Addressing NFV using Software-Defined Infrastructure

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Future Application Platforms

- Support open applications and content market
- Extremely large scale, very high churn
- Rapid introduction of applications
- Multi-tier cloud: Massive core datacenters + Smart Edge
- Control and Management of software-defined infrastructure in a multi-tier cloud is key
Smart Edge

- Located closer to user
- Support low latency application
- Cache content at edge
- Includes virtualized heterogeneous resources

Computing

Networking

Storage

GPU

Reconfigurable Hardware (e.g. FPGA)

Wireless Access Point
Integrated Management of SDI

- Infrastructure with **open interface** for:
  - **Control and manage** converged heterogeneous resources (software programmability)
  - Access infrastructure **resource information** such as topology, usage data, etc.
SDI Architecture

SDI Resource
Management System

External Entities

Open Interface

SDI Manager

Topology Manager

Resource Controller A

Resource Controller B

Resource Controller C

Resource A

Resource B

Resource C
SAVI Testbed

- A experimental platform for SAVI research themes

- Two-Tiered Cloud
  - Core nodes, Smart Edge nodes across Canada

- Implemented SDI in the SAVI Testbed
  - OpenStack for Cloud
  - OpenFlow for SDN
One Core node, seven Edge nodes in seven university

On going project to federate with GENI in the USA
Projects on SAVI Testbed Could Address NFV
Multimedia Applications

- Voice over IP (VoIP)
- Video Streaming
Wireless Virtualization

- Virtualize wireless access points connected to Smart Edges in SAVI Testbed

- Also GSM over SDR in SAVI; LTE planned
Projects running on SAVI Testbed

- Reconfigurable Hardware Virtualization (FPGA)
  - Presented at Tridentcom

- Big Data Analysis
  - Apache Hadoop cluster
  - Apache Spark cluster

- Content Delivery
  - Content Centric Networking (CCN)
    - Running CCN on SAVI and improve performance
  - X-CCN
    - Extended CCN to support long term subscription

- Connected Vehicle and Smart Transportation (CVST)
On-Going Work in SAVI Testbed

- Monitoring and Measurement
  - Creating an efficient system for monitoring all the resources in SAVI Testbed, for measuring, collecting, analyzing, and distributing resource state information

- Resource Allocation
  - Intelligent resource allocation and automatic scaling

- Traffic Engineering and Path Selection
  - Efficient data center traffic engineering using SDN

- Green Networking

- Content Distribution
Thank you!

Questions?