

# **DORMITORY WIRELESS IS A SNAP**

## **LEVERAGE EXISTING CAT 5 CABLE FOR COST EFFECTIVE 802.11N UPGRADE**

## WHITE PAPER

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## THE DEMAND FOR WI-FI™ IN DORMITORIES

Higher education students today expect Wi-Fi connectivity. Some studies have found that college bound students are bringing three to four Wi-Fi devices to campus, including laptops, tablets, smartphones, iPods, and gaming systems. They expect to use all these devices not just across campus, but also in their dorm rooms.

Until recently, most colleges and universities have concentrated delivering wireless connectivity in classrooms, lecture halls, libraries and cafeterias. Dorm rooms have been wired which allows students to connect to a wired network. However, students not only desire mobility, but many of today's devices – particularly tablets and smartphones - do not have an RJ45 connector for an Ethernet connection. Students are demanding 802.11n Wi-Fi in their dorm rooms.

## CHALLENGES WHEN UNWIRING DORMITORIES

Typically, dormitories are wired with two network drops per room, maybe more, depending on the number of students sharing the rooms. These cable pulls are expensive, as are the Ethernet switches they attach to in the wiring closet. As the demand shifts toward mobility and portable Wi-Fi devices, universities are faced with another round of time-consuming and costly Cat-5/6 cabling to support installation of 802.11n access points installed in the dormitory hallways.

This approach does not leverage the investment in existing wired infrastructure and requires an extensive RF survey to ensure that the placement of APs will provide the appropriate coverage into the rooms. Today, higher education institutions are looking for solutions that leverage their existing infrastructure, lower cost to deploy, and easier to manage. Motorola Solutions' AP 6511 with WiNG 5 architecture and software addresses the challenges that higher education institutions face.

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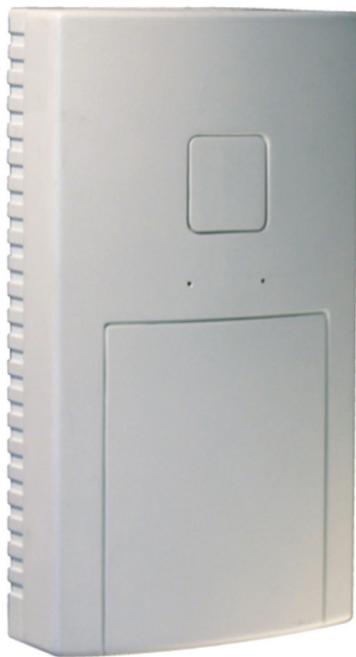
**AP 6511 802.11N WALLPLATE ACCESS POINT**

Wireless access points have been traditionally designed to provide wireless service in relatively open spaces. While this works well for large spaces like lecture halls, cafeterias and libraries, it faces challenges with regard to planning and installation in multi-room facilities such as dormitories.

In this paper we address a relatively unconventional means to quickly and cost-effectively overcome these challenges and provide high quality Wi-Fi without the conventional

cost and hassle. The solution is simple – use a wall plate access point that can be quickly snapped into place (in minutes, not hours) on the wall inside the room and use the existing CAT5/6 wires in the walls. And because the wall plate location is at the end of the room with the lowest attenuation (firewalls, fire doors, tile, mirrors, and water pipes) the radio quality from room to room is very strong – with minimal site survey and planning.

Since the wireless wall plate is rather unconventional we'll address how it compares with the traditional thinking in each essential phase of wireless LAN planning, installation, and management.



**AP 6511 WallPlate AP**  
2.75" x 5" x 1"  
(70mm x 125mm x 29mm)



**AP 6511 WallPlate AP**  
Shown with optional  
Ethernet Module

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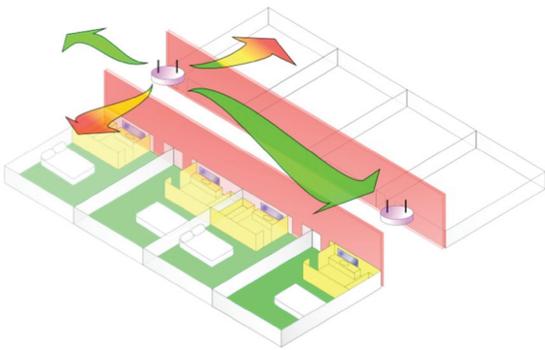
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## WIRELESS LAN PLANNING – GET IT RIGHT THE FIRST TIME

### TRADITIONAL THINKING

The goal of the site survey is to determine the optimal placement of the minimum amount of access points to provide reliable RF coverage.

This is a nice goal to have. However, this traditional thinking encumbers the network planning and installation as shown below.



### INSTALLATION IN THE HALLWAY

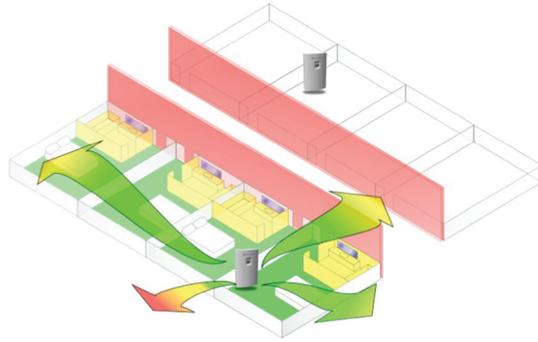
Traditionally, access points are installed in the hallways, and push the power through firewalls, fire doors, and around mirrors. The site survey needs to plan for these RF attenuation factors and ensure adequate coverage within the room where the wireless service is needed the most.

In many multi-room facilities, the hallway does not have plenum space. For example, there may be a hardcap ceiling to meet fire code regulations. The cost of installation can be very expensive and time consuming. Another factor to consider is co-channel interference between APs installed in the hallway. These APs have little attenuation from AP to AP, and co-channel interference becomes an issue that must be dealt with in the management software. During the site survey, managing co-channel interference is rarely considered. Thus, the physical placement of the access point is a critical determinant of the wireless LAN success. A poor site selection for the access point is nearly impossible to correct. Typical corrective action usually involves a higher gain antenna or relocating the installation site of the access point – pulling more expensive cable in the process.

### NEW THINKING

Focus on proper RF planning, not physical installation

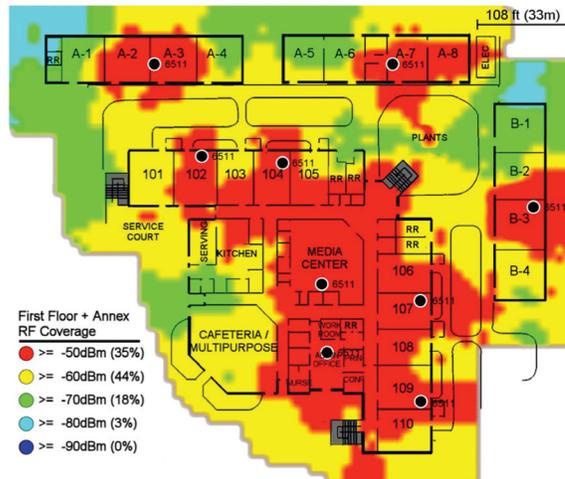
By installing the access point inside the room, the physical placement is always known. Installation density is easy to control and installation location is easy to change.



When the access point is installed in the room, co-channel interference is greatly reduced. It is easy to understand why: the walls that attenuate the client signal also prevent one access point from interfering with another access point on the same channel.

Pre-installation site surveys can now focus on the RF capacity planning and not the physical installation. This will lead to a more reliable site survey and a repeatable installation methodology.

Below is a heat map of a deployment using Motorola's AP 6511. Note that the AP's performance is concentrated inside the room rather than in the hall.



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# WIRELESS LAN INSTALLATION – BRING OUT THE HAMMER DRILL

## TRADITIONAL THINKING

One to three hours per AP is required for the physical installation

Each facility can require a different installation, depending on the architecture of the building and how Ethernet cables can be routed to the APs. Concrete construction can make installation in the hallway an arduous task with ladders and hammer drills. During the site survey, it is equally important to pay attention to where and how the Cat-5/6 cabling will be installed.

## NEW THINKING

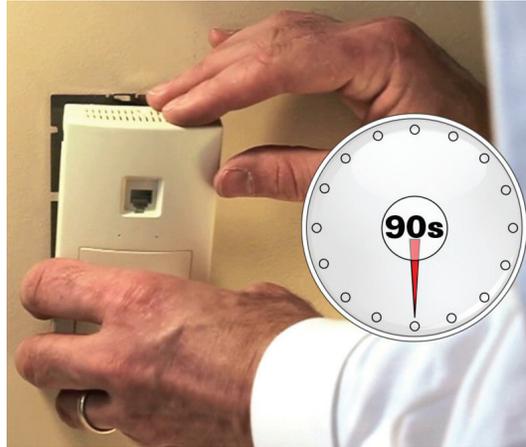
Repeatable, consistent installation routine

Consistency is the first key to lowering installation cost. Installation teams are more effective when they follow a set routine and replicate the procedure at every site.

Eliminating new cabling is the second key to lowering installation cost. In many dormitory wireless deployments the cost of new cabling is actually greater than the cost of the access points themselves. If a higher education institution has already invested in cabling the dorm rooms, it's important to not let that investment go to waste as residents move from wired connectivity to wireless.

### The AP 6511 installation is simple.:

1. Remove the existing structured wiring plate
2. Install the universal bracket
3. Connect the pigtail RJ45 cable from the access point to the structured cabling
4. "Hook and Snap" install the access point to the bracket



# WIRELESS LAN MANAGEMENT – DOES IT SCALE?

## TRADITIONAL THINKING

Use Independent APs when only a few are installed.  
Use an on-premises RF controller as a single point of management for many APs.

Many smaller facilities cannot afford the cost of a dedicated RF controller. So the property is left with either a large install of independent APs, or an expensive RF controller.

## NEW THINKING

Scalable Management with WiNG 5 intelligence at the Edge

The value of an RF controller based network cannot be overstated. Beyond management and configuration, the RF controller can optimize client roaming, detect Rogue APs, and manage the RF environment so the network is self-healing, redundant and always connected.

Motorola pioneered the first RF controllers in 2002, and continues the innovative trend with WiNG 5. Key WiNG 5 features include:

### 1. Highly Scalable

Each AP 6511 can operate as a standalone AP or act as a controller AP so that a cluster of up to 25 AP 6511s can be managed without a separate RF controller. The controller AP will provide central control and management along with self healing access points and intelligent ACL for small facilities. For larger networks, dedicated RF controllers running WiNG 5 scale from hundreds to thousands of managed access points.

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### 2. Intelligence at the Edge

By distributing stateful firewall policies to the access point at the edge, a WiNG 5 network is protected from unwanted access at the first point of entry. This also enhances network capacity by not tunneling “bad” packets to the controller to be filtered and rejected.

### 3. Self-Healing with Gap Free Redundancy

Leveraging the market proven SmartRF technology, WiNG 5 networks automatically adapt to changes in the RF environment to provide coverage in case an access point fails, or interference is detected. Additionally, SmartRF tracks wireless clients and automatically adjusts power levels to maintain consistent connections for any type of mobile wireless device, such as a smartphone, tablet, game Osystem, or laptop. Gap free redundancy means that WiNG 5 networks are site survivable in case communication to the controller is lost. It also means dynamic MESH links to move packets around a failed Ethernet segment. All done without administrator intervention.

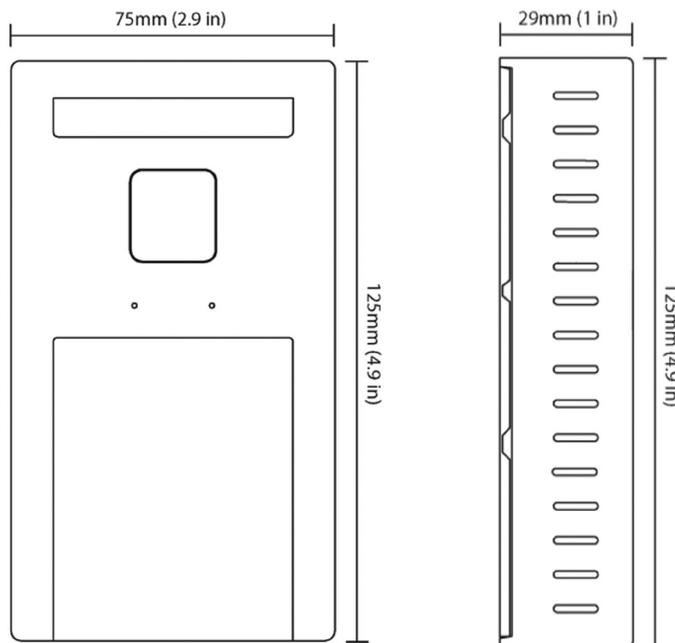
## OTHER AP 6511 ADVANTAGES TAILORED TO MULTI-ROOM FACILITIES SUCH AS DORM ROOMS

### HIGH PERFORMANCE RADIO

At the heart of a great wireless network is a high performance radio. Motorola designs high powered radios with equally high receiver sensitivity. The AP 6511 has a total output power of 26dBm on a single 2.4Ghz 802.11n chain. When combining two chains with 2x2 MIMO, the AP 6511 provides 29dBm of transmit power. At 5Ghz the maximum radio power is 24.5dBm. Easily enough power for a single AP to support a high capacity network of wireless tablets, laptops and other devices across multiple rooms

### UNIVERSAL MOUNTING

The AP 6511 installation is a snap – literally. The universal mounting bracket has six different hole patterns matching telecom plates found around the world.



The AP 6511 was designed to mount over a telecom plate – but that is not always practical or desired. To provide a flexible installation, the backside of the access point is flush with recessed connectors. This allows the access point to be installed over any surface; a telecom plate, on a desk, on a wall, on the ceiling, or above the ceiling in plenum space.

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### TAMPER-PROOF

One challenge for wireless deployments in dormitories is that some college students have a tendency to be... curious... about things installed on walls and in hallways. That's why the AP 6511 was designed to be tamper-proof. First and foremost, we have moved the access point from the hallway to the dorm room for increased student accountability. Next, once installed, a small screwdriver is required to release the latch and remove the access point from the wall. A torx security screw is included in the shipping BOM so the latch can not be removed without a special tool.

Additionally, the AP 6511 LEDs can be disabled by network command. This prevents the AP from attracting unwanted attention when installed in an accessible location.

### MODULAR ETHERNET PORTS

With the AP 6511, schools have an option to include an Ethernet port on the access point to offer a wired connection in the room, providing wireless coverage while still offering a wired connection. The AP 6511 can be upgraded with one or three Ethernet ports as needed for additional services such as wired LAN access or IPTV set-top box.

### SNAP-IN KEYSTONE PORT

In addition to Ethernet, there may be other connections required in the dorm room such as RJ11 for analog telephone or F-connector for TV.

When the AP 6511 is installed over the plate, the secondary network (RJ11 or F-connector) can be exposed by snapping the connector into the keystone style snap-in port. Actually, there are dozens of keystone style connectors commonly used in voice, data and audio networks. All are supported via the keystone snap-in port.

## CONCLUSION

Colleges and universities have made large investments in wiring dormitories and residence halls. However, today's students are using mobile devices and most of these devices do not come with a connector to plug a cable into. Today's laptops, tablets and smartphones rely on Wi-Fi, specifically 802.11n for their connectivity, so students are demanding Wi-Fi in the dormitories.

Campus administrators want a simple and effective way to deliver the new wireless service quickly, leveraging their existing wired investment to keep cost down. It is also beneficial to maintain a wired connection in the rooms, delivering both wired and wireless service.

Motorola delivers an innovative approach to solving the challenges of converting dormitories from just wired, to wired and wireless service. Motorola's AP 6511 uniquely enables administrators to meet student demands while achieving their business goals, with a cost effective solution that is a snap to install, and can scale as their needs grow.

### ABOUT MOTOROLA

Motorola offers true end-to-end mobility solutions for education and more that include: a comprehensive portfolio of private wide area and local area network infrastructure; mobile devices with extensive communications capabilities; a partner channel delivering best-in-class applications; and a complete range of pro- and post-deployment services to help you get and keep your mobility solutions up and running at peak performance. And when you choose Motorola, you choose the strength only an industry leader can offer, with proven technology in successful customer deployments in many industries around the world.

To find out how Motorola can streamline your wireless LAN operations, please visit us on the web at [www.motorola.com/education](http://www.motorola.com/education) or call us at 1-866-416-8593.

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