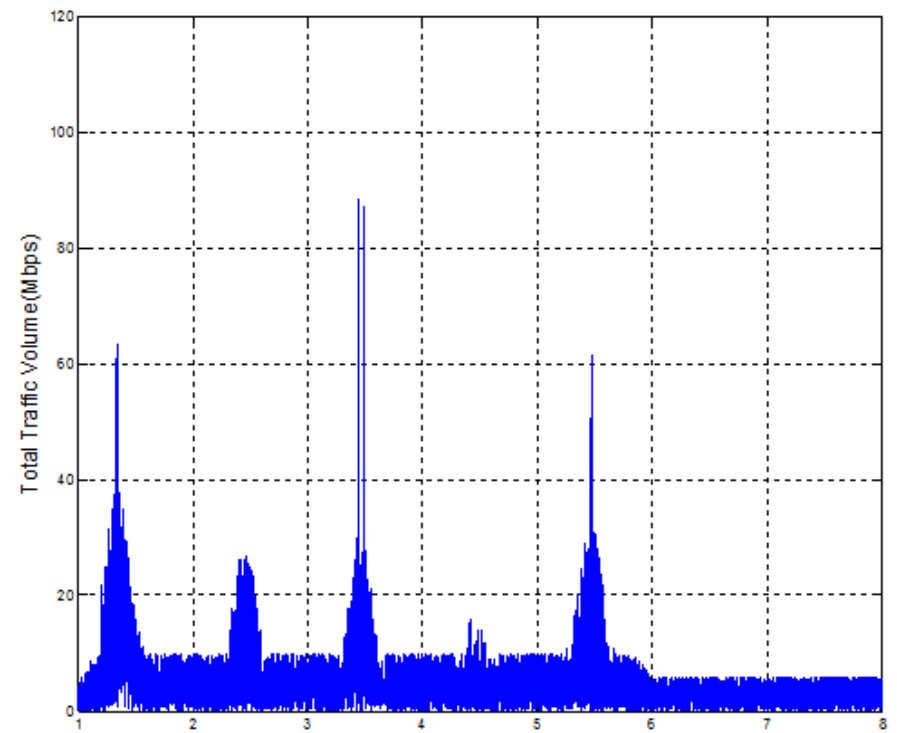
CPU Usage

SDN IPv6 Deployment

Metrics & Tools (4)



Active Flow



Total Traffic Volume

IRTF/IETF/BnB

SDN RG is a platform for exhibition of this approach

Protocol work needs to be done in IETF

You can experience it in Bits-N-Bites

Technology & Networking Social

IETF 88 Meeting - Vancouver, BC, Canada

Hyatt Regency Vancouver

Date: November 7, 2013

Time: 19:00-21:00

Location: Regency Ballroom D,E,F

Summary

- We provide a software defined approach to IPv6 transition
 - Low cost
 - High performance
 - Unifying existing IPv6 schemes
 - Extensible: easy to add / implement new IPv6 schemes
 - Easy to implement, deploy and operate

For more details, please refer to our ACM SIGCOMM 2013 poster titled *“A Software Defined Approach to Unified IPv6 Transition”*.

Questions