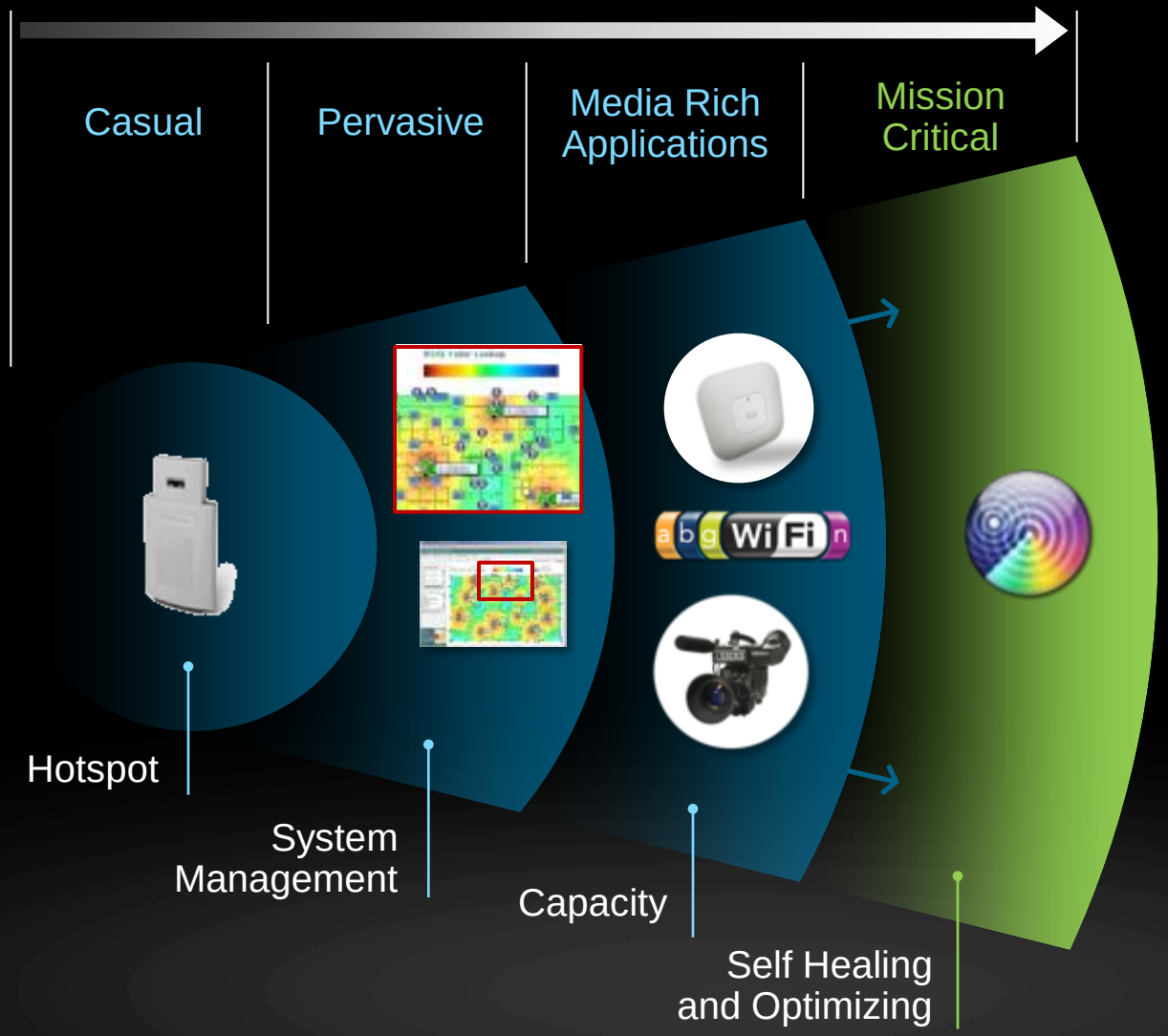
Cisco CleanAir Technology

Enterprise Wireless Evolution

From Best-Effort to Mission-Critical



Performance Protection for 802.11n Networks

Pull Toward Business Mobility

“I can’t do my job without wireless. It has to work.”

“Wireless is best-effort. I can’t support a level 1 SLA.”

Continued Growth and Reliance on Wi-Fi Devices

vs

IT Lacks RF Resources and Expertise

The Impact of a Crowded Spectrum

Performance At Risk in Unprotected Networks

End User Impact

- Reduced network capacity and coverage
- Poor quality voice and video
- Potential complete link failure

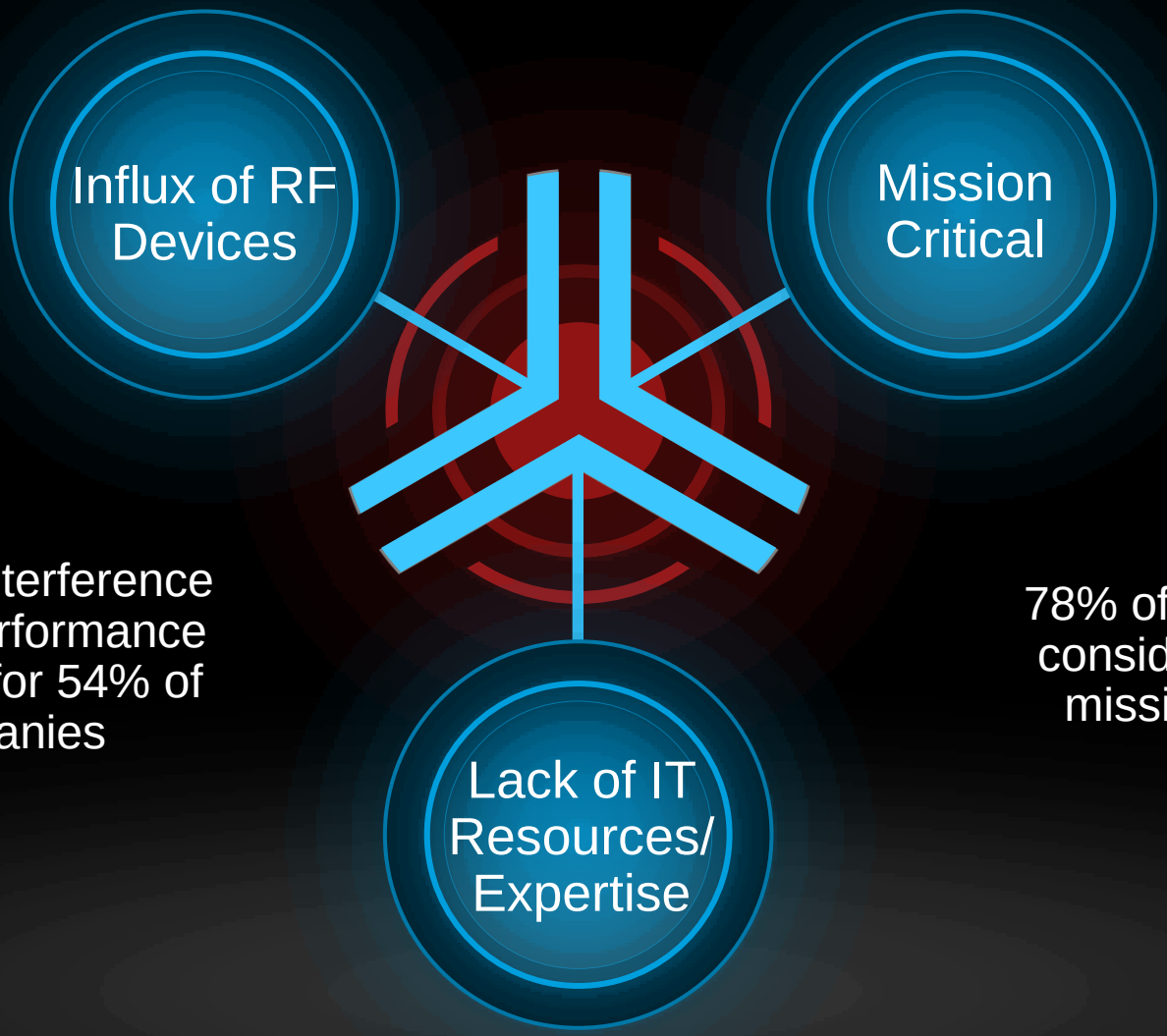
IT Manager Impact

- Potential security breaches
- Support calls
- Increased cost of operation

Interference Type		Throughput Reduction: Near (6m)	Throughput Reduction: Far (20m)
2.4 or 5 GHz Cordless Phones		100%	100%
Video Camera		100%	57%
Wi-Fi (busy neighbor)		90%	75%
Microwave Oven		63%	53%
Bluetooth Headset		20%	17%
DECT Phone		18%	10%

Source: FarPoint Group

Wireless Network Business Challenges

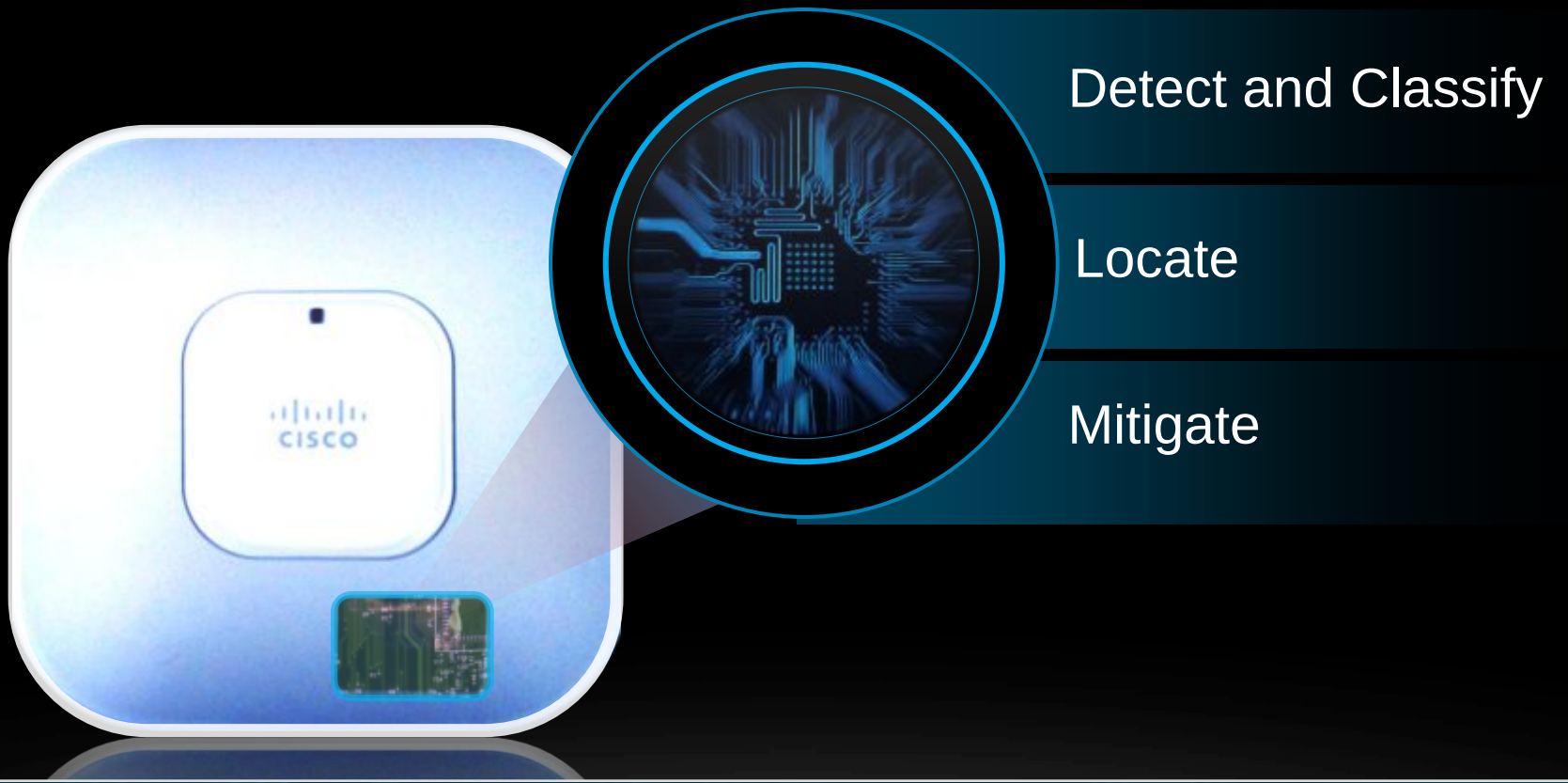


Wireless interference caused performance problems for 54% of companies

78% of companies consider wireless mission critical

Source: Cisco

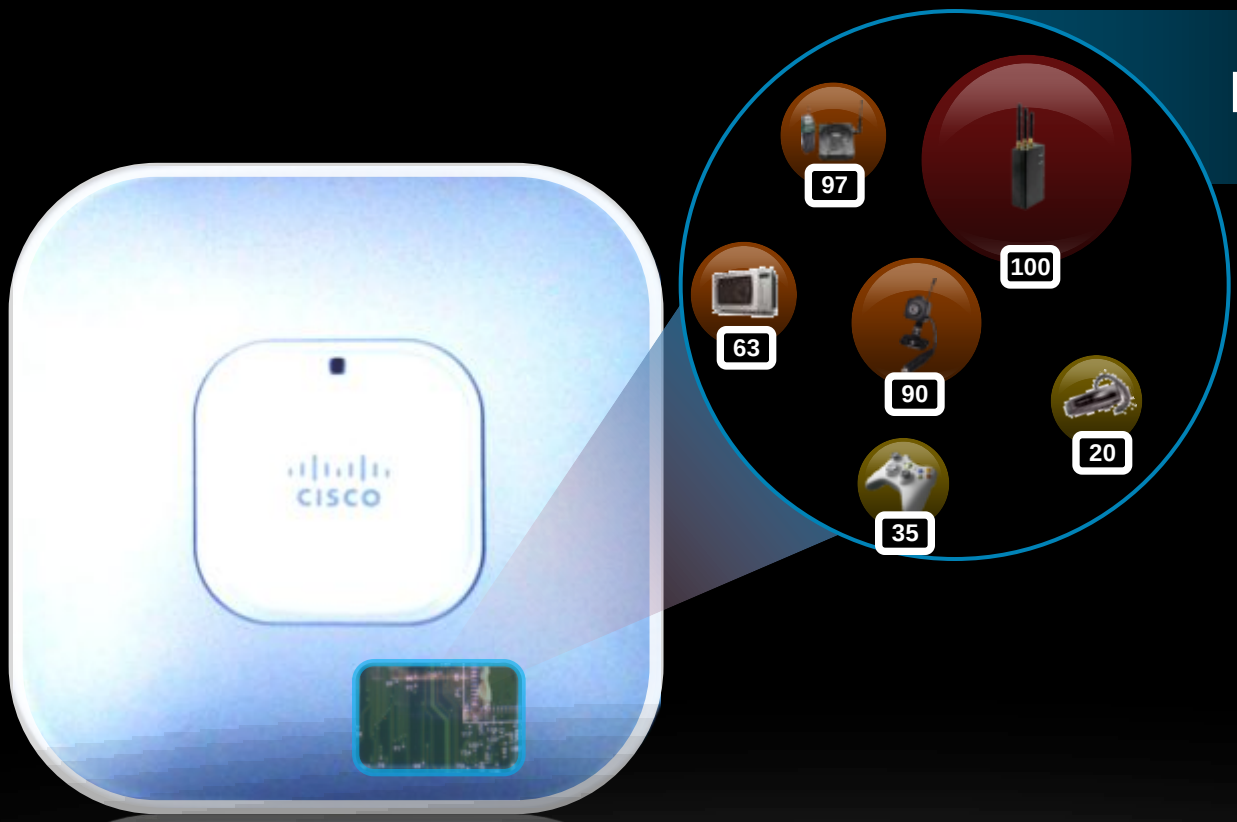
Introducing CleanAir



Cisco CleanAir

A system-wide feature that uses silicon-level intelligence to automatically mitigate the impact of wireless interference, optimize network performance and reduce troubleshooting costs

What is CleanAir?



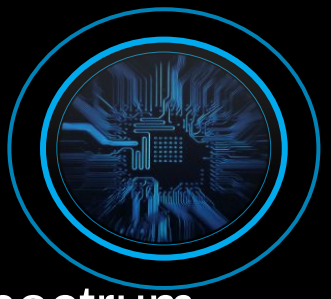
Detect and Classify

- Uniquely identify and track multiple interferers
- Assess unique impact to Wi-Fi performance
- Monitor AirQuality

Cisco CleanAir

High-resolution interference detection and classification logic built-in to Cisco's 802.11n Wi-Fi chip design. Inline operation with no CPU or performance impact.

CleanAir technology



- Classifies in Hardware all of the energy within the spectrum definitely NOT Wi-Fi and accounting
- Understands energy that is 802.11 modulated and classifies energy that is coming from Co-channel and Adjacent channel sources
- Calculates a severity index, a positive integer between 0 and 100—with 100 being the most severe.
- Interference severity is then subtracted from the Air Quality (AQ) scale (starting at 100—good) to generate the actual AQ for a channel/radio, AP, Floor, Building or campus.

What is CleanAir?

- Classification processed on Access Point
- Interference impact and data sent to WLC for real-time action
- WCS and MSE store data for location, history, and troubleshooting

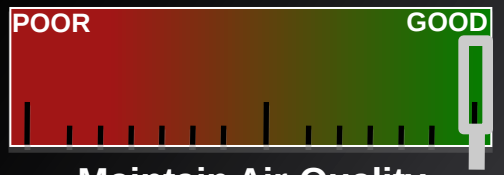
Locate

WCS, MSE

Visualize and Troubleshoot

Mitigate

Wireless LAN Controller

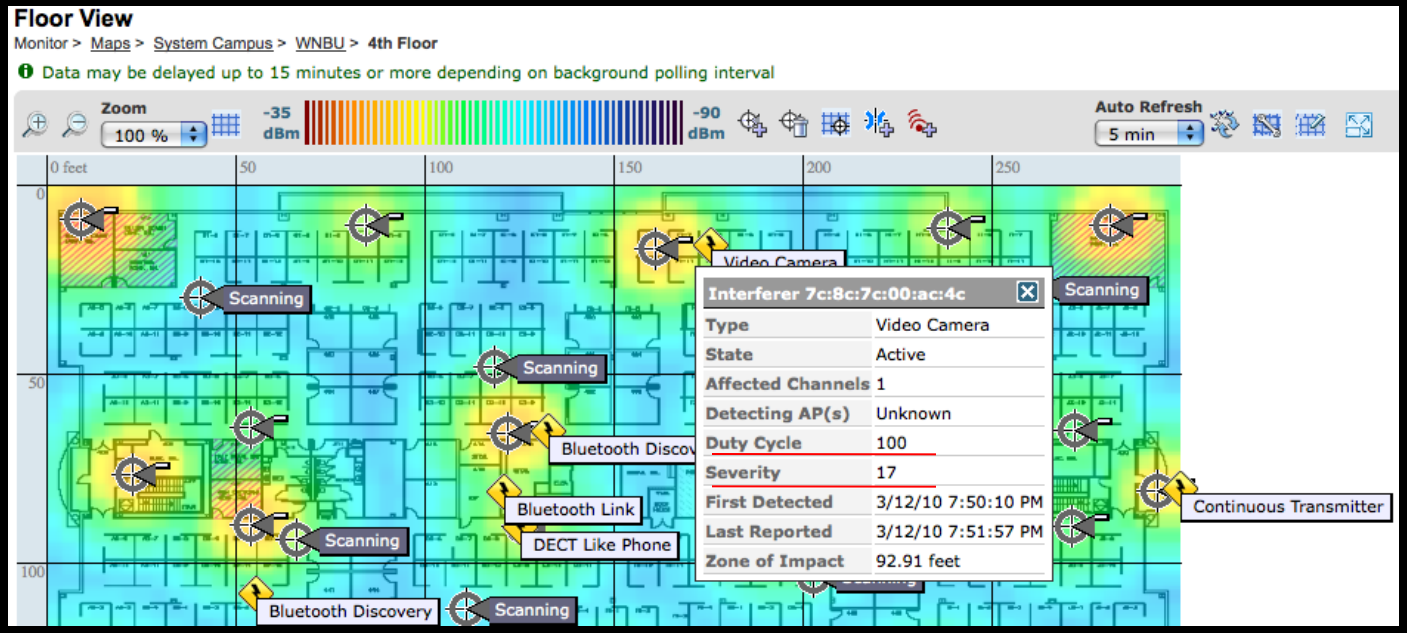


Maintain Air Quality

Cisco CleanAir

Cisco CleanAir Technology integrates interference information from the AP into the entire system.

Air Quality and Severity

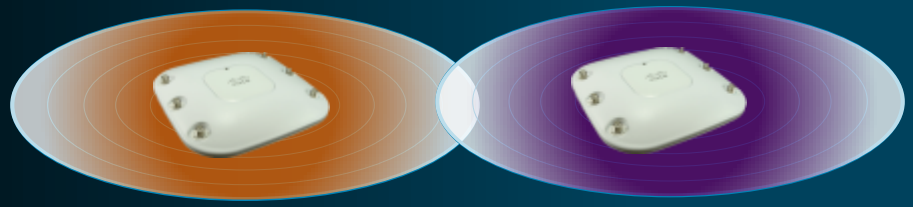


- Severity is used to understand the potential impact to a Wi-Fi network
- The RSSI at the AP for this interferer (-78) is well below CCA threshold (Clear Channel Assessment)
- Even with duty cycle of 100% - the severity here is 17 – if it was closer to us, the severity would be much higher

Benefits of CleanAir

Self Healing and Optimization

Interference Aware RRM



Maximizes performance by avoiding interference

Event Driven RRM

Self Healing to avoid Wi-Fi degradation

Persistent Device Avoidance

Self Learning to increase reliability

Interference Mitigation Features

Event Driven RRM – (EDRRM)

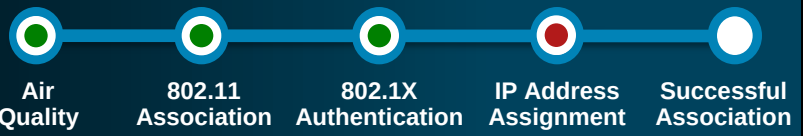
- Fast acting (=< 30 seconds)
- Works on AQI on a per AP basis
- Designed to prevent catastrophic interference from disrupting channel/clients

Persistent Device Avoidance – (PDA)

- Operates on Classification
- Once set – biases DCA against the PDA channel for the detecting AP only
- Remembers interference and avoids placing the AP back on the same channel

Forensics for Troubleshooting

Remote Client Troubleshooting



Quickly determine connectivity issues

Spectrum Expert Connect

Remove need for onsite expertise

Location Impact Analysis History Playback

Investigate past problems

Wireless Security

IP and Application Attacks & Exploits	WiFi Protocol Attacks & Exploits	RF Signaling Attacks & Exploits
Traditional IDS/IPS Layer 3-7	**wIPS** Layer 2	**CleanAir** Layer 1

Monitors Exploits Invisible to existing Systems

New Rogue Threats

Detects new ‘undetectable’ Rogue/Clients

WiFi Jammers

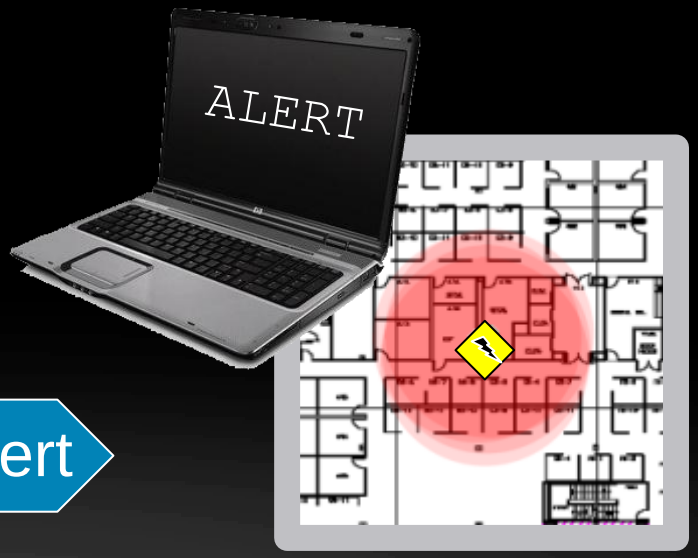
Locates and Expedite Interference Removal

Policy Enforcement

Unwanted Device Notification

Corporate Policy

No Xbox X
No Cordless Phone X
No Bluetooth Data X



System Alert

Enables Enforcement of "No-Device" Policy

Introducing CleanAir Technology

Performance Protection for 802.11n Networks

- **CleanAir Technology uses silicon-level intelligence within the access point to improve Air Quality**
  - **Detects and classifies interference**
  - **Locates problem sources**
  - **Automatically avoids interference**
- **Delivers Benefits of**
  - **Self Healing and Optimizing**
  - **Troubleshooting Forensics**
  - **Wireless Security**
  - **Policy Enforcement**

CleanAir Components:

- 3500 Series Access Points
- Wireless LAN Controller
- Mobility Services Engine (MSE)
- Wireless Control System (WCS)

Cisco CleanAir Components

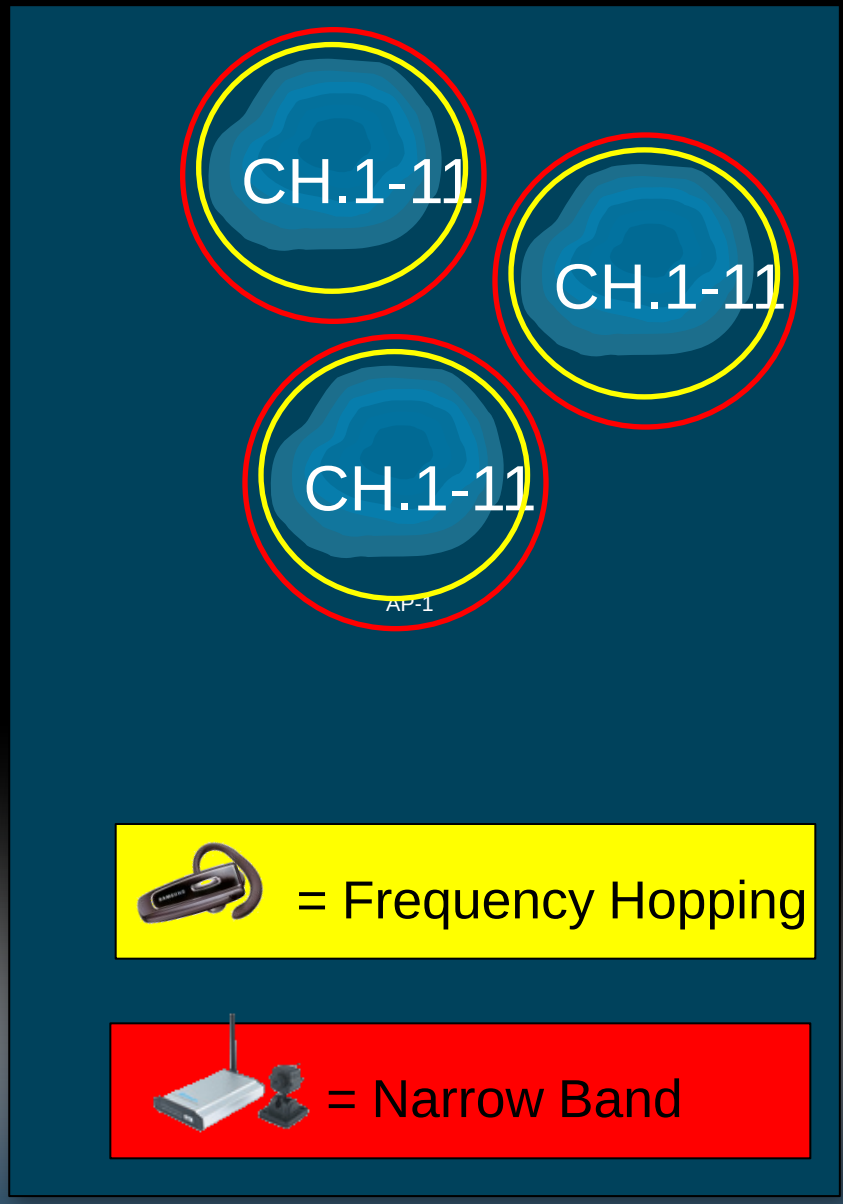
Product	Licensing Requirements	Functionality
AP3500	▪ None	▪ Multi-interferer Detection & Classification ▪ AirQuality Monitoring ▪ Self-Healing Event Driven RRM
Wireless LAN Controller	▪ Standard per AP	▪ AirQuality Aware RRM ▪ Self-Learning Persistent Device Avoidance ▪ Spectrum Expert Connect ▪ AirQuality and Interferer Alerts
MSE	▪ Context Aware “endpoints” required for each interferer tracked ▪ MSE adds support for 100 interferers when AP3500 present (5 per AP, additive)	▪ Interferer Tracking and Merging ▪ Location Calculations ▪ History Storage
WCS	▪ Standard per AP count ▪ WCS Plus required for MSE	▪ Remote Client Troubleshooting ▪ AirQuality Visualization and Mapping ▪ Forensics Tools Location Visualization Impact Analysis History Playback

Local Mode (LMAP) Sensors

- Only monitor the served channel – 20 or 40 MHz
- CleanAir is active anytime that the Wi-Fi chip is neither sending or receiving
- No Dwells are performed on off Channel Scans –
  - Not frequent enough for classification
- In 5 GHz, may not be enough AP's receiving signal to reliably locate
- NO IMPACT on Client Traffic!

Monitor Mode (MMAP) CleanAir Deployment and Detection

- Do Not broadcast Neighbor messages
- No Mitigation features!
- Rely on X-Y map location for merging – must have MSE
- Do scan all channels continuously
- Can support CleanAir and aWIPs concurrently
- Overlay – 1 MMAP to 4-5 clients serving AP's



MMAP and LMAP CleanAir AP Mixed Mode deployment and Detection

- Best of Both
- MMAP’s do HEAR neighbor messages – so accuracy increases as these can be used for PMAC merge
- Additional scanning capacity ensures complete coverage – not just what spectrum is in use
- Location performance improvements – especially in 5 GHz

Technology Differentiation and Innovation

Cisco	Benefit	Alternative
Specialized chipset design	Enables collection of rich RF data, monitor/serve traffic simultaneously	Standard chips limited to basic Wi-Fi data only, in monitor OR traffic mode
High Resolution Information	Spectrum intelligence on non-Wi-Fi interference with impact severity and unique device tracking	Wi-Fi data only, very limited “best guess” data
System Integration	Auto-Optimization, location, history, RF forensics, reporting	No automatic action or system-wide correlation

CleanAir Rocks!

The Industry Acknowledgements Keep Coming!

Cisco CleanAir battles Wi-Fi smog

Cisco delivers first interference-fighting tool built directly into access points

Overall, we were quite impressed with the capabilities of CleanAir as implemented today, and look forward to further enhancements in this product line. Our initial testing here suggests that this capability is indeed valuable and belongs on the short list of features for any enterprise-class WLAN installation.

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INTEROP
TOKYO | 7–11 JUNE, 2010
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Cisco's CleanAir Spectrum Analysis Offers Outstanding RF Visibility

By: Andrew Garcia
2010-08-12
Article Rating: ★★★★★ / 2
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There are user comments on this Enterprise Networking story.

For providing a distinct and premium solution in an increasingly commoditized marketplace trending toward lower prices and similar feature sets, Cisco and CleanAir earn eWEEK's Analyst's Choice.

Cisco CleanAir—based on the networking giant's newest Aironet3500 series access points and the 7.0 version of the Unified Wireless Network software—provides outstanding RF visibility combined with reporting, tracking and assessment tools that help wireless administrators build stable wireless networks ready to host mission-critical systems and applications.

For providing a premium and distinct solution (even at a premium price) in an increasingly commoditized marketplace trending toward lower prices and similar feature sets, Cisco and CleanAir earn eWEEK's Analyst's

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Cisco's CleanAir - My Hands-On Review

Spectral assurance in WLAN infrastructure is going to become a key requirement in enterprise wireless LANs. Cisco got there first, and my testing of their ClearAir technology shows that it works as advertised.

By Craig Mathias on Mon, 11/08/10 - 6:02pm.

Cisco Wireless LAN Services for CleanAir Technology

Take full advantage of the system wide capabilities of the Cisco Unified Wireless Network

Plan

Cisco Wireless LAN Performance and Security Assessment

Understand the current state of your wireless LAN infrastructure, identify gaps and receive recommendations to increase security, streamline operations and improve performance

Cisco Wireless LAN Network Planning and Design Service

Align your customer's requirements with architectural and detailed design activities that help increase deployment efficiencies and achieve the highest levels of performance and scalability

Cisco Wireless LAN 802.11n Migration Service

Simplify your migration to high-performance, next generation 802.11n and create a strong foundation for the reliability and performance of CleanAir technology

Build

Run

Cisco Technical Services

Cisco Technical Services help to ensure that your Cisco products and network operate efficiently and benefit from the most up-to-date system and application software.

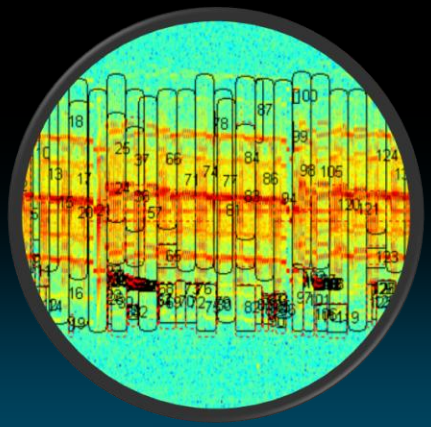
- Cisco SMARTnet Service
- Cisco Smart Foundation Service
- Cisco Application Support
- Cisco Focused Technical Support

Raising the Bar in Wireless

Hi-Def Interference Detection

15x more granular

Enables intelligent action



Silicon-based implementation

Inline

High speed

No processing overhead

System-wide Intelligence

Aggregated interference impact

Automatic reaction

Location & Event correlation

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Benefits of Cisco CleanAir technology

	Features	Benefits
	▪ AirQuality Aware RRM ▪ Event Driven RRM ▪ Persistent Device Avoidance	Self Healing and Optimizing *Reduces Downtime, Maximizes Resilience*
	▪ Remote Client Troubleshooting ▪ Spectrum Expert Connect ▪ Location, Impact Analysis and History Playback	Troubleshooting Forensics *Lowers Problem Resolution Time/Cost*
	▪ New Rogue Threats Detection (off-channel, inverted) ▪ DOS Jammer Detection	Wireless Security *Improves Visibility to New Threats*
	▪ Unwanted Device Notification ▪ Unwanted Device Location	Policy Enforcement *Enables Enforceable Rules*

Next Steps and Resources

- www.cisco.com/go/cleanair
- Intelligence in Action White Paper
- CleanAir Technology Flash
- TechWise TV Replay: Improving Air Quality with Cisco CleanAir http://www.cisco.com/web/go/semreg/cisco_cin/192467_26/index.html
- Contact your Account Manager
- THANK YOU!