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# Understanding RF Fundamentals

and the Implications for Wi-Fi 6

Mark Krischer, Principal Wireless Architect, APJC  
BRKEWNv-2017

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# 6 for 6



Increased  
Speed



Higher  
Density  
& Capacity



Improved  
Security



Reduced  
Latency

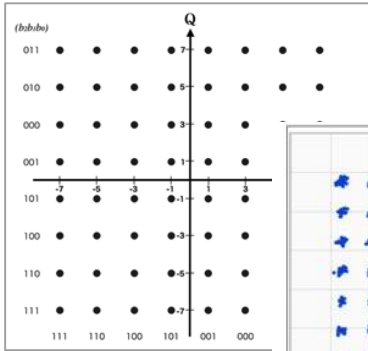


Greater  
Range

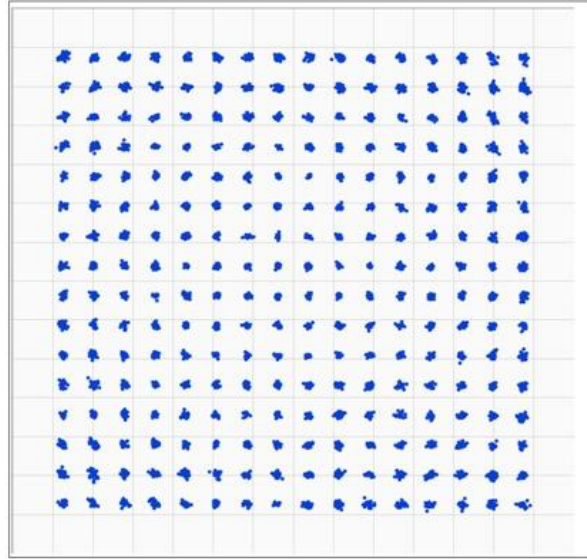


Power  
Efficient

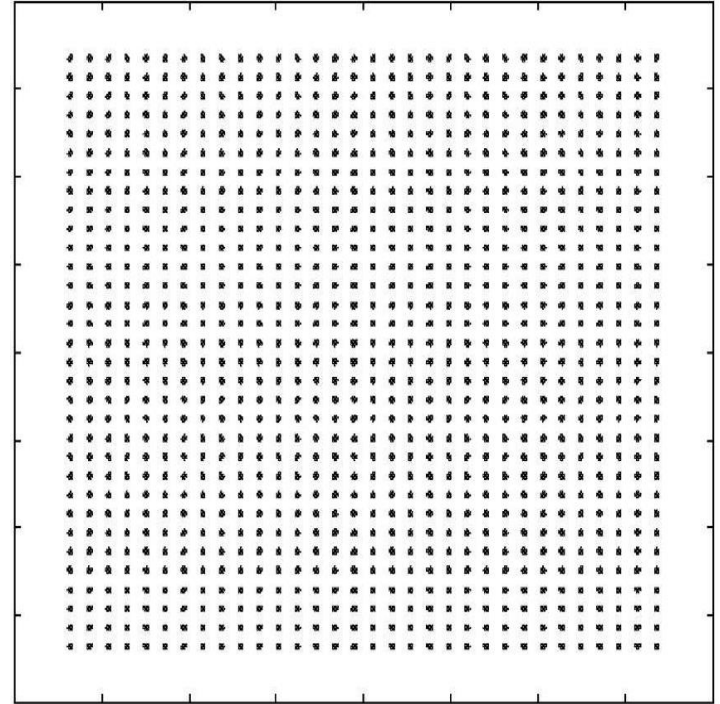
# Improving Data Rate



64-QAM

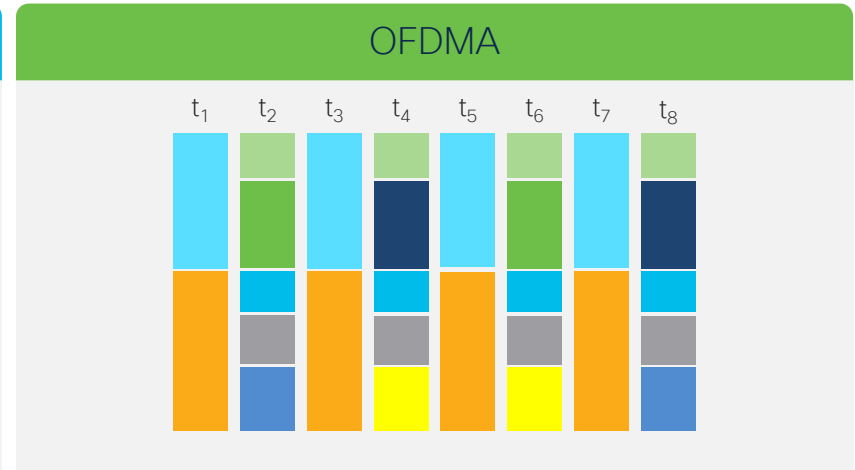
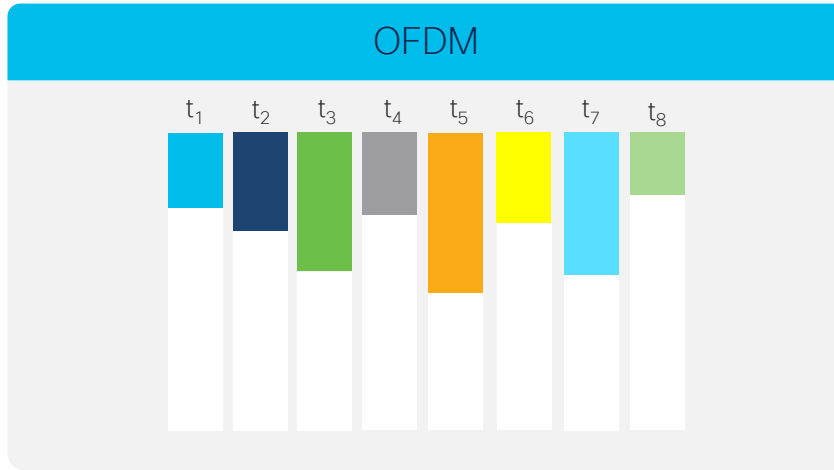


256-QAM



1024-QAM

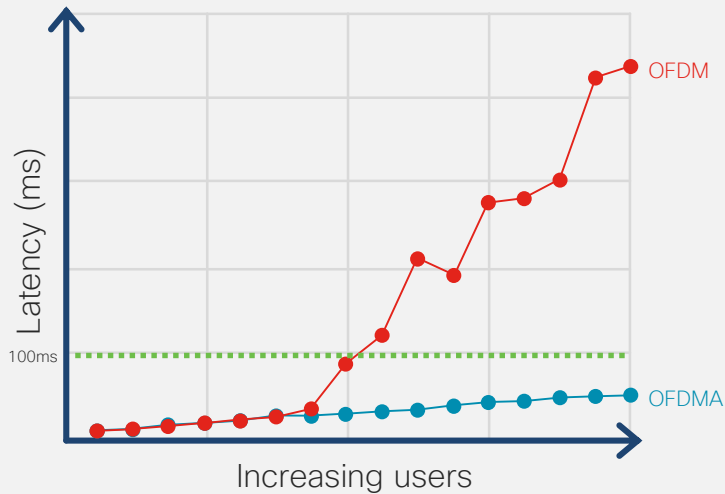
# Improving Capacity



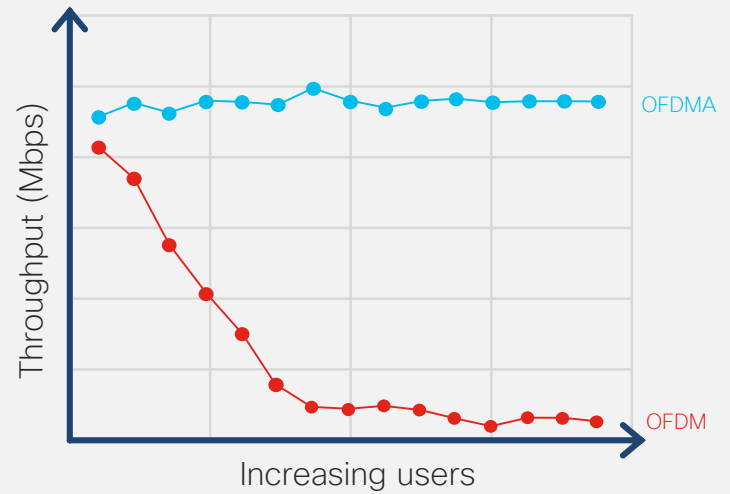
User 1 - Telemetry User 2 - VoIP User 3 - Video User 4 - VoIP User 5 - Data User 6 - IoT User 7 - Data User 8 - VoIP

# Improving Latency

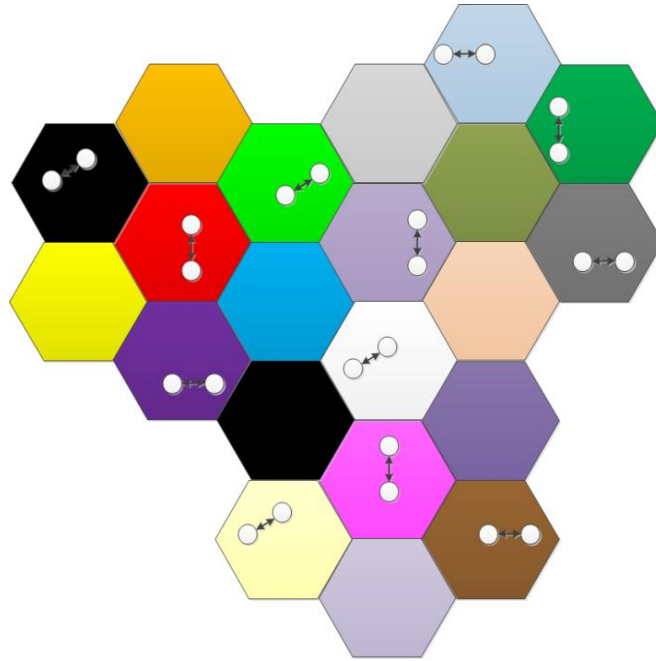
## Linear **Voice** delay



## Consistent **Data** throughput

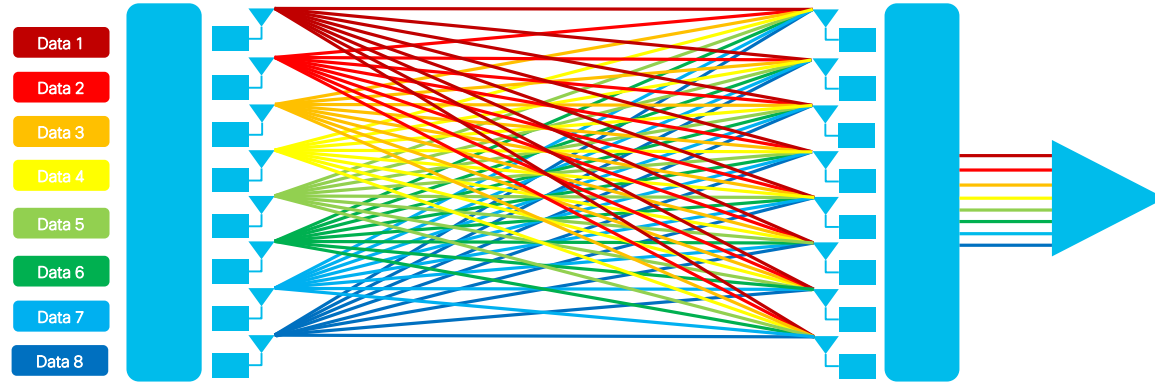


# Improving Efficiency



BSS Colouring

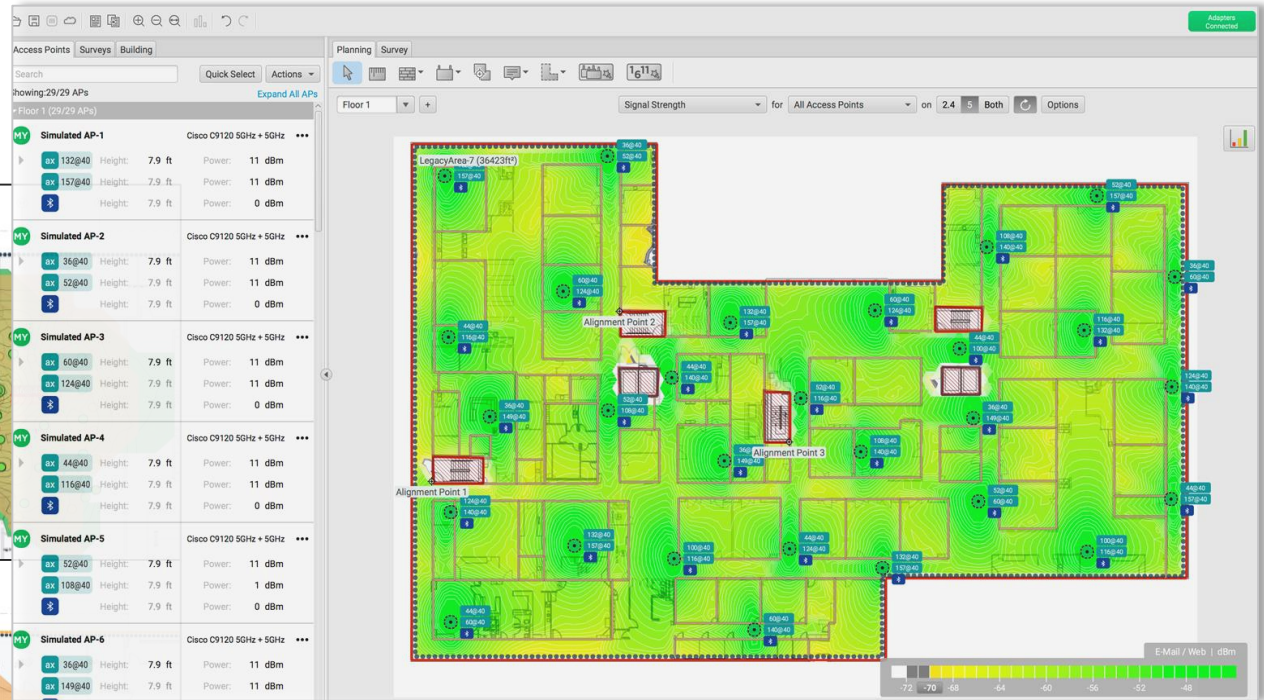
# Improving Throughput



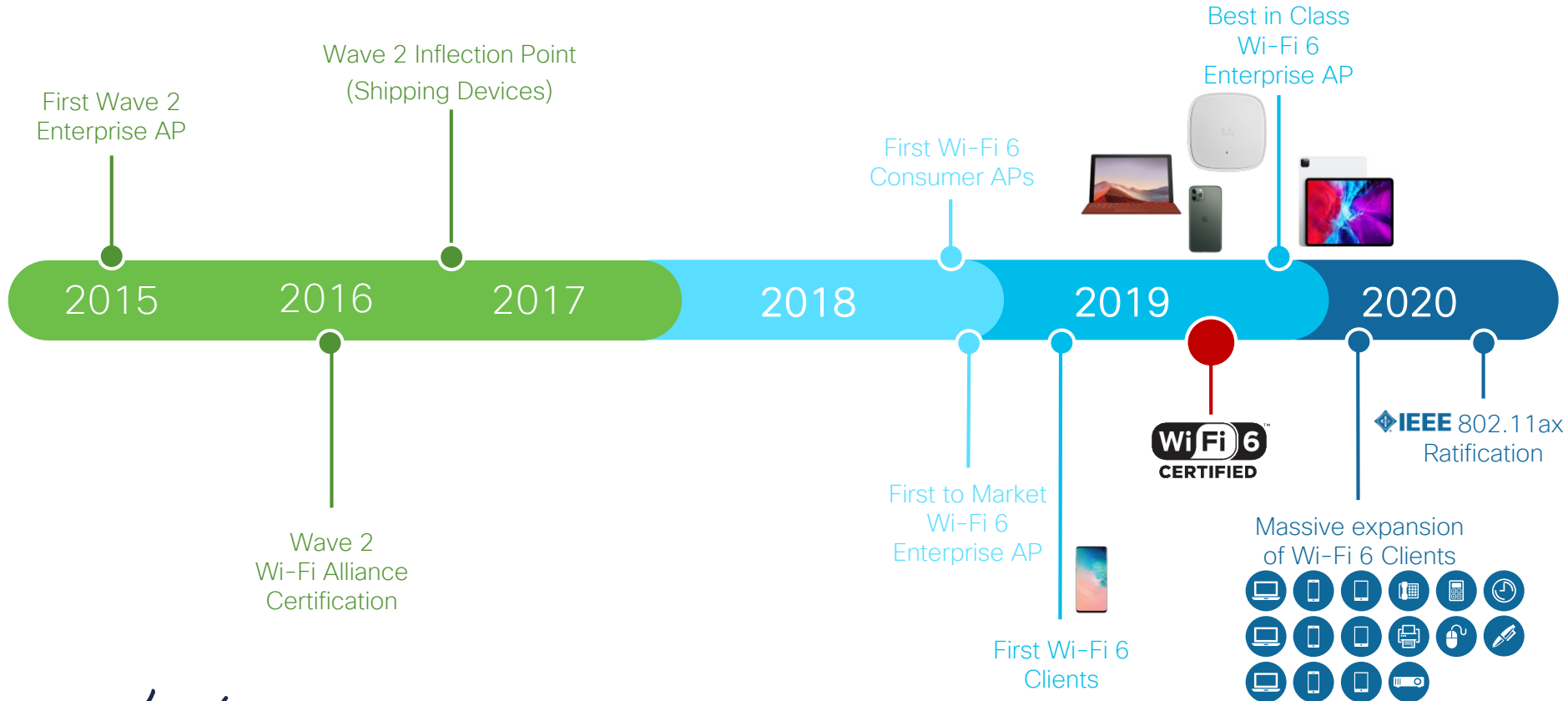
8x8 Spatial Streams



# Site Surveys



# Wi-Fi Evolution



# Catalyst 9100 Series Wireless Access Points

Ideal for small to medium deployments

Mission Critical

Best in Class



9115AX

- 4x4 + 4x4
- Spectrum Intelligence
- 1 x 2.5 mGig
- Wi-Fi 6 Certified



9117AX

- 8x8 + 4x4
- Spectrum Intelligence
- 1 x 5 mGig
- Integrated Antenna only
- OFDMA (only DL)
- TWT (non-triggered)
- Wi-Fi 6 Compatible



9120AX

- 4x4 + 4x4
- Cisco RF ASIC
- Dual 5GHz
- Application Hosting
- IoT ready (Zigbee, Thread, BLE)
- 1 x 2.5 mGig
- Wi-Fi 6 Certified



9130AX

- 8x8 + 4x4 or 4x4 + 4x4 + 4x4
- Cisco RF ASIC
- Tri-radio (Dual 5GHz + 2.4GHz)
- Application Hosting
- Decrypted data packet iCAP
- IoT ready (Zigbee, Thread, BLE)
- 1 x 5 mGig
- Wi-Fi 6 Certified

Cisco DNA Assurance with  
Intelligent Capture

Bluetooth 5  
USB

Full Wireless  
Capabilities with  
802.3at/PoE+

Integrated or External  
Antenna Options

# Meraki MR Series Wireless Access Points



OFDMA  
(DL/UL)



MU-MIMO  
(DL/UL)



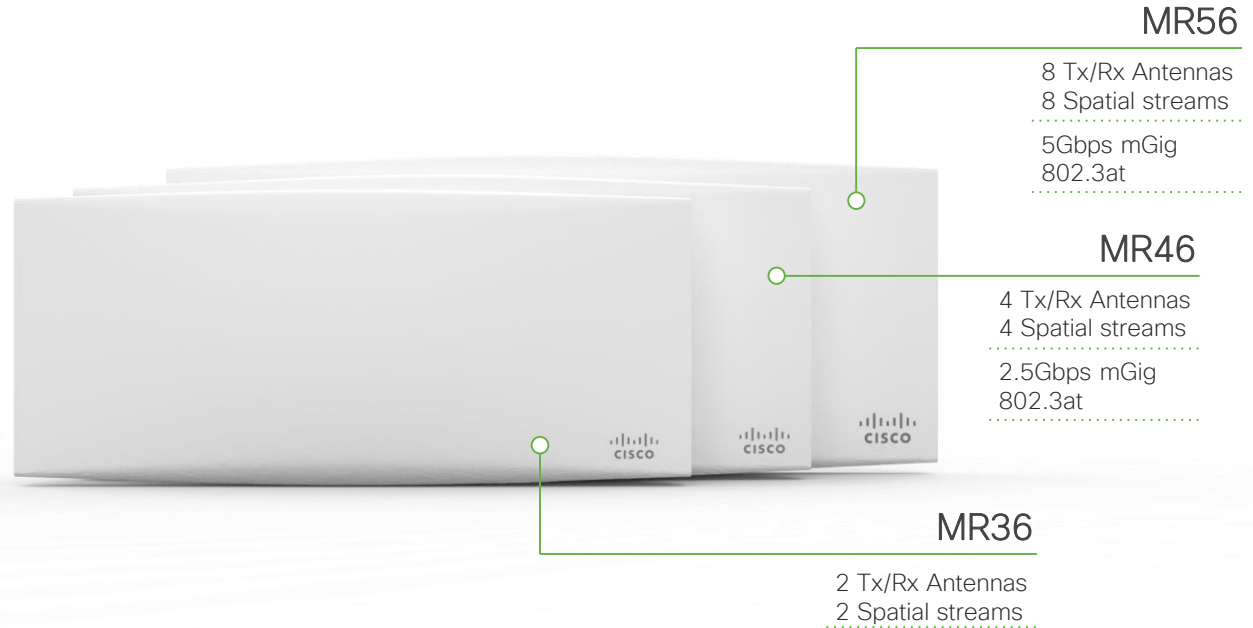
Target  
Wake Time



Bluetooth  
5.0



2.4 GHz &  
5 GHz



# Cisco is Making Wi-Fi 6 Even Better

## Innovation Beyond the Standard



Spectrum Intelligence  
Interference and  
Rogue Detection



AI/ML Assurance  
RF Analytics  
Location Analytics

## Built for IoT & Security



Multilingual Radio



RF Snapshot



IoT Segmentation

## Wireless Ecosystem



Device  
Interoperability



Facebook  
Wi-Fi



OpenRoaming

Powered by Next Generation Cisco Catalyst Wireless Access

# Cisco Next Generation Wireless Stack



Catalyst 9100  
Access Points



Catalyst 9800  
Wireless Controllers



Cisco DNA  
Center



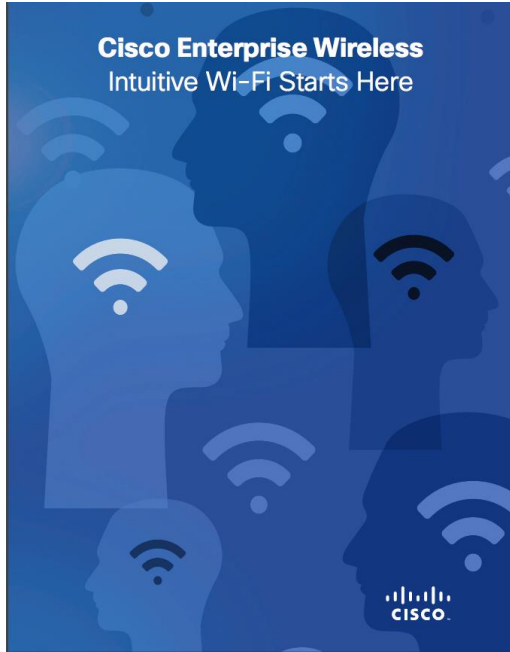
Cisco DNA  
Spaces

Resilient, Secure, Intelligent

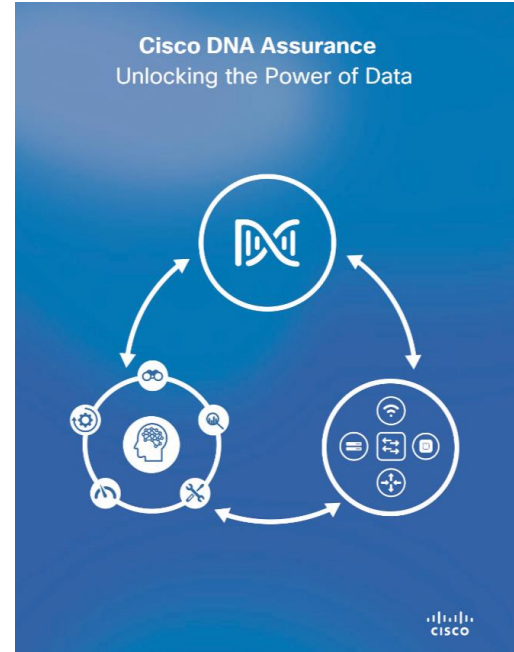
# Recommended Viewing

- BRKEWN-2017 – Cisco Live Cancun 2019 – Mark Krischer
  - RF Fundamentals from a Technology Perspective
- BRKEWN-2017 – Cisco Live Barcelona 2020 – Fred Neihaus
  - RF Fundamentals from a Product Perspective
- BRKEWN-3010 – Cisco Live Barcelona 2020 – Jim Florwick
  - RF Fundamentals from a Deployment Perspective
- BRKEWN-2010 – Cisco Live Cancun 2019 – Mark Krischer
  - Cisco Next Generation Wireless Full Stack

# Recommended Reading



<http://cs.co/wirelessbook>



<http://cs.co/assurancebook>





# Thank you





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