What's Next for Carrier Wi-Fi?

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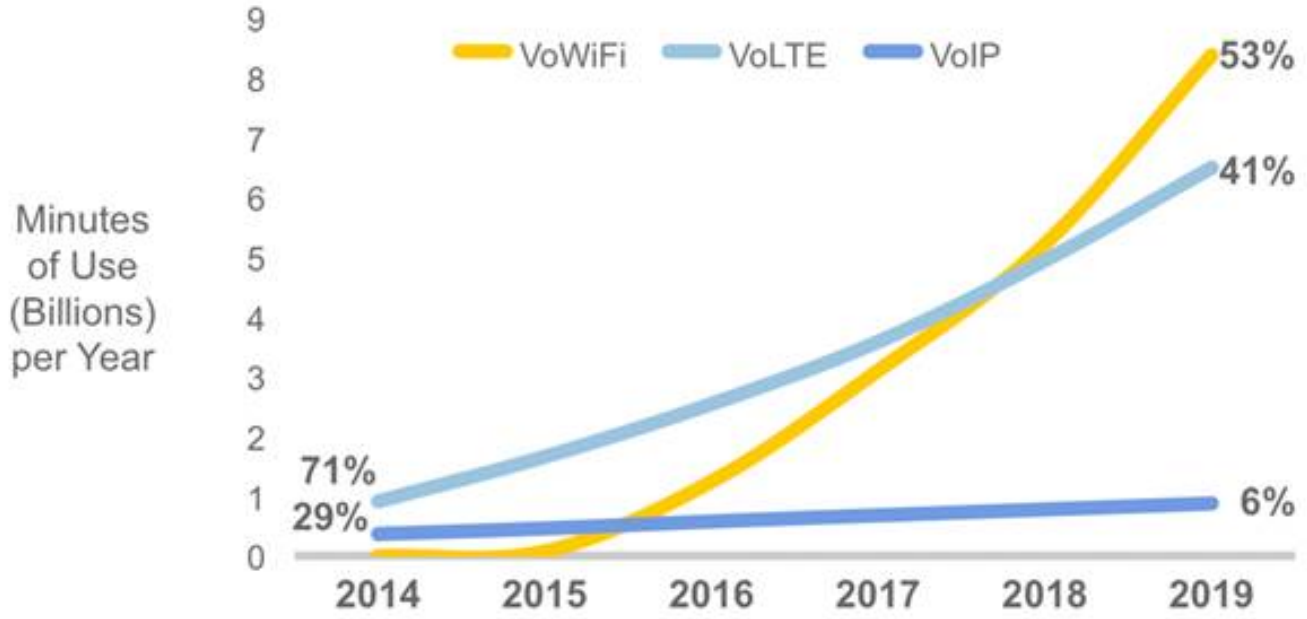
September 2015

What is Driving Wi-Fi Growth?
VoWi-Fi & LTE



Note: VoLTE and VoIP are mobile-specific, VoWi-Fi could be from any Wi-Fi connection. Circuit-switched mobile voice is excluded from the mix. It would grow at 5 percent CAGR.

Source: ACG, Ovum, Cisco VNI Mobile, 2015

What is Driving Wi-Fi Growth?
VoWi-Fi

Primary Use Cases

- Complete indoor voice coverage for home and enterprise
- International roaming
- Voice on non-SIM devices (eg: Wi-Fi iPad)

T-Mobile Turns Up VoLTE-to-WiFi Handoff

NEWS ANALYSIS
SARAH REEDY,
Senior Editor

T-Mobile used its Un-carrier 7.0 event to remind the world of a technology it first announced back in 2007: WiFi calling.

Apple Inc. (Nasdaq: AAPL) has a way of making old technologies seem exciting and new, so T-Mobile US Inc. is hoping to coast off that by announcing its voice-over-WiFi calling service with a few upgrades. Most notably, the service, which now works on iPhones in addition to Android, now supports seamless handoff between voice-over-LTE and VoWiFi, although it's not compatible with T-Mobile's 3G network. (See Apple's New iPhones Have 20 LTE Bands, VoLTE.)

Never miss an update *Follow AppleInsider* Like 17k Follow 184K followers

Friday, September 12, 2014, 10:27 am PT (01:27 pm ET)

AT&T to support Wi-Fi calling for Apple's iPhone 6, iPhone 6 Plus in 2015

By Sam Oliver

Topics: Service Provider Strategies | Smartphones and Devices

Verizon Wireless plans to launch Wi-Fi calling in mid-2015

September 17, 2014 | By Phil Goldstein

EE to offer Wi-Fi Calling for iPhone 6 and iPhone 6 Plus

UK network named as one of two partners for Apple's new feature

By Patrick Goss September 9th COMMENTS

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What is Driving Wi-Fi Growth?
Device and Traffic Growth

Wi-Fi is now the primary access network

53% of fixed IP traffic will be Wi-Fi, exceeding wired by 21% by 2019[1]

28% of device connections will be used for machine-to-machine traffic by 2019[1]

72% of mobile traffic will be video by 2019[1]

Denser Network Traffic

Greater Bandwidth Consumption

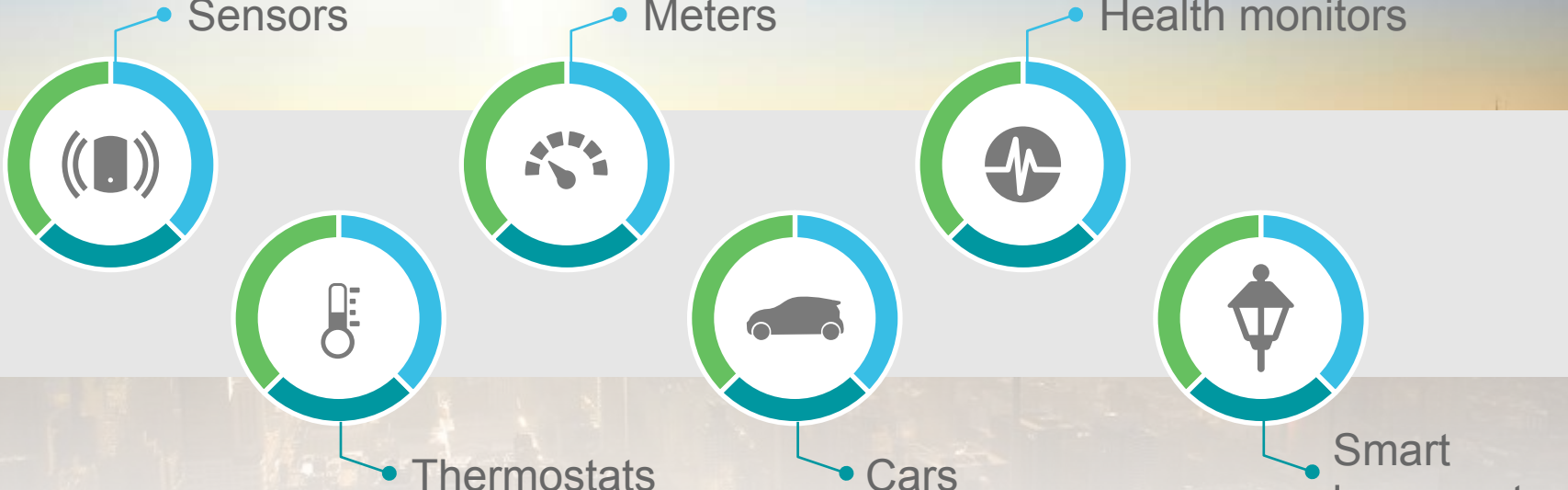
Network resources and capacity are maxing out

Source: Cisco 2015 Visual Networking Index Mobile Forecast

What is Driving Wi-Fi Growth?

Internet of Everything

Connectivity abounds



What is Driving Wi-Fi Growth?
Data Consumption by Location in 2019

Home
50%

Work
35%

Metro
11%

On the go
4%

Source: Cisco VNI, 2015

Carrier Wi-Fi: Addressing the Future

Business Outcomes

Community Wi-Fi | Exchanges | VoWi-Fi Services | Location Services

Wi-Fi Policy | Portal / Hotspot | Wi-Fi Control | AAA / Proxy

Voice Gateway | Packet Gateway | Packet / IMS Core

Network and User Insights

Dedicated Platform

Managed / Cloud

Wi-Fi Access

Residential

SMB

Outdoor

Indoor

Industrial

@Home | @Metro | @Work

Market Trends

Dedicated Platforms

Managed/Cloud

- ✓ CAPEX to OPEX
- ✓ Barriers to market entry diminishing
- ✓ Fastest growing channel to enterprise and public vertical markets
- ✓ Consolidation of Access Networks (Community Wi-Fi & Fast Roaming)
- ✓ Ease of Service Deployment (e.g. Tail-f)
- ✓ Monetization is real

Disruptors

- “Killer App” → VoWi-Fi is maturing
- Matching how (M)SPs do business → Wi-Fi as a Service
- Differentiation from OTT → Network Driven Analytics

Critical Architectural Changes

- Coverage and Capacity → Smart Radio Management/ 802.11ac Wave 2
- Frictionless Onboarding → Hotspot 2.0 Migration
- Agile Service Delivery → Virtualization/Orchestration

Where Do Carriers Fit?

Managed Services

Growth, Protection, Incentives & Support

Sophisticated Buyers

High Scale & Performance

Total Control and Richest Set of Features

On-Premise Integration & Management

Preference for “Do-It-Yourself”

Lean Buyers

End to End (Complete) Solution

Less IT Engagement & Attractive Pricing (CAPEX)

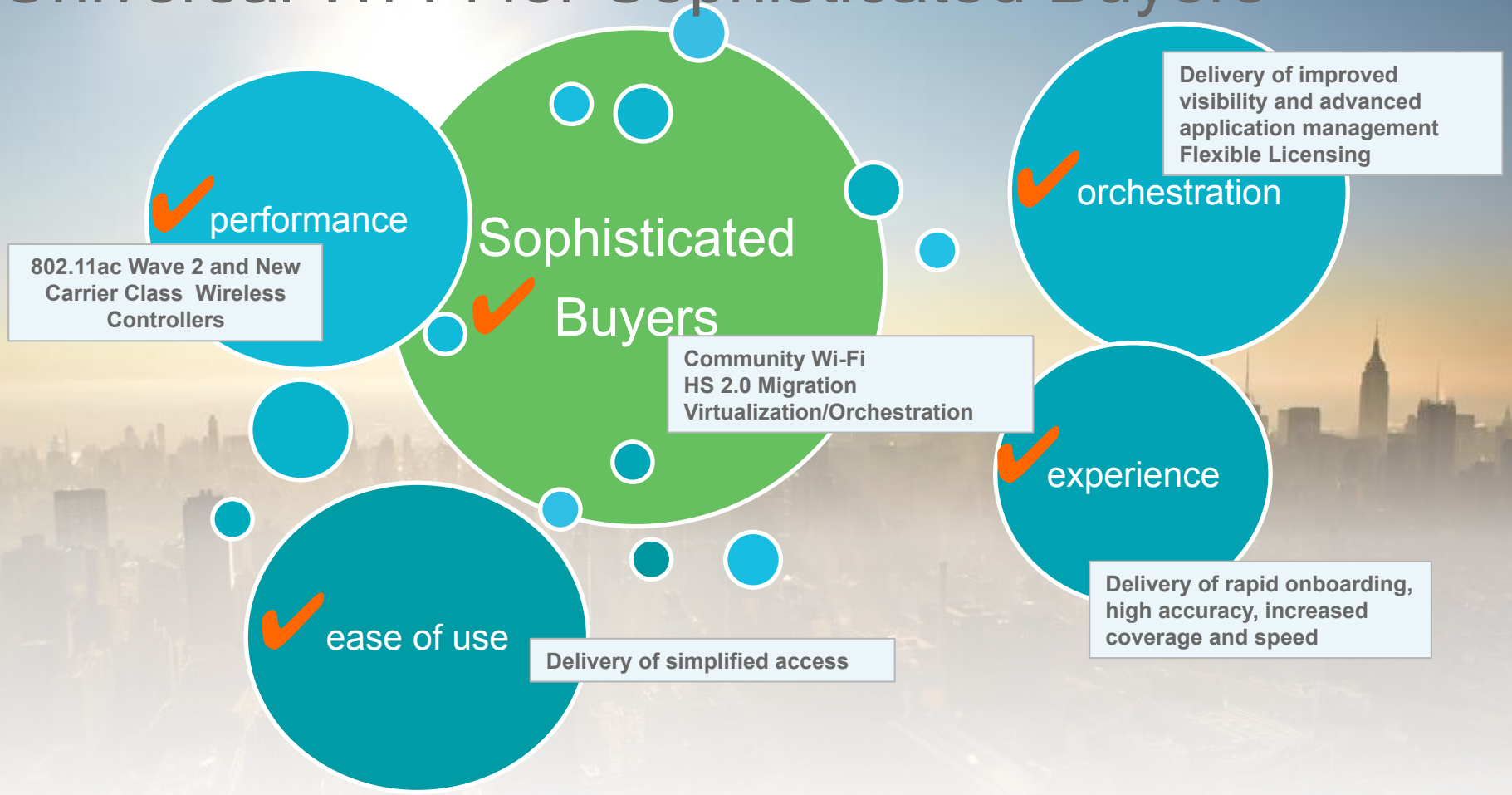
Focus on Monetization (Business Model and Value Added Services)

Preference for “Out-of-the-Box”

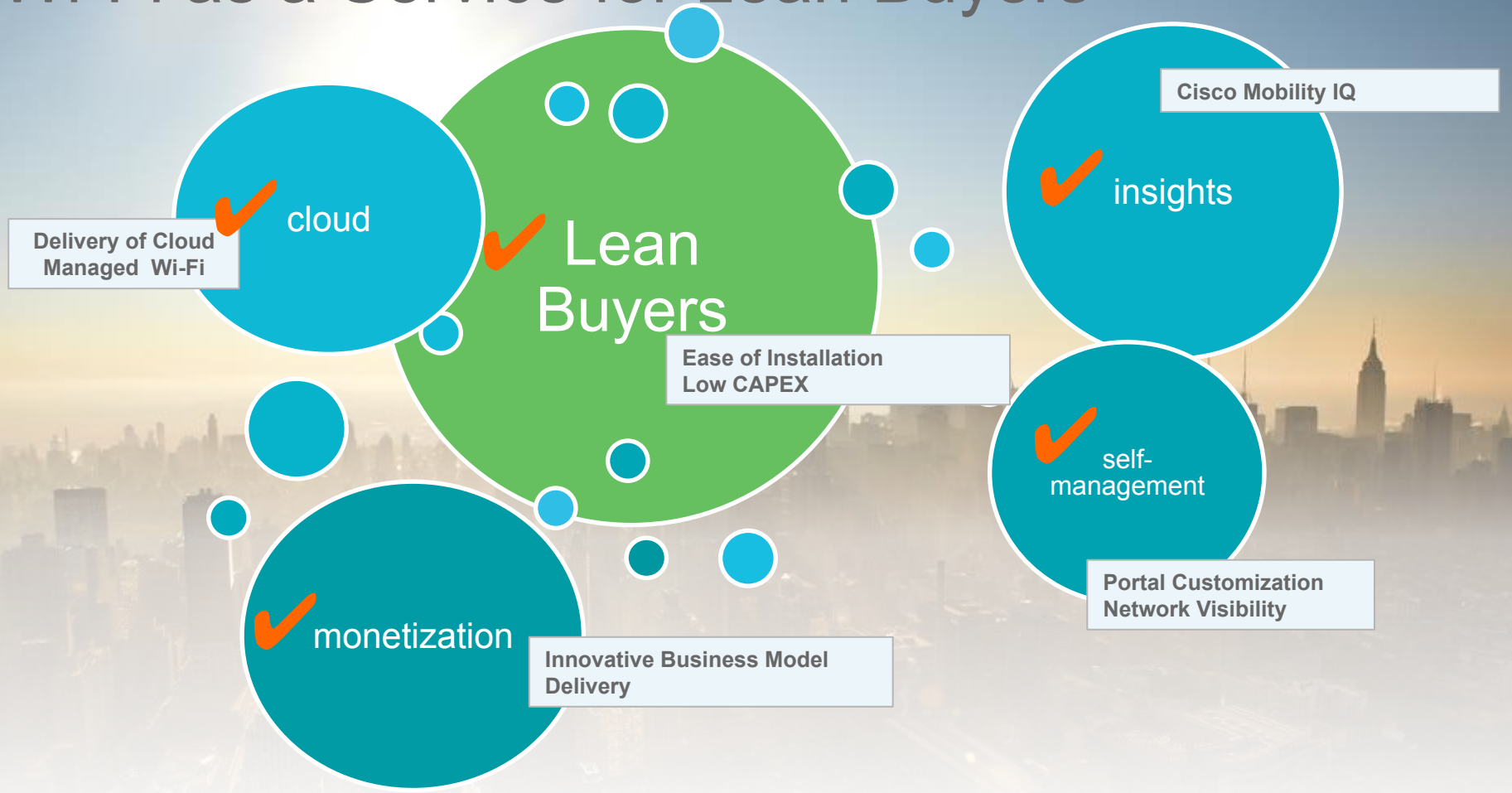
Universal Wi-Fi

Wi-Fi as a Service

Universal Wi-Fi for Sophisticated Buyers



Wi-Fi as a Service for Lean Buyers



Cisco Solution

Dedicated Platforms

Managed/Cloud

✓ 8(APs

✓ F

Best User Experience
Ready for Voice & Video

End-to-end Voice Quality

✓ Untrusted, Trusted & Hybrid

Flexible Service Deployments
for Metro and Community Wi-Fi

✓ N t New Use Cases

✓ Ai

✓ RF

Best RF Performance
Mobile & IoT Use Cases

✓ Hyper Location

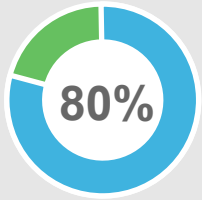
✓ Subway/Train Fast Rc

Simplified User Onboarding
New Revenue Models

✓ Global Reach

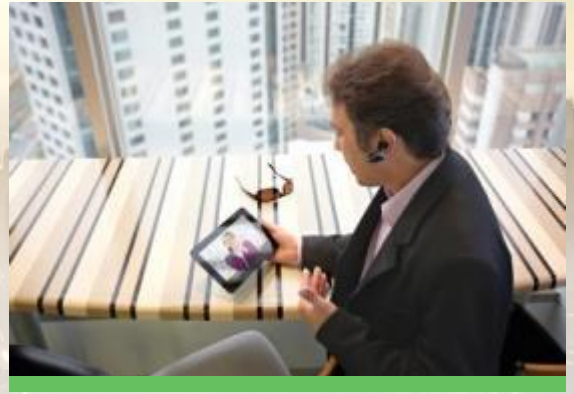
Software Driven Infrastructure on
Standards-based Hardware

How 802.11ac Wave 2 Works

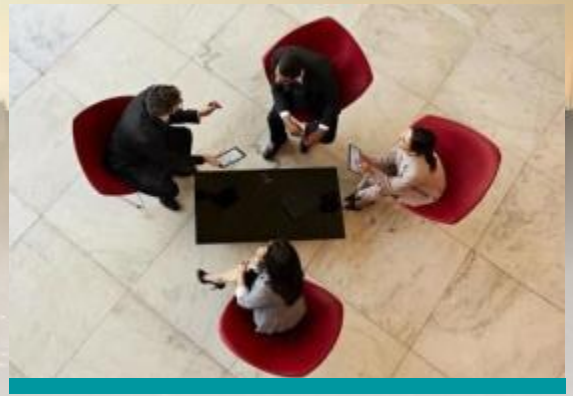


speed boost compared to Wave 1, thanks to:

Multi-User MIMO (MU-MIMO)



Wider RF Channels



Four Spatial Streams

Cisco Air Time Fairness (ATF)

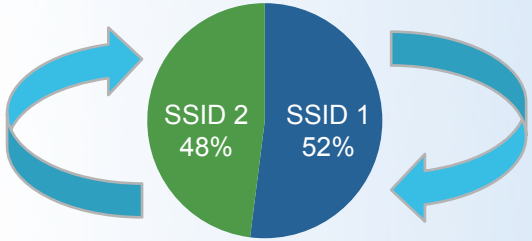
Before

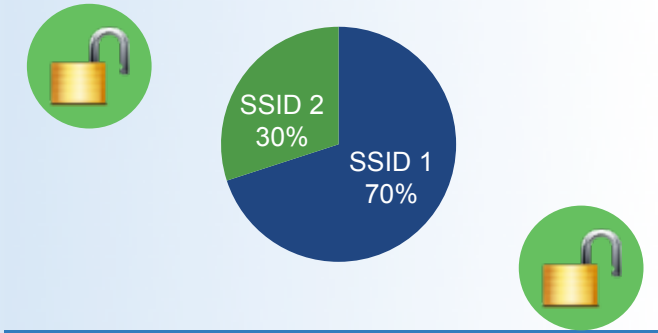
Rate limiting can only specify a bit rate (throughput) limit.
There is no way to limit the duration that the bit rate will use.

After

Air time is allocated per SSID, per realm, per client.
There is now better control over how air time is shared.

Improved Predictability and Performance





Bandwidth rate unpredictable	Client-dependent fluctuation	Not time-based

Time-based	Automatic calculation on availability	Ongoing recalculation

Operators can provide Wi-Fi SLAs

Cisco Hyperlocation

Before

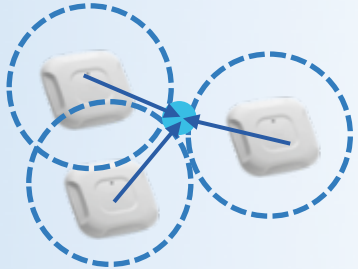
Location is approximated based on a single calculation.
Prone to errors

Approximated based on received signal strength indication (RSSI) only	Range inferred	Room-level accuracy

Engage Guests and Improve their Experiences

After

Location is determined based on three calculations.
Dramatic error reduction



Blue dot spotlight projected at the user's feet

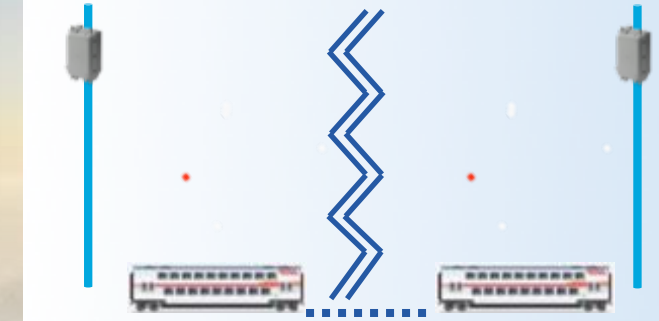
High accuracy	Multi-technology calculation: Angle of arrival, RSSI, Bluetooth low energy	Improved calculation

Accurate Indoor User Location Supports Contextual User Experience

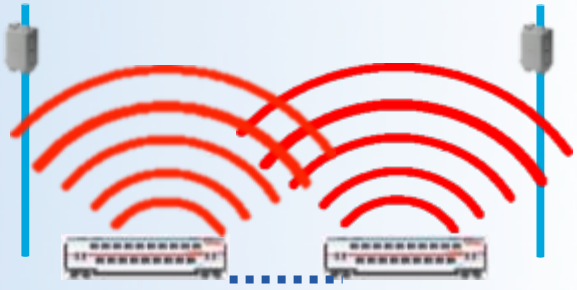
Cisco Fast Roaming

Before
High latency and unstable connections

After
Higher throughput and more reliable operation



Fast Roaming for Transportation



- Longer handover times
- Continuous rate-shifting instability
- Marginal performance at vehicular speeds

- Optimized algorithms
- Faster rate-shifting
- Simple checkbox configuration

Wi-Fi Connectivity and Performance for Public Transportation Applications

Onboarding and Business Insights

Transport

Retail

Outdoor

Education

Health

Hospitality

Corporate

Entertainment

Mobility IQ
Visual Network Knowledge

Network Operations
Experience Network IQ

Marketing Experience
User IQ

Managed Services
Experience Business IQ

Data Sources
Connectors

Mobility IQ
on Cisco® Cloud Services

ISV Third-Party Apps

Universal Wi-Fi

Access On Premise

Wi-Fi as a Service

Key Takeaways

- ✓ Mobile usage is increasingly moving indoors
- ✓ Carrier-grade Wi-Fi is ready to meet the demand
- ✓ We want to partner with you to take advantage of this opportunity

cisco.com/go/spwifi

Cisco Universal Wi-Fi
Performance and Innovation for Your Business

- Over 20 million Wi-Fi APs deployed, 55%+ share
- Over 500 Service Providers using Cisco Wi-Fi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