

Cisco M-Drive Technology: Simplify 802.11n Adoption

Executive Summary

Cisco M-Drive technology helps the transition of business wireless technology to the 802.11n standard by providing a set of tools that deliver the robust, scalable wireless foundation required to realize the true potential of mobility. These tools include:

- Cisco ClientLink technology to raise uplink and downlink performance of existing 802.11a/g equipment
- Automated configuration and powering of access point
- Advanced capabilities to select data rates, adjust power, and manage QoS for access points

Wireless Challenges

The demand for mobility in the enterprise is growing dramatically. Users have made it clear that they prefer to be untethered, and the business has embraced the productivity enhancements that mobility provides. More than just a wireless connection, mobility has a transformational effect on productivity and business process.

The mobile experience requires an approach in which wired and wireless networks integrate to provide seamless connectivity for any application. For this, wireless should provide performance and reliability comparable to wired networks. Building reliable wireless systems can be an IT management challenge, not only because of the unique set of issues brought about by wireless, but also because of limited employee expertise in wireless.

The emergence of 802.11n has been a key transition in the wireless industry, enabling wireless link speeds to approach those of wired links. Although the transition to 802.11n will help decrease wireless-specific challenges, IT should pay careful attention to the following:

- Not all 802.11n solutions are equal. The best are fully hardened and well-engineered, not based on consumer-grade technology.
- RF systems can be unpredictable. Their performance varies over time as people and objects move around during the course of the day. IT may have limited experience in dealing with RF propagation or interference issues, and yet downtime is not tolerable.
- The 802.11n RF medium is shared. That means that performance can vary with the number of users being supported. IT requires systems that are scalable across periods of both low and high demand.
- Businesses will generally begin with mixed networks. As businesses deploy next-generation wireless networks based on 802.11n, their users will access them with a diverse set of devices, including a mix of wireless standards. The 802.11a/g and 802.11n standards are fully compatible, but IT must still ensure that they can optimize performance for coexisting technologies.

Cisco M-Drive Technology Overview

As part of the Cisco Motion strategy and vision, Cisco has introduced Cisco M-Drive technology, a set of tools to facilitate the transition to 802.11n by helping deliver a scalable, reliable wireless foundation. A systemwide feature of the Cisco Unified Wireless Network, M-Drive addresses the four most important concerns of adopting a robust, business-ready wireless network: reliability, scalability, compatibility, and security.

The Cisco Unified Wireless Network relies on the Cisco portfolio of 802.11n access points: the Cisco Aironet 1250 Series and the Cisco Aironet 1140 Series. The 1250 Series is a ruggedized platform with external antennas, designed for challenging RF environments. The 1140 Series is optimized for office environments, with a sleek design and integrated antennas.

Cisco M-Drive technology offers tangible benefits such as:

- Enterprise-hardened access point designs appropriate for both office and ruggedized environments
- Greater wireless capacity and coverage
- Optimized client performance
- Simple wireless management

Cisco M-Drive technology simplifies the adoption of 802.11n by building on Cisco's experience in wireless design, testing, and validation. When deploying a Cisco 802.11n solution with Cisco M-Drive technology, you get the confidence of having:

- The solution that is used as the benchmark for the Wi-Fi Alliance 802.11n test bed
- A solution that has been extensively tested with Intel Centrino based laptops and is Centrino Certified
- A solution that integrates seamlessly into your existing Cisco wired network infrastructure

In all cases, Cisco M-Drive technology is fully compatible with all new 802.11n and existing 802.11a/g equipment. In this way it helps facilitate the adoption of 802.11n while extending the useful life of existing 802.11a/g solutions.

Components of Cisco M-Drive

Cisco M-Drive has three major components, each aimed at a specific challenge of business wireless:

- Cisco ClientLink helps you get the most from coexisting 802.11a/g equipment
- Automated RF management tools help you deploy and tune access points
- Device and connection management tools that help you ensure the highest level of performance consistently

Cisco ClientLink

Most organizations take a phased approach to migration. With equipment typically being replaced on a three- or four-year cycle, most businesses will maintain an installed base of 802.11a/g devices alongside the new 802.11n devices. Recognizing the need for businesses to protect their investment in these 802.11a/g devices, Cisco developed ClientLink technology to help businesses extend performance benefits of 802.11n to their 802.11a/g devices and increase their useful life.

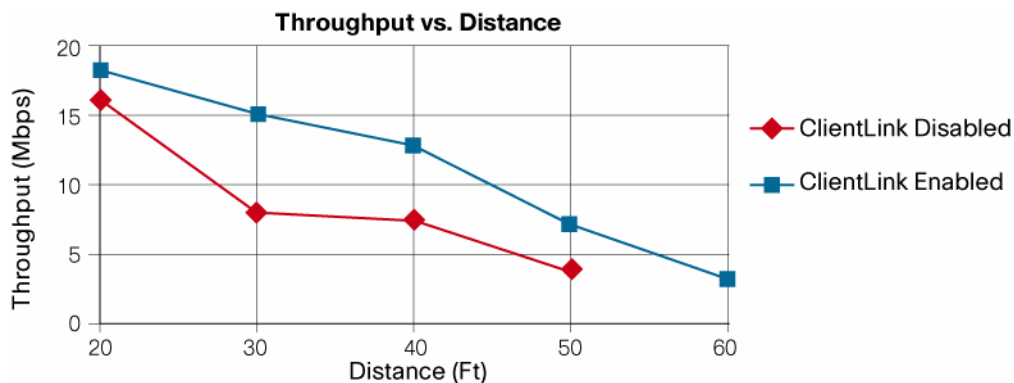
Most 802.11n solutions offer some level of improved performance for 802.11a/g clients in the uplink direction (to the access point), but none in the downlink direction (from the access point). This is significant because the majority of client traffic, such as web browsing and file downloads, is in the downlink direction. Cisco ClientLink technology improves 802.11a/g downlink performance, resulting in better network coverage and a more reliable roaming experience.

Another challenge the mixed 802.11n and 802.11a/g environment presents is ensuring that slower 802.11a/g devices don't limit the performance of faster 802.11n devices. By raising downlink throughput for these slower clients, ClientLink effectively increases the system capacity of the entire network including 802.11n clients.

ClientLink works through advanced signal processing built into the access point. After learning the optimum way to combine the signal received from a client on the access point's multiple antennas, ClientLink uses that information to send packets in an optimum way back to the client in a technique referred to as multiple-input, multiple-output (MIMO) beamforming. Moreover, MIMO beamforming does not require an expensive external antenna.

Figure 1 demonstrates the increase in performance you can expect with ClientLink:

Figure 1. Increase in throughput over distance with ClientLink



Automated RF Management

A wireless network costs more to operate than it does to purchase. To help simplify wireless management and reduce operational costs, Cisco M-Drive technology includes automated RF management features that can reduce the number of trouble tickets and the IT time spent dealing with them.

The Cisco Unified Wireless Network automates the configuration of access point channel assignments and output power. M-Drive establishes the channel plan and output power of each access point to optimize coverage of the office space. This greatly speeds up deployment.

As the physical conditions of the facility change (example, a filing cabinet moves), Cisco M-Drive technology automatically adjusts access point settings to compensate. The 802.11n standard includes the ability for access points to operate with 40 MHz channels for higher performance (in addition to the older 20 MHz channels), complicating the way that channels can be deployed. M-Drive is designed to simplify 802.11n deployments by understanding both 20 MHz and 40 MHz channels.

M-Drive detects coverage holes by observing client performance. When a coverage hole is detected, the system compensates automatically by adjusting the power output of the closest access points. No IT intervention is required, saving time and resources.

Consistent Connections

Wireless users can become frustrated by inconsistent performance, over time or space (as they move around). If users can't depend on the wireless network, they will be reluctant to use it regularly.

Under 802.11n as well as 802.11a/g, client performance may vary with the client's distance from its access point. The 802.11 standard deals with this by allowing for different data rates at different distances. Essentially, the farther away the client is, the lower the data rate, and thus the connection can maintain reliability even with a lower signal strength. However, the 802.11 standard does not dictate how these data rates should be chosen.

Competing solutions have been shown to treat rate selection in a haphazard manner, resulting in less than optimal selection. The device may talk slower than it needs to, or worse, the device tries to talk too fast and no data gets through at all. The rate selection algorithm in Cisco M-Drive technology makes sure the best possible data rate is used at all times. This means that the connection will be more reliable everywhere the client roams.

Another factor that can impact the performance of both 802.11n and 802.11a/g devices is the consistency in the power level of the access point. Consumer-grade access points may have power levels that vary significantly over time and temperature, which affects the distance at which their signal can be received. This presents a problem for IT because the placement of access points depends on a site survey using a single power level. If power decreases, the result may be coverage holes where devices are unable to connect. If power increases, neighboring access points may start to interfere with each other. Cisco M-Drive technology uses carefully calibrated hardware that measures temperature and adjusts output to comply with environmental changes. This helps ensure a more dependable performance.

A third factor that can impact client performance is quality of service (QoS) for sensitive traffic like voice and video. Cisco M-Drive technology enforces QoS policies across the system to help ensure consistent performance. For example, it ensures that access points don't become oversubscribed, degrading application performance. If a client attempts to associate to an access point that is already at capacity, it is assigned to a neighboring access point. Other systems that are not properly tuned to handle QoS traffic offer limited reliability when there is a mix of data and voice or video traffic.

Conclusion

A pervasive wireless network can yield the benefits of true business mobility only if it operates reliably. Cisco M-Drive technology takes 802.11n from being a consumer-grade technology to being truly business-ready. It includes breakthrough innovations like ClientLink, which offer extended life for existing 802.11a/g devices. M-Drive includes well-engineered and tested execution of the 802.11n standard that encompasses high-quality industrial design, optimized rate selection, and power consistency. And Cisco M-Drive technology includes automated RF management to reduce the IT burden of maintaining a next-generation wireless network.

For More Information

For more information visit:

- <http://www.cisco.com/go/wireless>
- <http://www.cisco.com/go/802.11n/>



Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

CCDE, CCENT, Cisco Eos, Cisco HealthPresence, the Cisco logo, Cisco Lumina, Cisco Nexus, Cisco StadiumVision, Cisco TelePresence, Cisco WebEx, DCE, and Welcome to the Human Network are trademarks; Changing the Way We Work, Live, Play and Learn and Cisco Store are service marks, and Access Registrar, Aironet, AsyncOS, Bringing the Meeting To You, Catalyst, CCDA, CCDE, CCIE, CCIP, CCNA, CCNP, CCSP, CCVP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco ICS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Collaboration Without Limitation, EtherFast, EtherSwitch, Event Center, Fast Step, Follow Me Browsing, FrameShare, GigaDrive, HomeLink, Internet Quotient, IOS, IPPhone, iQuik Study, iSeePart, the IronPort logo, LightStream, Linksys, MediaTone, MeetingPlace, MeetingPlace Chime Sound, MGX, Networkers, Networking Academy, Network Registrar, PCNow, PIX, PowerPanel, ProConnect, SmartShore, SenderBase, SMARTnet, Spectrum Expert, StackWise, The Fastest Way to Increase Your Internet Quotient, TransPath, WebEx, and the WebEx logo are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (081216)

