Innovation Driving Leadership and Value in SP

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Mobile World Congress Investor Briefing
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Cisco Priorities
Secure, Intelligent Platform for Digital Business

- Reinvent Networking
- Enable a Multi-Cloud World
- Unlock the Power of Data
- Enrich the Employee and Customer Experience
- Deploy Security Everywhere

Deliver Continuous Customer Value
The World Has Gone Mobile & Wi-Fi

7X Mobile Data Traffic Growth 48.3 EB/mo

63 percent of IP traffic will be mobile/Wi-Fi

Smartphone traffic will exceed PC traffic (33% versus 25%)

Internet Traffic Growth Is at the Edge

60% Metro Traffic growth – to 35%

15% Regional Traffic growth – to 23%

29% Cross Country Traffic decline – to 41%

Growth/decline of global internet traffic %

The SP Business Challenge

Bandwidth growth outpacing revenue growth

• SPs need new revenue opportunities

• Bandwidth growth and network architectures need new business and scale models (e.g. 5G)

• SP CapEx spending relatively flat

Source: Cisco VNI and Industry Data
SP CapEx Shifting to New Growth Initiatives

Infrastructure

Scale (Virtualization, 5G) & Operations (Automation, ML)

Growth Initiatives

NGN

ENT
Megatrends in SP
Cisco Helping SPs Save $ and Grow Their Business

- 5G
- Automation
- Virtualization & Cloud
- Bandwidth Explosion & Edge Migration
- B2B M2M

Security
Services

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Cisco 5G
Redefining the Network

SECURE NETWORK • SECURE CLOUD • SECURE ENTERPRISE
Cisco 5G Services

**Converged Core**
Single platform for licensed, unlicensed, IoT to enable services over multi-access networks

**Network Slicing**
Partition and tailor resources to meet service, application, and user needs

**Service Automation**
Automatically assure right-sized network resources without needing to involve people

**Edge Distribution**
Disaggregated service construction puts resources and micro services where they make sense

**Virtual Scaling**
Densify service provider network with scalable software for on-demand elasticity
Cisco’s 5G Services Use Cases

**Mobile SD-WAN** – Enables customers to offer software defined WAN services with both MPLS & OTT support with Cisco/Viptela/Meraki.

**IoT Connected Devices** – Cisco IoT connectivity management platform allowing customers to automate, gain insights, & manage all IoT connected devices.

**Virtual Collaboration** – the future of work. Collaboration continues to become more interactive & requires low latency. Cisco’s Spark is a long-term collaboration solution that will fit into the 5G ecosystem.

**Mobile Managed Security** – We augment SP’s expertise with Cisco Security experts at Talos, plus advise on implementation and ongoing protection.

**Smart Cities** – Cisco helps customers build an IOT environment inclusive of ruggedized/outdoor connectivity, deep compute beyond MEC (FOG), & optimized IOT data delivery & compression.

**Network as a Service** – Enables SPs to offer network services, slices, & connectivity as needed with ease to enable new business models.

**Mobile Video** – Cisco helps SPs deliver enhanced Mobile Broadband experiences to both consumer and enterprises – securely delivering the right network resources wherever, whenever.

**Mobile Experience** – Cisco enables SPs to plan, deploy, and deliver public Wi-Fi services faster and more accurately.
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What is Automation?

Automation leverages the scope of human experience of repetitive actions and expertise, previously isolated and variable from one person to another ... spanning the breadth of the full lifecycle of operational disciplines ...

Software-based Intelligence with Machine Learning

Networks that automatically deploy routine tasks, with self-healing and self-optimization. Analytics extracts useful data to provide to humans, faster, for better decision making.
The Cisco Crosswork Network Automation Framework

Most comprehensive closed-loop, mass scale automation solution that embraces multi-vendor networks

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<th>Mass Awareness</th>
<th>Augmented Intelligence</th>
<th>Proactive Control</th>
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<td>Collect massive amounts of data in a standardized format</td>
<td>Run analytics, apply machine learning</td>
<td>Take action with an organized approach</td>
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Cisco Crosswork Network Automation Use Cases

**Configuration and Change Management** – Cisco Network Services Orchestrator can transform network changes into intent-driven deployments with automatic validation.

**Real Time Analytics and Automation** – Cisco Crosswork Change Automation uses analytics enhanced closed-loop automation to automatically remediate network issues as they happen.

**Collector Service and Data Store** – Cisco Crosswork Data Platform creates a single point to seamlessly collect, analyze, and visualize network data across multiple services and domain devices.

**Event Correlation with Machine Learning** – Cisco Crosswork Situation Manager uses artificial intelligence algorithms to automatically triangulate faults across multiple network domains, drastically reducing the time to isolate network outages, and provide root cause analysis to prevent future outages.

**Real-Time Visualization** – Cisco Crosswork Data Platform, combined with Cisco Crosswork Health Insights, utilizes real-time visualization with analytics to provide unparalleled insight into network performance.

**Continual Optimization for Business and Service Needs** – Cisco WAN Automation Engine (WAE) and XR Traffic Controller (XTC) use advanced telemetry and analytics to improve network performance in real time without human intervention.
Improved Customer Outcomes with Automation

Time to Value
Configuration & Change Automation

Faster Customer Service On-boarding: 78%
Faster Execution of Change Requests: 81%
Faster Execution of Maintenance Procedures: 84%

Time to Remediation
Automated Fault Remediation

Improvement in Mean Time to Repair: 70%

Source: Cisco Automation Benchmark of 5 SP Customers
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Services Moving Closer to the Customer

In the past, services lived in the CO. Today, service architecture has moved towards edge to support new services and data growth. Virtualized and microservices-based SW architecture, intelligence moved towards edge, and new optimized HW platforms have contributed to this movement. The diagram illustrates the transition from core to edge, with cloud services and content, security, automation & orchestration, and public cloud as key components. © 2017 Cisco and/or its affiliates. All rights reserved. Cisco Confidential.
Cisco Leadership in Cloud & Virtualization

**Hybrid Cloud Solutions**
- CloudCenter
- HyperFlex
- UCS
- Nexus/ACI
- Mercury/Cisco VIM
- AppDynamics
- Tetration

**Cloud Apps**
- Cisco Spark
- WebEx
- Jasper

**Security Everywhere**
- CloudLock
- Umbrella
- Cloud Email Security
- Stealthwatch (Cloud License)
- Next-Generation Firewall

**Networking for the Cloud**
- Meraki
- Cloud Services Router 1000v
- Secure Agile Exchange
- Viptela/SD-WAN
- NSO/VMS/NFVI
- Mobile Edge Compute
- Fog Usage VPP

**Cloud Professional Services**
- Advisory
- Design & Architecture
- App Migration
- Automation & Orchestration
- API Integrations
- Management & Governance

Partner Ecosystem

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Services
Simplifying with Next Gen Routing Architecture

Fully Automated  Proactive + Self Healing Network  Enables Service Velocity

Evolved Networking Stack  Autonomous Network  Platform for Open Innovation

Industry-leading Building Blocks

ASIC  SW  HW  Optics  Services

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Innovating in Silicon Diversity and Systems

**Light Speed**
- Maximize Wavelength rate: 200G → 600G → 1Tb
- Optimize data rate vs. distance vs. cost
- Gain more from existing fiber infrastructure

**Silicon**
- 100G to 400G shift with same density; 3–4x cooling required for new optics
- Lower cost per bit; high bandwidth radix flattens network; higher aggregate power per rack
- Virtual chassis vs. multi-chassis
- Flexible forwarding micro-architecture

**Systems**
- Custom and merchant silicon, leveraging the breadth of IOS XR across best-in-class merchant vendors
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B2B
M2M
Enabling SP B2B Service Creation

Services

- Collaboration, MPLS Private Networking
- Managed Security Services
- Global SD-WAN and WiFi Deployments
- SMB Solutions

Why Buy from an SP?

- Connectivity and Collaboration Service Application
- Simplicity
- Consistent Service Experience over Broad Geography
- SP Brand Strength
- Bundling of Enterprise Service with SP Analytics and Services
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• Cisco is partnering with Reliance Jio to drive the national agenda of Digital India, from communications to digital lifestyle by building a first-of-its-kind, future-proof, 5G-ready network

• This largest all-IP, multi-Terabit capacity network in India for delivering broadband, mobile video, VoLTE, and VoWiFi services to 18,000 cities across India