# Cisco CleanAir Technology

How to Buy

Cisco® CleanAir™ technology uses silicon-level intelligence to create a spectrum-aware, self-healing, and self-optimizing wireless network that mitigates the impact of wireless interference and offers performance protection for 802.11n and 802.11ac networks.

In today's business world, the wireless network is more than just a convenience; it's mission-critical. Wireless operates in shared spectrum with a variety of applications and even more devices competing for bandwidth in enterprise environments. More than ever, IT managers need to have visibility into their wireless spectrum to manage radio frequency (RF) interference and prevent unexpected downtime.

## Interference: A Threat to Your Wireless Network

Microwave ovens, cordless phones, RF jammers, motion detectors, neighboring wireless networks, and wireless security cameras are just a few sources of interference that can rob your network of critical performance that can severely impact your wireless network, bringing business productivity to a halt. Because RF spectrum is constantly changing, IT managers need to have visibility into the spectrum to prevent unexpected downtime. As latency- sensitive applications like voice and video make their way onto the air, IT managers have an even greater need to be aware of interference and monitor its impact. Resolving RF problems requires not only the right tools but also the right training. Many enterprises lack the in-house resources and expertise for effective RF troubleshooting.
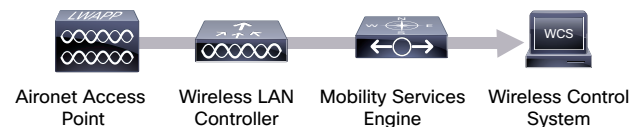
## The Value of Cisco CleanAir Technology

Cisco CleanAir technology delivers the performance of 802.11ac and the reliability required to support mission-critical applications, while intelligently avoiding the impacts of interference.

CleanAir technology is a systemwide feature of the Cisco Unified Wireless Network that streamlines operations and improves wireless performance by providing complete visibility into the wireless spectrum. CleanAir has the unique ability to detect RF interference that other systems can't see, identify the source, locate it on a map, and then make automatic adjustments to optimize wireless coverage. CleanAir gives you access to real-time and historic information about devices and assets located anywhere in the wireless network. Now IT managers can enforce policies and quickly take action to improve network performance based on intelligent, accurate, real-time and empirical information.

Cisco CleanAir technology is enabled by the advanced silicon design of the Cisco's Second Generation Access Points, the Cisco Aironet® 3600 and 2600 Series, as well as by Cisco Wireless Controllers, Cisco Prime Infrastructure, and the Cisco Mobility Services Engine (Figure 1).

**Figure 1.** Components of CleanAir Technology and the Cisco Unified Wireless Network



| Aironet Access Point | Wireless LAN Controller | Mobility Services Engine | Wireless Control System |

Cisco CleanAir technology enables organizations to:

- Automatically optimize the wireless LAN for reliability and performance

- Perform remote troubleshooting for expedited problem resolution and reduced downtime

- Detect non-Wi-Fi security threats and resolve issues in real time, allowing non-Wi-Fi interference to be mapped in real time with existing network resources

- Monitor air quality for the entire installation 24/7 and generate alerts on customizable anomalies

- Monitor and track historic interference information for back-in-time analysis and faster problem solving

- Set and enforce policy with intelligent identification of non-Wi-Fi devices

## Self-Healing and Self-Optimizing Wireless

With Cisco CleanAir technology, if an interference source is strong enough to completely jam a Wi-Fi channel, the system will change channels within seconds to avoid the interference, resuming client activity on another channel outside of the affected area. The system remembers intermittent interference from persistent sources such as a microwave ovens, wireless bridges, or wireless video cameras. Through tight integration with Cisco radio resource management technology, the CleanAir solution indicates the channels where these devices operate so that system administrators can optimize performance and minimize future disruption.

Others claim to have integrated spectrum intelligence but can't effectively distinguish between Wi-Fi and non-Wi-Fi interference. Spectrum intelligence products from other manufacturers typically falsely interpret any network noise as interference and randomly switch channels, which jeopardizes network stability and may reduce overall network performance.

Cisco CleanAir technology uses silicon-level intelligence to precisely detect and classify over 20 interference types, changing channels only if it determines that the interference is severe enough to impact network performance.

A CleanAir channel change is coordinated with the entire network to minimize adjacent cell disruption. The administrator can rely on the default threshold values or has complete control over interference types, thresholds, and locations, making it to build a truly custom response by the system. Any action taken by CleanAir generates alerts in the system and visible through comprehensive management interfaces that keep administrators informed of system status.

## Troubleshooting Forensics for Faster Interference Resolution and Proactive Action

Cisco CleanAir technology provides full visibility into the performance and security of the wireless spectrum, with an easy-to-understand Air Quality Index. The index identifies problem areas and locates them in the context of radios, access points, floors, buildings, and campus (Figure 2).

**Figure 2.** An Air Quality Index Providing a Snapshot of Network Performance and the Impact of Interference

**Air Quality Index: 95**
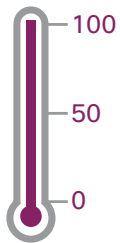


CleanAir technology reduces downtime. Network administrators can set alerts so that they are notified when air quality falls below a desired threshold. The system can also be configured to automatically enforce security or management policies. Cisco CleanAir technology automatically assesses the severity of the problems with a device to help network administrators prioritize interference issues that require immediate attention and easily drill down into the details for further network analysis.

Full systemwide reporting includes summary and detailed formats of the worst RF conditions, recent security risk interferers, threshold alarms, and historical charts.

By proactively monitoring Air Quality Index charts and 30-day interference reports, administrators can establish normal behavior and monitor network trends that may be warnings of future problems so that they can be corrected before they affect network performance.

## Quick and Accurate Interference Detection to Reduce False Positives

Interference can be difficult to track because most devices are constantly moving or they turn on and off quickly. Even in very busy RF environments where hundreds of devices are operating simultaneously, CleanAir can classify over 20 different types of interference within seconds.

The accuracy and speed of CleanAir classification is a key differentiator because it reduces reports of interference when none exists ("phantom interference"), and eliminates duplicate reporting of the same device detected by multiple access points. This increases reliability and user confidence; it also increases the ROI of owning spectrum monitoring tools.

The accuracy of the Cisco CleanAir solution is the hallmark of technology that began with Spectrum Expert in 2005 - and remains through continued investment the best in class technology today. Administrators can rely on CleanAir alerts with confidence, helping to ensure that both the ROI and performance of your network are maintained.

## Remote Access for More Efficient Problem Resolution and Reduced Travel

For low-level remote troubleshooting, Spectrum Expert Connect mode provides an expert, remotely accessible view of low-level spectrum plots from an individual access point's coverage area.

While the CleanAir technology provides a great deal of higher-level analyzed data, including reports that classify devices and assess the wireless air quality, there will always be cases in which it is desirable to look at the real-time, raw spectrum data to help with difficult to diagnose interference problems.

## Effective Policy Enforcement

Enforcing policies to prohibit devices that interfere with the Wi-Fi network has been a challenge for network administrators. 2.4-GHz phones can disable handheld scanners that are used for inventory tracking in retail environments. College campus networks become unusable when Xbox games are active. With CleanAir technology, network administrators now have the ability to track network performance, locate and see the impact of non-Wi-Fi devices, and enforce policies by verbosely identifying the source device, location, and time and date. This "what, where, and when" information gives administrators the tools they need to prevent network outages, educate users on the issues and policy, and monitor for compliance. All of this reduces the IT time spent and increases efficiency overall, accelerating ROI.

## Robust Security

From a security perspective, there are a number of threats to your network that are invisible to traditional Intrusion Detection System/Intrusion Prevention System (IDS/IPS) solutions because they can only be detected at the RF physical layer. These threats include proprietary wireless bridges, wireless video cameras, and older products such as Frequency Hopping (FH) 802.11 that may represent intrusion points on your network or violations of privacy. These threats also include malicious Wi-Fi devices that operate on nonstandard operating frequencies or that use nonstandard modulation. And of course, there are always denial-of-service (DoS) attacks that can occur from jamming devices.

In addition to viewing security-impacting devices on a map, administrators can configure customized alerts based on device or location. This is a powerful feature since certain devices may be considered a threat in some areas of your building (for example, in trading wing), but not in other areas, such as the building lobby.

## Market Differentiators

Cisco CleanAir technology provides comprehensive visibility into the wireless spectrum and optimizes wireless coverage to work around interference. Since wireless interference at the RF physical layer accounts for as much as 75 percent of wireless performance lags and connectivity disruption, gaining visibility into the spectrum is crucial in maintaining business-ready wireless application services.

Cisco CleanAir technology delivers three distinct advantages that other interference solutions can't match:

- **Custom chipset implementation.** Only Cisco has invested in creating a custom hardware chipset optimized to allow detection of non-Wi-Fi wireless transmissions while simultaneously serving network traffic. Because the detection and classification takes place on inline silicon and because it has access to rich, low-level data not available with standard Wi-Fi chipsets, Cisco CleanAir technology produces interference visualizations that are much more detailed and precise than those produced by competing systems.

- **High-definition interference visualization.** Cisco CleanAir technology is uniquely broad in its ability to detect 20 different interferers, and uniquely granular in its ability to visualize interference impact. These capabilities support more intelligent decisions and policies, for automatic remedial action and faster troubleshooting.

- **Systemwide integration.** Rather than managing interference on one access point at a time, Cisco CleanAir technology aggregates the impact of interference across the entire network. It can provide both real-time and historical views of interference across the whole system and down to a single client.

## Spectrum Intelligence

In addition to CleanAir, the Cisco's Second Generation Aironet Access Points allows for different levels of Spectrum Intelligence. Depending on the size of the network and the level of spectrum intelligence desired, the 802.11n-based AP such as the 3600, 2600 and 1600 Series as well as the 802.11ac-based Access Point such as the 3700, 2700, 1700 & 1570 Series can provide the right solution for your network.

| Spectrum Intelligence | | | |
|---|---|---|---|
| | CleanAir Express | CleanAir | CleanAir with WSM |
| Access Points | 1600 1700 | 2600 3600 2700 3700 1570 | 3600 3700 with WSM |
| Detection | ■ | ■ | ■ |
| Classification | ■ | ■ | ■ |
| Mitigation | ■ | ■ | ■ |
| Location | ■ | ■ | ■ |
| Performance Optimized | | ■ | ■ |
| Top Impacts and Severity List | | ■ | ■ |
| Alert Correlation | | ■ | ■ |
| Air Quality Index | | ■ | ■ |
| Zone of Impact | | ■ | ■ |
| Off Channel Scanning | | | ■ |
| Predictive Intelligent Channel Switching | | | ■ |

## Mobility Services Engine and CleanAir Technology

The indoor location and advanced spectrum analysis capabilities of the Cisco Mobility Services Engine greatly enhance the effectiveness of CleanAir technology.

| | CleanAir APs with Wireless Controller Only | CleanAir APs with Wireless Controller and Mobility Services Engine |
|---|---|---|
| Rogue Mitigation | ✓ | ✓ |
| Detect Interferers | ✓ | ✓ |
| Classify Interferers | ✓ | ✓ |
| Mitigate Interferers | ✓ | ✓ |
| Maintain Air Quality | ✓ | ✓ |
| Detect Layer 1 Exploits | ✓ | ✓ |
| System wide Interferer Details and Event Correlation | ✗ | ✓ |
| Zone of Impact and Interferer Notification | ✗ | ✓ |
| Track and Trace Interferers and Layer 1 Exploits | ✗ | ✓ |
| Track and Trace Rogues | ✗ | ✓ |
| Security Penetration and DoS attack Mitigation | ✗ | ✓ |

In addition to the enhancements to CleanAir, the Cisco Mobility Services Engine delivers:

- Advanced Location Services that enable venue owners and retailers to monetize their wireless LAN by engaging their customers thru Mobile Concierge. Aggregate customer behavior can also be tracked with Advanced Location Analytics

- Adaptive WIPS Service provides comprehensive over-the-air threat detection, location and mitigation

## Cisco Clean Air Express

Cisco CleanAir Express technology is enabled on the advanced silicon design of the Cisco's Second Generation entry-level Access Points such as the 802.11n-based Cisco Aironet® 1600 Series and the 802.11ac-based Cisco Aironet 1700. With Clean Air Express the Aironet 1600 and 1700 Access Points have the ability to effectively detect RF interference, identify the source, locate it on a map, and then make automatic adjustments to optimize wireless coverage. With Clean Air Express technology, organizations have a basic spectrum analysis capability to support their wireless networks while simplifying ongoing operations.

## CleanAir with WSM

An enhancement to CleanAir, the Aironet 3700 and 3600 Access Points' modular design allows for a dedicated radio to provide additional Spectrum Intelligence. The Wireless Security Module (WSM), much like the 802.11ac module will simply plug into your existing 3700 or 3600 Access Point. The WSM will provide for the RF excellent features such as CleanAir 2.0 to operate at the highest level of interference mitigation. A separate radio module allows the 3700 and 3600 Access Point's radios to be dedicated to providing connectivity for clients, while the module is dedicated for monitoring and security, CleanAir and wIPS spectrum monitoring. This offload of functions results in a more efficient use of the internal radios to serving Wi-Fi data clients, and allows each function to perform at its highest level.

## Summary

With CleanAir technology, the Cisco Unified Wireless Network correlates sources of interference across the network, supporting intelligent decisions and policies for faster troubleshooting and automatic RF interference avoidance. CleanAir technology makes it easy for network administrators to assess service disruptions, receive notices about performance degradation, and research resolutions and quickly take action to improve network performance. The CleanAir solution is part of the industry's most adaptive, reliable, and high-performance wireless network - a network that has the ability to adjust automatically to changes in its environment, without the need for time-intensive or costly human intervention. Add to that Cisco's ability through Cisco's Second Generation Aironet Access Points that allows for different levels of Spectrum Intelligence from CleanAir Express on the 1700 and 1600 Access Point for small to medium sized networks to CleanAIr with WSM on the 3700 and 3600 Access Point for large scale networks.

With Cisco CleanAir technology, organizations have the tools to support a truly mission-critical wireless network while simplifying ongoing operations. Business benefits include the ability to:

- Protect user productivity with reliable and secure performance for business applications
- Reduce troubleshooting time from days or weeks to hours, saving IT resources and protecting business productivity

- Consume fewer IT resources with automatic interference mitigation and faster troubleshooting
- Prevent costly downtime with a self-healing Wi-Fi network
- Seamlessly integrate mobile services and simplify the transition to 802.11ac networking with Cisco partners and Cisco Wireless LAN Services

## How to buy

To view buying options and speak with a Cisco sales representative, visit www.cisco.com/c/en/us/buy.

## For More Information

For more information about Cisco CleanAir technology, visit www.cisco.com/go/wireless or contact your local account representative.