

## No Towers Required: Distributed Access Systems (DAS)

BY MICHAEL HARRIS



Dallas Cowboys Stadium



Mandalay Bay Resort



FDA White Oak Campus



Atlanta International Airport

When designing and deploying new cell sites, carriers are increasingly taking antennas off the tower and installing them closer to mobile users, both indoors and outdoors. Called Distributed Access Systems (DAS), this “towerless wireless” approach helps carriers improve mobile network coverage in challenging outdoor urban, suburban and campus areas, as well as in-building environments.

DAS first became popular with carriers to provide mobile coverage within busy public venues – airports, train stations, malls, arenas, stadiums, convention centers and large office complexes – for two reasons. First, wireless signals transmitted from large cell towers weaken as they pass through the concrete and steel common in commercial structures, resulting in spotty indoor reception and dropped calls. This is particularly true with signals in higher radio frequencies, such as 1800 MHz, 1900 MHz and 2.1 GHz. Second, locations with big crowds saturate network capacity as many users simultaneously make calls or access bandwidth-hungry data applications. The dynamic creates a problematic one-two punch – high simultaneous usage plus poor reception – that DAS alleviates.

These days, DAS is everywhere. If you are enjoying a game at the Dallas Cowboys Stadium or a visit to Las Vegas at the Mandalay Bay Resort, DAS delivers your mobile calls.

Hartsfield-Jackson Atlanta International Airport has installed a massive DAS network with more than 700 antennas covering over 5.8 million square feet. The U.S. Food and Drug Administration's White Oak campus in Silver Spring, MD, home to 7,000 federal employees, offers over 2 million square feet of DAS coverage in 10 buildings.

As carriers gained confidence in DAS for in-building networks, they started deploying it outdoors, on college and corporate campuses. Now, they are taking it to the street, using DAS in crowded city settings and upscale suburban locations.

*“A key benefit of DAS is that the networks are far less visually invasive than large towers, which can help carriers win local zoning approval more rapidly.”*

Michael Harris

Federal regulations prohibit local governments from barring the installation of cell sites needed to provide cellular coverage. However, they can create strict local ordinances specifying tower height, security, placement and appearance. These rules are increasingly used to prevent or delay the installation of “big ugly towers” in many communities. Carriers can spend years and tens of thousands of dollars navigating the local approval process for the addition of a single macrocell site. Moving antennas off the tower with DAS offers a win-win solution for carriers, their customers and local communities: mobile network expansion is achieved without a major aesthetic penalty.

## How DAS Works

To understand DAS, it is helpful to look at what it replicates and replaces: a large cell tower and base station.

The function of a traditional cell tower is to elevate antennas above terrain to maximize the coverage area for mobile services. Base station equipment – including transceivers, signal amplifiers, combiners and controllers – is housed at ground level in sealed telecom equipment cabinets (Figure 1). The radio frequency signals transmitted and received by the antennas on the tower reach the base station via coaxial cable (Figure 2). Electrical cabling is installed on the tower to power the antenna equipment.

As the name implies, with DAS, antennas are distributed throughout a mobile service area rather than elevated on a single tower. Figure 3 illustrates the approach for an outdoor DAS deployment. The distributed antennas are linked via fiber optic cabling to a central base station. This way, although the antennas are located far apart, they can operate seamlessly like a single “virtual” cell site.



FIGURE 1: Wiring from tower antennas to base station



FIGURE 2: Macrocell tower

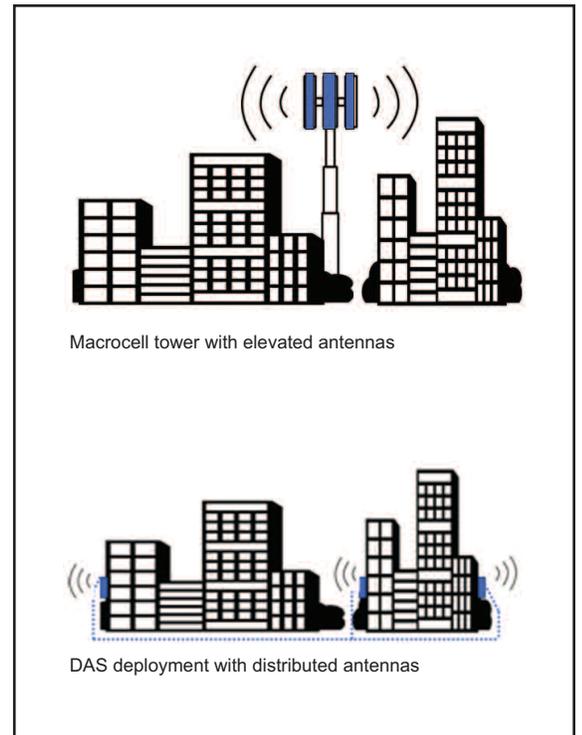


FIGURE 3: An Outdoor DAS Deployment

There are two options for installing DAS in an indoor environment: active or passive. Passive DAS connects antennas via coaxial cable and transmits wireless RF signals “as is” across the wire. Active DAS employs either fiber-optic or CAT-5 cabling, the latter is the wiring commonly used by businesses for their data networks. Active devices digitize and amplify the RF signals for transmission.

Industry analysts estimate there are about 20,000 DAS nodes installed today. The research firm Mobile Experts predicts the market for outdoor DAS equipment will grow by 29 percent by year-end 2010 as deployments continue to climb.

With momentum for DAS building in the mobile market, some large tower owners are hedging their bets by investing in this approach. For example, in September 2010, major tower company Crown Castle purchased DAS player NewPath Networks for \$115 million. Crown Castle owns more than 22,000 traditional cell sites.

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*“Increasingly, we believe that distributed antenna systems will be an important complement to traditional tower installations.”*

Ben Moreland, President and CEO, Crown Castle

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The arrival of DAS marks an important change for cell site owners. For the first time, wireless is starting to go towerless.

#### **About the Author**

Michael Harris is principal consultant at Phoenix, Ariz.-based Kinetic Strategies, Inc. Applying more than 15 years of experience as a strategist, research analyst, journalist, public speaker and entrepreneur, Michael consults with select clients in the networking, Internet and telecommunications industries.

#### **About Unison Site Management**

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