Drivers of Digital Transformation

- Internet of Things
- Global IP Traffic
- Software-Centricity
- Public & Private Clouds
- Artificial Intelligence
- Pervasive Security
What We’re Hearing From Customers

EDGE TO CLOUD

“We would like to access our mission-critical cloud apps directly from the sites”

TRAFFIC OPTIMIZATION

“We want to do Internet offload locally to reduce costs and simplify the network”

FLEXIBILITY / CONTROL

“We need the ability to mix and match apps and connectivity based on the site type”

TRUSTED PROVIDER

“We require a trusted partner to help us transform because we lack expertise”
Leading the Industry in Network Transformation

- Data Traffic
- Virtualization Progress

2007 Data Traffic: 5.7%
2017 Virtualization Progress: 34%
2020 Virtualization Progress: 75%

250,000% GROWTH* from 2007 to 2017

*From 2007 - 2017
### AT&T Platform Approach

#### E-Services
- **Integrated Portal**: (Business Center)
- **Design Functions**: Operational Functions
- **Operational Functions**: External Data Movement & APIs
- **Data Collections**: DCAEd
- **Analytics**: Common Services, Data Movement, Access Control & APIs

#### BSS/OSS
- **Controllers**: Engineering Rules & Inventory
- **Inventory**: Active & Available
- **Inventory**: A&AIG
- **Inventory**: Dashboard
- **OA&M**: Operation Administration & Maintenance

#### Big Data
- **ECOMP**: Controller
- **Recipe/Engineering**: Rules & Policy
- **Distribution**: AT&T Service Design & Creation
- **Analytic Application Design**: Policy Creation

### AT&T Platform Approach

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**Note:**
- **AT&T INTEGRATED CLOUD**
- **Any Payload, Anywhere**
- **End to End Experience**
- **Vendor and VNF Independence**
- **Single Pane of Glass**
- **Speed of Delivery**
- **Speed to Scale**
- **Speed to Innovate**

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ONAP Coverage

Major Operators
- AT&T
- Bell Canada
- China Mobile
- Comcast
- China Telecom
- Orange
- Reliance Jio
- Verizon
- Vodafone

ONAP Members

Pipeline

60%
Enabling Intelligent Network

- **SDN-Enabled Core** – faster implementation, dynamic bandwidth and reconfiguration for transport services
- **Virtual Edge** – simplified deployment of network functions, flexible management options, and improved TCO
- **SD-WAN** – flexible, cost-effective, application based routing
- **Integrated Vision**: SDN-enabled Core with virtualized edge and flexible access options – all on a single pane of glass
SD-Network: Reinventing Networking Experience

- Network control decoupled from physical elements
- Bandwidth scaled dynamically when needed
- Fast, automated provisioning
- Web-based self-service management

Orchestrated Architecture
Automated Tools & APIs
On-Demand Control
Virtual Edge: Network Function Virtualization

Traditional Network Appliance Approach

- Multiple functions on a single device
- Complex network management
- Physical install per appliance per site

Network Function Virtualization Approach

- Multiple functions on a single device
- Less complexity, improved TCO
- vROUTER
- vFIREWALL
- vWAN-X
VNFs On the Premises and In the Network

ON the PREMISES
- Router
- Firewall
- WANX

IN the NETWORK
- DDoS Protection
- SD-WAN Gateway
- Provider Edge Routing

Virtualized Network Functions

Universal CPE

Network Cloud
Universal CPE Solution

APPLICATIONS
Open VNF ecosystem

DEVICES
Orchestrated hardware

NETWORKS
Global, agnostic Ethernet & TDM

DEPLOYMENT
Flexible, easy Any site type

Deployment and VNF scaling agility

Flexible management options

Future-ready platform
Rapidly Expanding VNF Eco-System

Router

Security

WANX

Visibility

IoT Gateway
Platform for Mission Critical Apps

Unified Communications

- High availability to ensure performance for UC

Internet of Things

- WAN optimization to enable fast IoT data transfers

Enterprise Applications

- Virtual security to protect retail applications

VIRTUAL EDGE
SD-WAN: Enabling Network Agility

**SD-WAN**

- Wireless
- Data Center
- MPLS
- Remote Site
- Internet
- Cloud Provider

**BENEFITS**

- **NETWORK AGILITY**
  Software-centricity allows for quick adaptation to changes, like adding access or connecting new sites

- **EASE of DEPLOYMENT**
  Flexible deployment options with easily updatable plug’n’play configurations

- **CENTRALIZED CONTROL**
  Centrally located orchestrator that enables automation and real-time analytics and reporting

- **TOTAL COST of OWNERSHIP**
  Simplified architecture, optimized operations and increased cost-effectiveness
SD-WAN Approaches

**Over the Top**

- Flexible Service Chaining
- Transport Agnostic
- Customer Technology Choice

**Network Based**

- Per-Site Deployment Choice
- Elegant Migration Path
- MPLS Feature Preservation
Network Transformation: One Size Does Not Fit All

**MISSION CRITICAL SITES**
- MPLS
- Secure Customer Network
- Internet
- Virtual Route
- Virtual Security
- Virtual WANx
- Virtual SD-WAN

*Larger enterprise sites that require full MPLS ecosystem*

**BRANCH SITES**
- LTE
- Secure Customer Network
- Internet
- Virtual SD-WAN

*Branch and store sites that require Internet and back-up*

**REMOTE SITES**
- Secure Customer Network
- Internet
- Router
- IPSec

*Small remote sites that require Internet and basic protection*
One Integrated Intelligent Network

- **SD-WAN VPN + Internet**
- **SD-WAN Dual Broadband**
- **SD-WAN Internet**
- **MPLS**
- **IPSec Gateway**
- **VPN + LTE**
- **VPN for Cloud**
- **Dual VPN**
- **Hub Site**
- **Dual Ethernet**
- **Data Center**
- **Cloud Providers**

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Accelerating the Industry Shift

ONAP Framework
Real-time, policy-driven automation of virtual network functions

Open Universal CPE
Common specs for premises-based devices; any provider environment

Open Network AI
Open source AI-driven network platform easily accessible by developers