ETE Reliability Challenges and Opportunities in User Defined Network Cloud

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Rethink Possible®

What will our industry look like in 2020?

Effortless

Virtual

Ultra-Fast

Mobile

Global

An effortless customer experience is table stakes for great companies

Cloud – How content is stored and processed
Software Defined Networks – How content is delivered

Fiber-optic world & LTE

All solutions must be mobile
Customers won't know or care whether fixed or wireless

Communications and entertainment will be global
Customers, content owners and app developers will need partners with global scale

Drivers for Change

All IP Network — Mobile & Broadband

Cloud As A Services — Virtualization

SOA & APIs — Platform Delivery

Software Control — Emerging Service & Products

Virtualization

Reduces physical footprint of Network infrastructure & maximizes its utilization

Dedicated Hardware

VIRTUALIZATION

Shared Hardware

Hardware tightly integrated with a software application & provided by a single vendor

Commercial of the Shelf (COTS) hardware provided by AT&T & to be a shared resource utilized by software applications from one or multiple vendors

Key Benefits

New Innovative Services

Cycle Time Reduction

Lower CAPEX & OPEX

Prevent Vendor Lock In

On-Demand Scalability

What Is User Defined Network Cloud?

Emerging Services   Virtualization   Broadband   User Experience

Software   Mobile

Cloud   Video   Content   Stream

Digital Care

Speed   Innovation   Flexibility   Real Time

Open Stack

Transformation   Low Cost

Game   Social Media

Disruptive Technology   Collaboration

Reliability, Availability, Performance, and Security

User-Defined Network Cloud
A multi-service, multi-tenant platform

Network Function Virtualization (NFV)
+
Software Defined Networks (SDN)

- ✓ Enables Innovative new services (L4 -> L7) built internally and by 3rd party

- ✓ On-demand scalability

- ✓ Significant cycle time Reduction

- ✓ Enables innovative new services (L1 -> L3) built internally and by 3rd party

- ✓ Enables intelligent & automated bandwidth/SLA management

- ✓ Shifts control from hardware to software

Four Key Principles

1   **Open**

2   **Simplify**

3   **Scale**

4   **Secure**
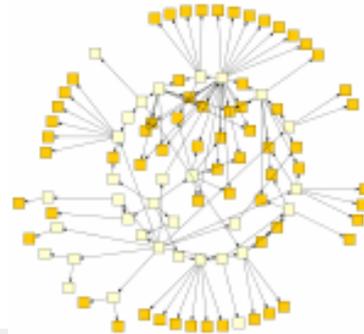
APIs are the perfect tools

More Common Infrastructure

Evolution in traffic growth
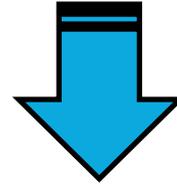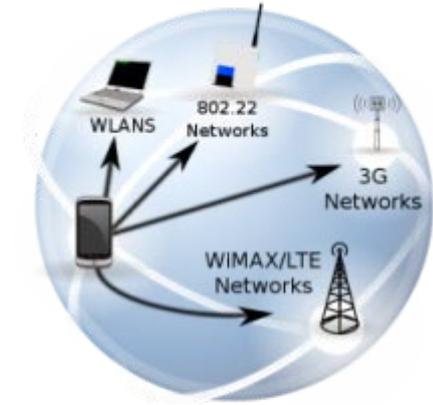
Protect Control Plane

Rapid Transformation

User-Defined Network Cloud

Is Changing

| How the network is built | Equipment & software | Vendor Management | Our Operations and Culture |

Reliability Challenges & Opportunities

Hybrid Network Model & Virtual Network Latency

ECOMP Is Not Well Defined but New Collaboration

Break-Fix Model Going Away but ...

Close Loop Real Time Orchestration, Optimization, and Monitoring

Fundamental Shifts in Systems & Operations Focus In User Defined Network Cloud

- **Infrastructure (Compute, Storage, and Network)**
- **Application Management**
- **Service Management**
- **Command & Control**

From	Key Paradigm Shift	To
Hardware/Firmware Centric		Software Centric
Separate IT/Data Center & Network/CO		Common Technology "Plant"
Geographically Fixed/Single Purpose EQ		Dynamic & Configurable Topology/Roles
Tight Coupled NE Instance/Generic, EMS/NMS		Separation of Physical/Logical Components
Separation of Service & Support Systems		Integrated Service and Support Functions
Hardware Monitoring		Software and Probe Based Monitoring
Optimized EQ/Carrier Network & Ops Process		Optimized for Customer Experience

Thank You

Q & A