BROCADE

IT Infrastructure

Transforming Networks to Meet the New Reality

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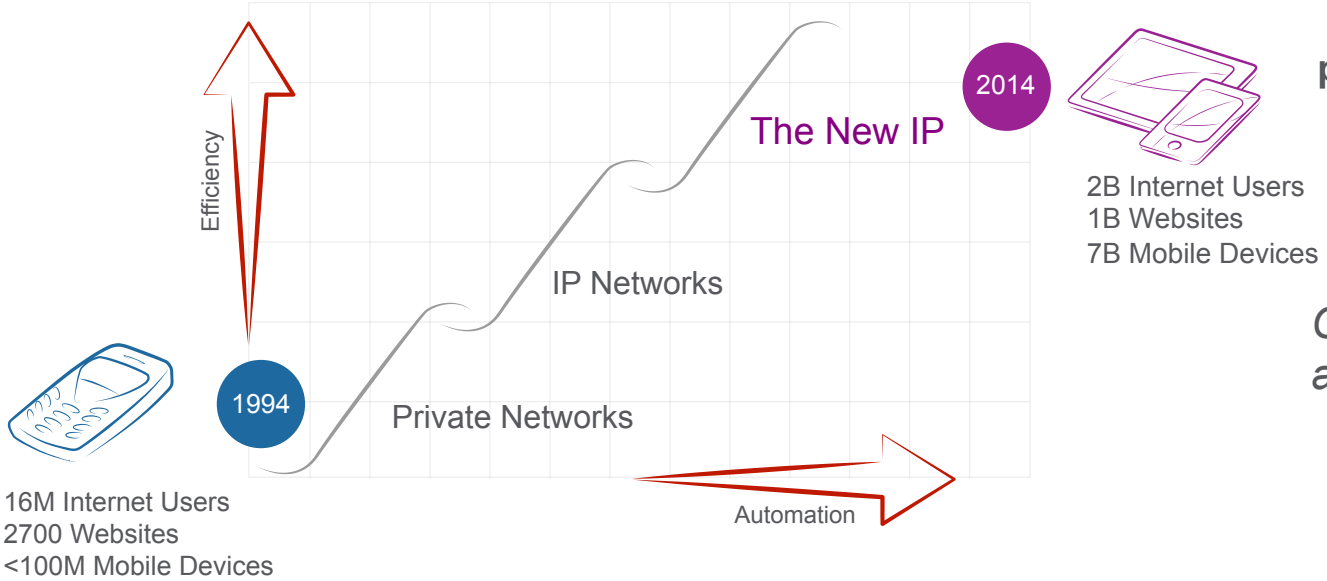
AFCEA-GMU C4I Symposium

May 20, 2015

The New IP

The Foundation for the Digital Government

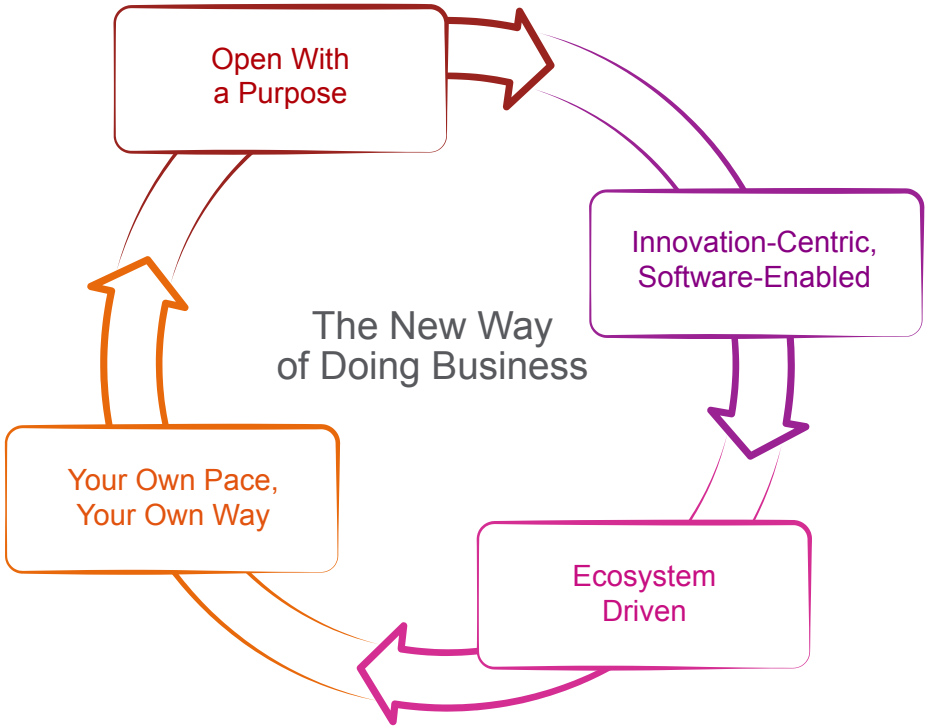


1/3rd of the world's population is connected to the internet

Can your Old IP handle a New IP world?

IT runs on 20 year innovation cycles, and we are on the forefront of the next wave, now is the time to embrace the new IP in order to improve network agility and reliability

The New IP is Transforming IT



- Open keeps pace with the rate of innovation, reduces vendor lock-in, and reduces cost and complexity
- Software-Enabled Innovation improves time to value and customer experience
- The Ecosystem provides a pool resources to accelerate innovation
- Transform your business on your own time, on your own terms

The New IP Framework

Brocade Strategy: Optimized to Lead the Transformation

Management and Orchestration

Management and Orchestration Platform

OpenStack

Applications

Application

Service Chaining, Network Analytics, Traffic Engineering, etc.

Control

Network Controller | Server Controller | Storage Controller

OpenDaylight

Virtualization

Network Function Virtualization

NFV: vRouting, vADX

Network Function Virtualization

VxLAN/NVGRE/STT

Server Virtualization | Storage Virtualization

Physical Infrastructure

Network | Compute | Storage

Ethernet Fabric, L3 Router, Fibre Channel SAN

openstack™

OPEN DAYLIGHT

Vyatta vADX

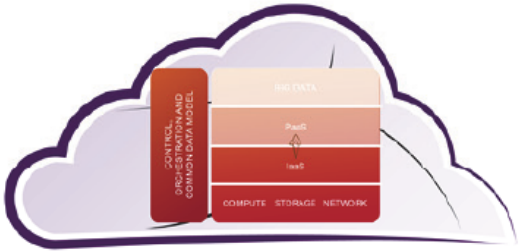
OpenFlow

BROCADE VCS® FABRIC

MLXe

Brocade GEN5 Fibre Channel

Foundation for the Internet of Things



Applications + Big Data + Virtual

Connected + Smart + Physical

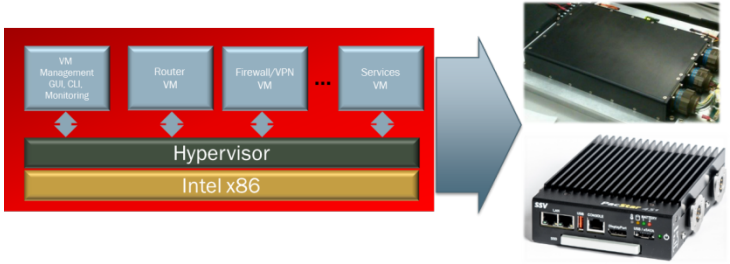
Network Technology Evolution

Characteristics of the New IP and their impact on C4I Networks

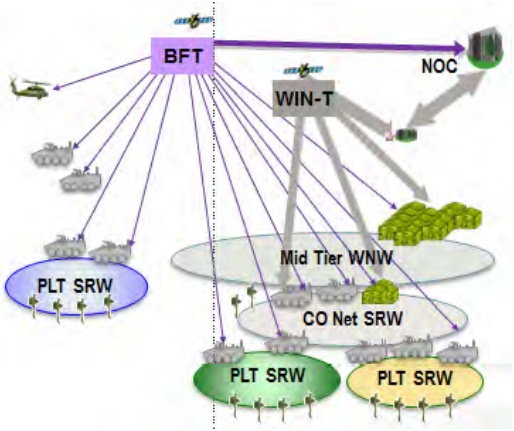
- Emerging technologies are specifically targeted at improving application performance/agility and reducing administrative complexity
  - **Policy** will govern next generation networks versus Configurations
  - Open APIs and interfaces between layers and components allows **automation**, **adaptability**, and **agility**
- Automation and programmability are as important to tactical network architectures as latency and throughput
  - Tune cyber posture of the network
- The more virtualized your tactical edge environment becomes, the more network functions will be a part of that environment
  - Command Post Cloud

New IP for C4I

Maximizing Effectiveness at Tactical Edge



- NFV - Reduced SWaP
  - But only with optimized software
- SDN - Simplified Provisioning
  - But only with open, standardized interfaces/ APIs
- Greater Cyber Situational Awareness
- Agile, Opportunistic Traffic Optimization
- Cloud technology that scales up to the strategic level and down to the tactical level



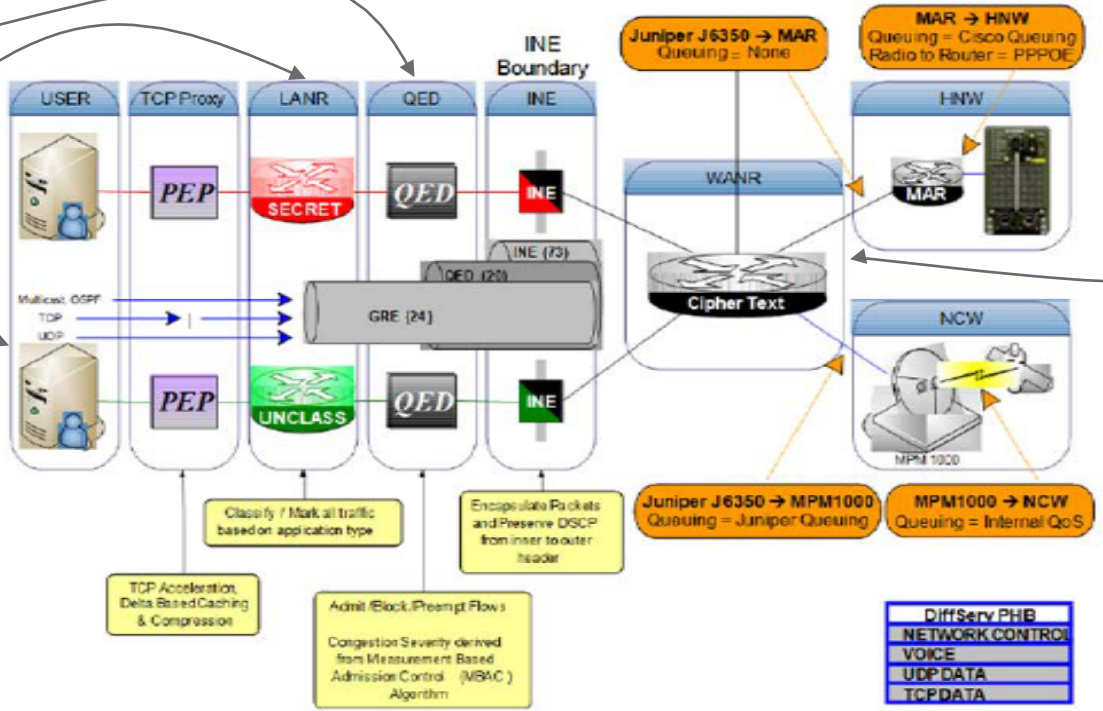
SDN/NFV in Tactical Networks

Possible Insertion Points

Utilize SDN to perform QoS normalization

NFV replacement of LAN Router

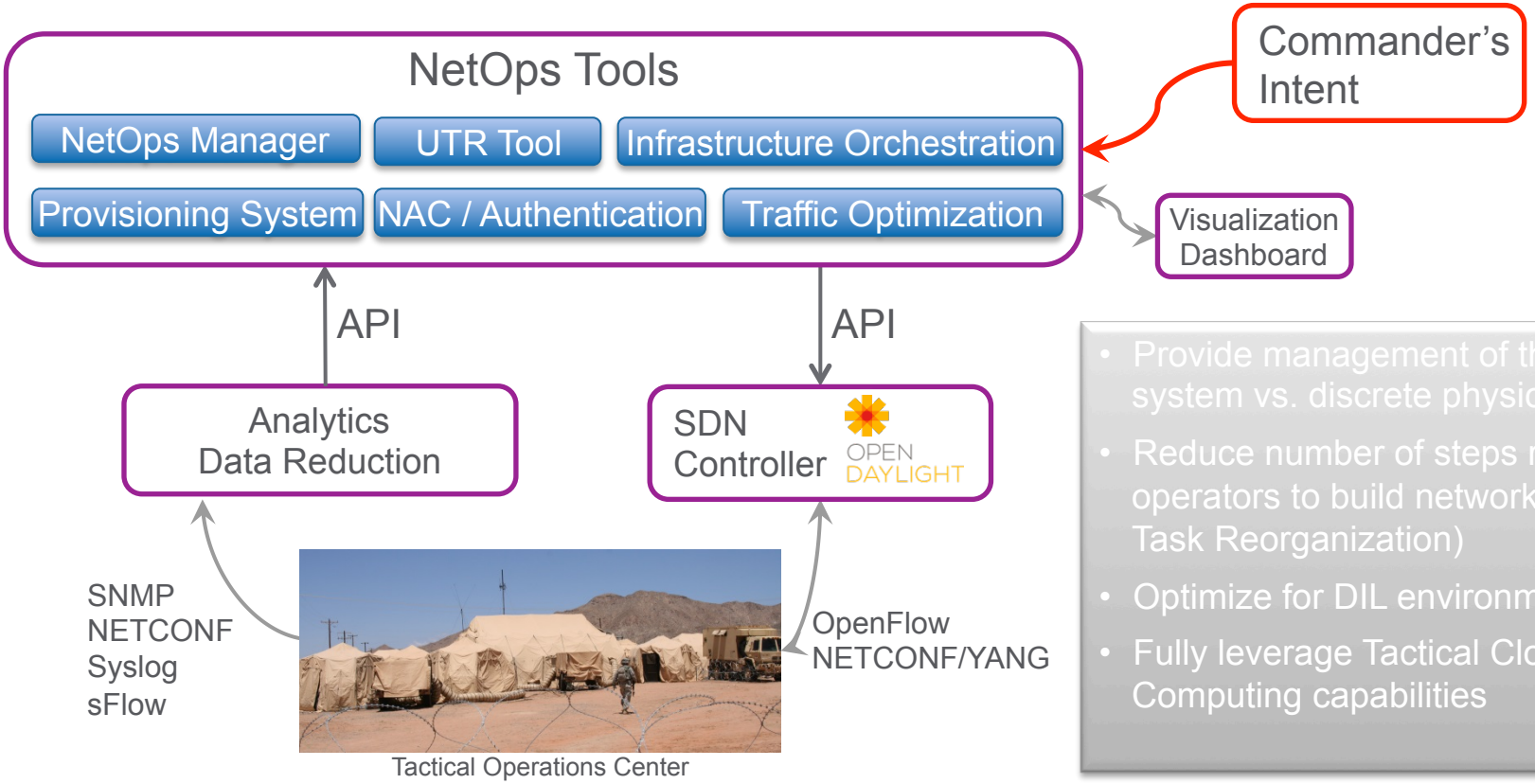
Compact Server Class platforms for high VM/NFV density



NFV WAN Router – NETCONF/YANG programmability

Leverage OpenFlow QoS match to direct traffic to appropriate WAN transport

Use Case: NetOps Simplification

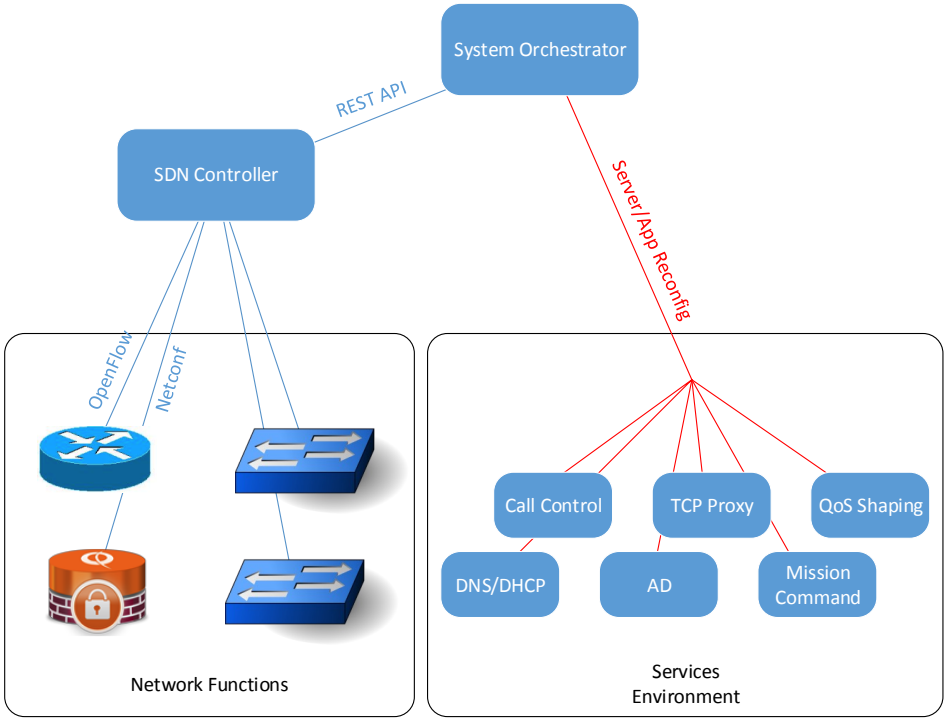


- Provide management of the distributed system vs. discrete physical devices
- Reduce number of steps required for operators to build network plans (Unit Task Reorganization)
- Optimize for DIL environments
- Fully leverage Tactical Cloud Computing capabilities

Unit Task Reorganization

Concept Leveraging SDN

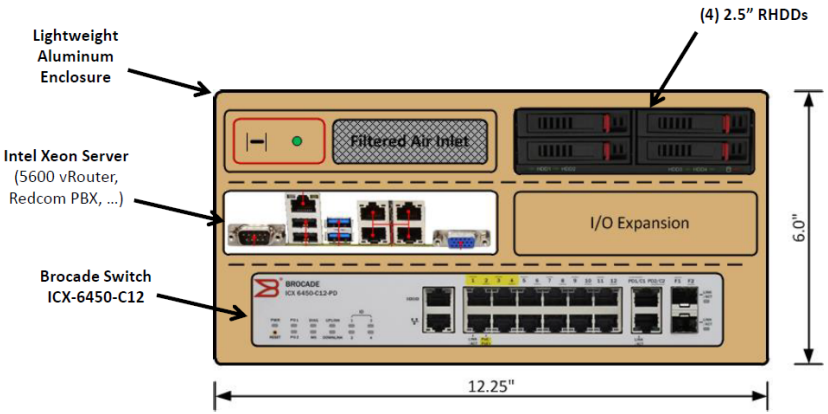
- Satellite constellation provides minimal data to node for reconfiguration
- Orchestration layer interprets request
  - Identify target variables within VMs for manipulation (IP addresses, database entries, voice trunks, …)
  - Avoids VM redeployments
  - Hands off network reconfiguration to edge SDN controller
- Leverage SDN aware infrastructure
  - Routers, Ethernet Switches, VPN, Firewall
  - Physical or Virtual

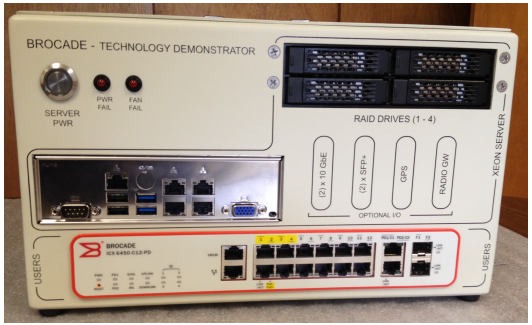


Dense Virtualization at Tactical Edge

Brocade Concept Platform

- Existing tactical server platforms are Intel Core i5/i7
  - Limited to 2 cores/4 threads (few VMs)
  - Multiple units required to support application workloads
  - Not optimized for virtualized network functions
- Alternative compact server platform
  - Xeon class server (10+ core)
  - Capable of hosting multiple high performance applications
    - UC, MC applications, NFV, VDI, etc…
    - Commodity HW building blocks
  - Integrated compact switch provides 1 GbE user access

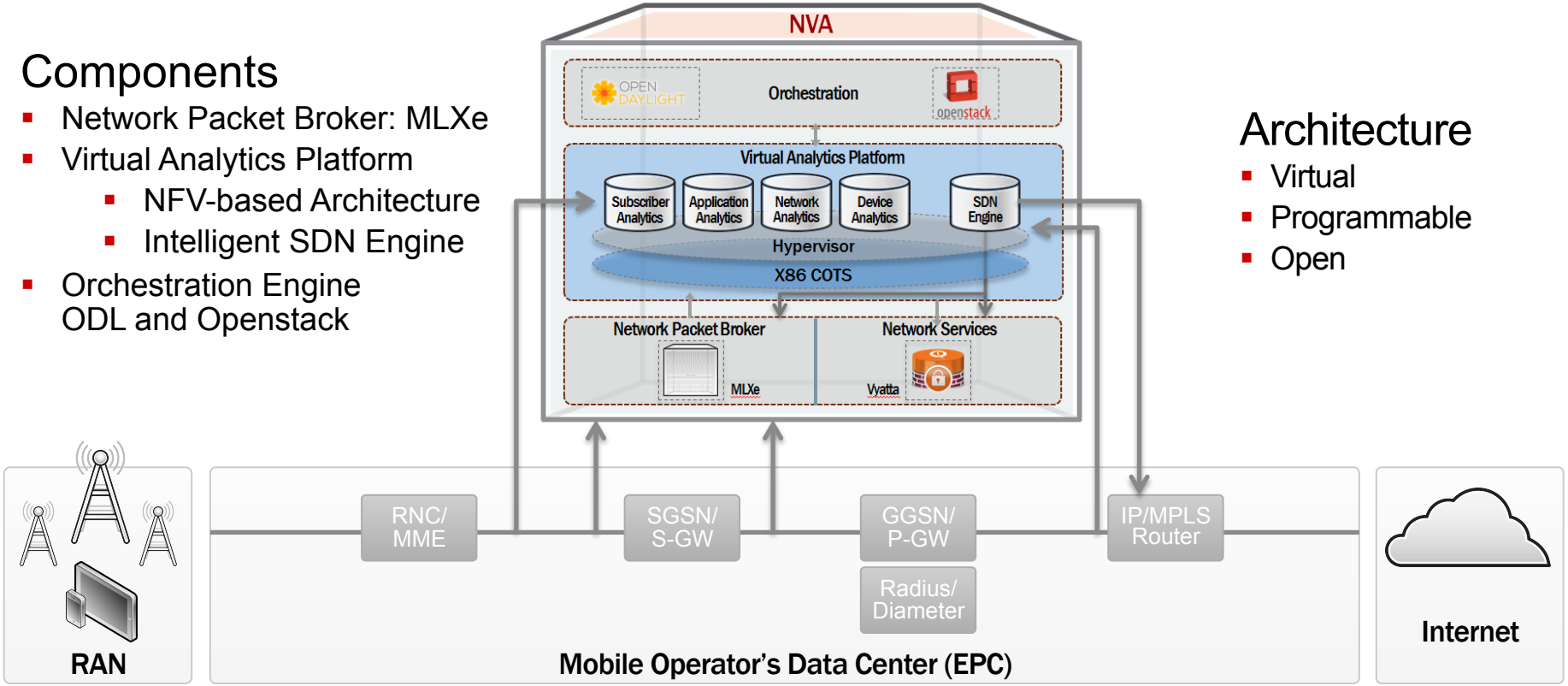




Network Visibility and Analytics (NVA)

Components

- Network Packet Broker: MLXe
- Virtual Analytics Platform
  - NFV-based Architecture
  - Intelligent SDN Engine
- Orchestration Engine
  ODL and Openstack



Architecture

- Virtual
- Programmable
- Open

Software Defined Intelligence (SDI)

SDN + Machine Learning

- SDI foundations: Data Science and Machine Learning
- First applications will be in “Network Learning”
  - More generally: “Predictive” Security
  - *Predict* eminent DDOS rather than reacting to an existing DDOS
    - “the probability you will experience a DDOS is 0.05”
  - Detecting spam prefixes in the Internet routing table based on various data sources

- Larger goal: Uncover new relationships and structure in network data
- Trivial example: “Better Data Centers Through Machine Learning”
  - Google PUE example