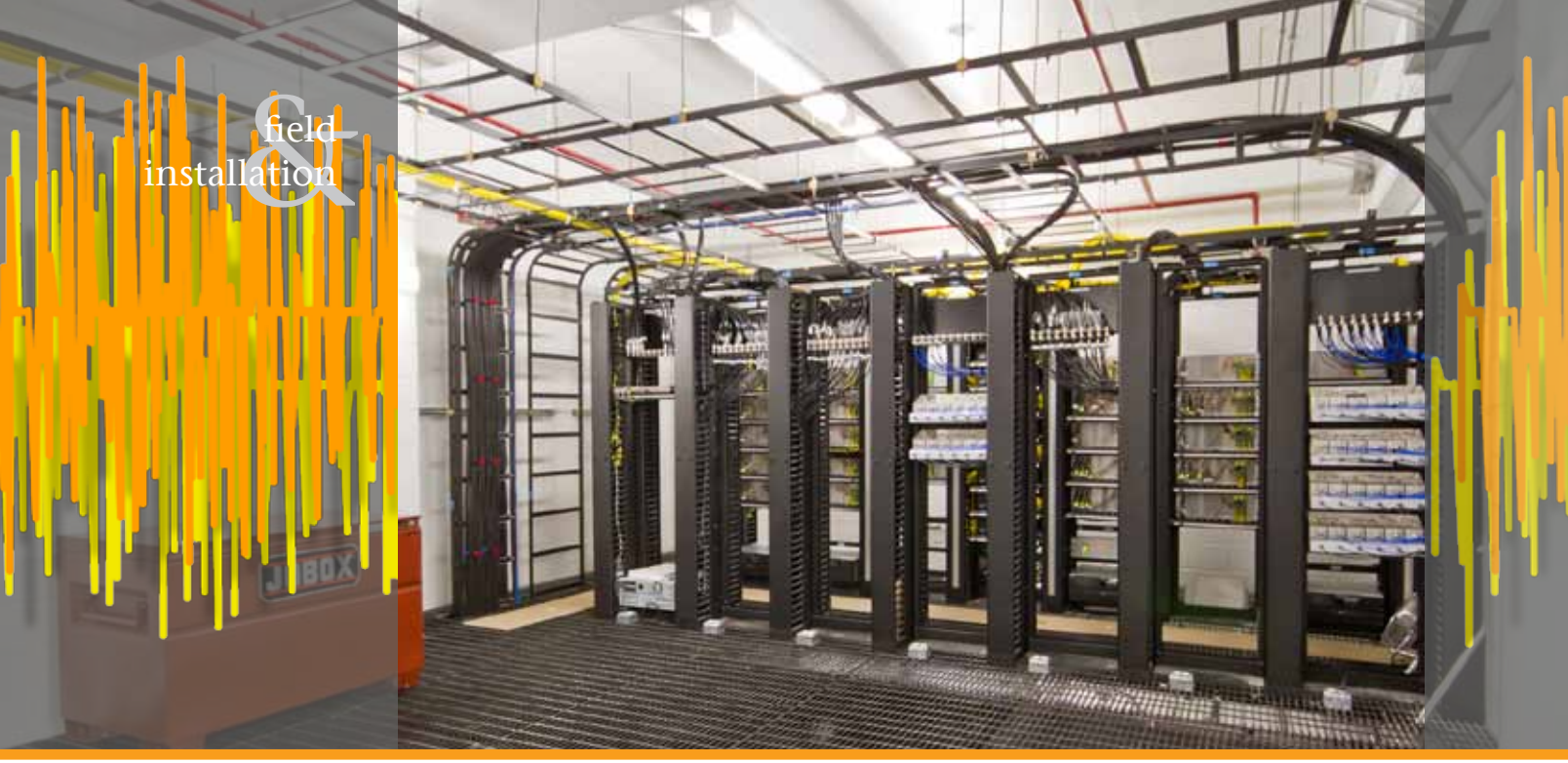
BICSI news
MAGAZINE
march/april 2013 | volume 34, number 2

ITS Project Management and the Project Charter

{DAS Deployment Considerations}
{Cloud-Based Voice Service}
{License Plate Capture and Recognition}

Bicsi®



Installing DAS & Small Cells—What You Need to Know

by Tracy Ford

A DAS project can be described in three words—smarts, parts and hearts. All three must be present for a successful project.

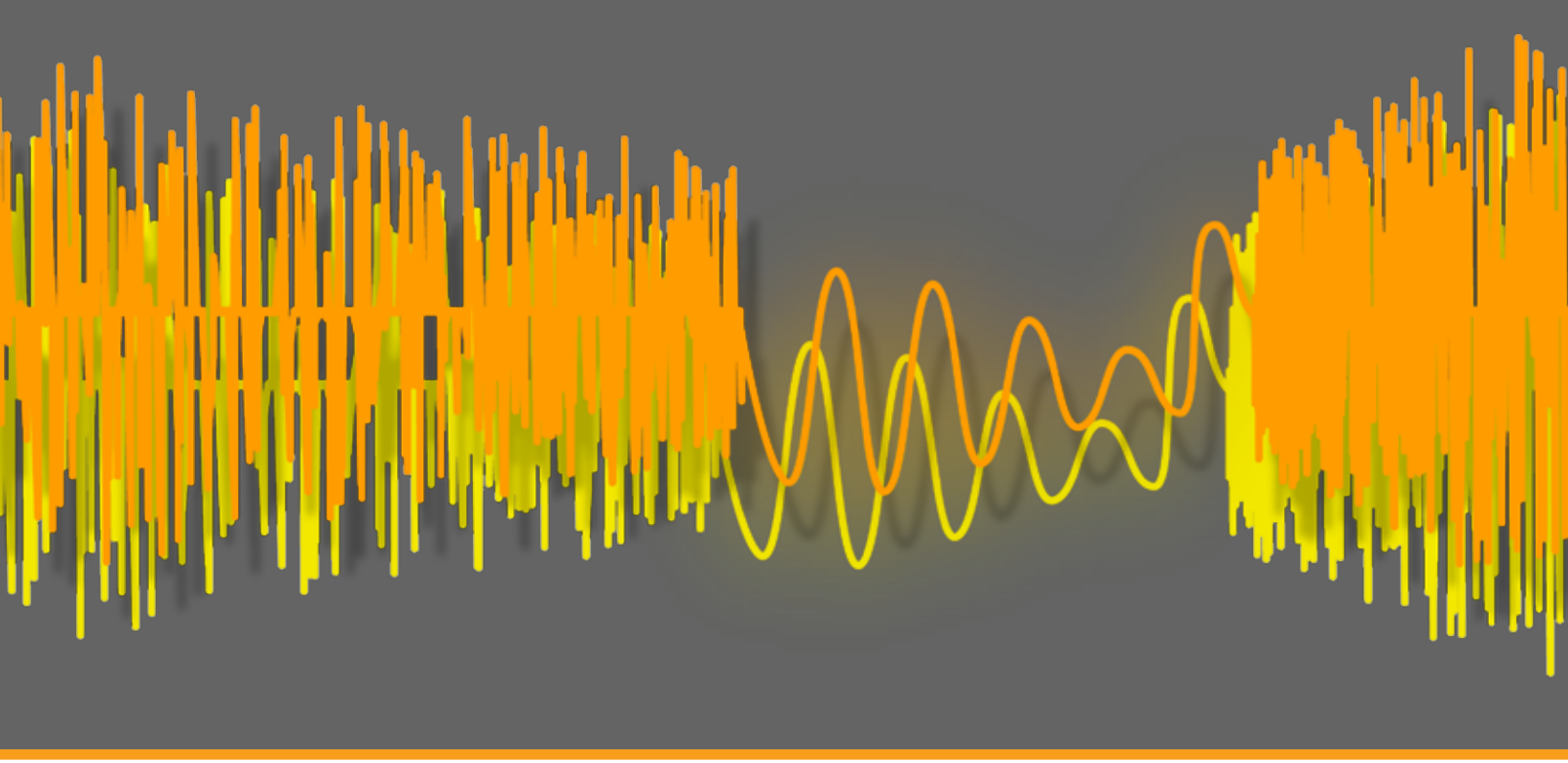
Tracy Ford is director of The DAS Forum at PCIA, The Wireless Infrastructure Association. The DAS Forum is a membership group dedicated to the development of the DAS component of the nation's wireless network. Tracy composed this article with the help of The DAS Forum members Tempest Telecom, Corning MobileAccess, CCI Systems and Connectivity Wireless. She can be reached at fordt@pcia.com.

People are in love with their wireless devices. According to Gartner Inc., smartphones accounted for about 40 percent of all mobile phones sold worldwide in the third quarter of 2012. Tablet sales continue to explode, as do the number of mobile applications available for download. Flurry Analytics estimated that on Christmas Day 2012, a record-breaking 17.4 million smartphone devices were activated and a record-breaking 328 million applications were downloaded.

The astounding increase in wireless traffic is impacting more than commercial wireless service providers. Building owners realize that adequate wireless broadband coverage and capacity inside their buildings is important to their end-user customers. Current estimates suggest that more than 60 percent of voice calls and 70 percent of data usage take place from inside buildings. Wireless connectivity has moved beyond a "nice-to-have" option for venues to a "must-have" necessity.

Wireless service providers are aware of this trend, and they continue to add capacity to their systems and upgrade their networks to fill in wireless coverage in areas that cannot be covered by their macrocellular network. New technologies, including the long term evolution (LTE) protocol, are being rolled out to address increased consumer demand and the quality of the wireless experience. But even as commercial carriers try to address this need for additional bandwidth, they are confined by the realities of financial and human resources. Meanwhile, end users are doing more with their mobile devices, which continues to put pressure on wireless networks. Society has moved from sending simple text messages to sending high data videos. As such, wireless data consumption will continue to rise.

Electronic reprint with permission from *BICSI News Magazine*-March/April 2013 Issue



DAS vs. Small Cell

Installing a distributed antenna system (DAS) is an ideal match for high-traffic venues to address wireless capacity constraints. A DAS is a network of spatially separated antenna nodes connected to a common transport medium—typically coaxial or optical fiber cable—that provides wireless service within an area, building or other structure.

DAS is often an attractive solution because these systems are scalable and flexible. Like macrocell sites, DAS can be configured to support multiple wireless service providers deploying a variety of frequency bands and wireless service technologies in a small form-factor. While DAS networks are often driven by the same radio transceiver equipment that is used with macrocell sites, DAS solutions enable these resources to be narrowly targeted to the areas where they are most needed. The capacity can be shifted to different parts of the DAS as subscriber locations and demands shift.

Common candidates for DAS deployments include offices and corporate campuses, stadiums, universities, retail centers, health care facilities, transportations centers (e.g., airports, train and subway stations) and hospitality venues (e.g., hotels, convention centers). Passive DAS solutions primarily provide wireless coverage to small- to medium-sized buildings that range from 10,000 to 200,000 square feet (ft^2). Active DAS solutions add wireless coverage and capacity to larger-sized buildings, ranging from 100,000 ft^2 to 1 million ft^2.

The phrase "small cell" is used to describe wireless deployments that are not related to the traditional tower and rooftop rollouts. Historically, the term refers to equipment designated as microcells, picocells/metrocells and femtocells. There are certain similarities between DAS nodes and small cells that often give rise to some confusion. Small cells are physically much smaller and they transmit at signal power levels that are much lower than macrocells. Like DAS nodes, when deployed outdoors, small cells are typically mounted or installed in the public right of way at low elevations.

However, DAS and small cells differ greatly with respect to functionality, capacity, complexity and cost. These network architectures and technologies are not interchangeable, and each is suitable only for the particular purposes and environments it is designed to address. Some small-cell technologies may only be useful for limited indoor deployments.

Unlike small-cell solutions, the distributed architecture of a DAS, including the high capacity optical fiber network providing interconnectivity and the ability to drive large numbers of nodes from a central hub location, makes DAS a robust, scalable, flexible and efficient solution to a range of capacity and coverage challenges. For example, a DAS can be deployed to simultaneously accommodate multiple wireless frequencies and technologies for two or more wireless service providers. A DAS can also be designed or easily retrofitted to handle 2G, 3G and 4G commercial frequencies that operate in a range from 700 to 2500 megahertz (MHz), as well as public safety UHF and VHF frequency bands (e.g., 150 and 450

Electronic reprint with permission from *BICSI News Magazine*-March/April 2013 Issue

MHz band channels). A DAS can also be configured to support numerous Wi-Fi access points.

In contrast, small-cell solutions are typically deployed piecemeal to provide coverage or enhance capacity in much smaller areas with a single technology for a single wireless carrier. Each small-cell installation is similar to a single DAS node installation in that it requires a communications link back to a larger network, an electric power source and location space. An appropriately-configured small cell can generally be deployed to provide an immediate solution to a more isolated location with smaller coverage or capacity challenges in a manner that requires less up-front design work, planning and capital investment than a DAS.

Roles, Needs and Best Practices

A DAS project can be described in three words—smarts, parts and hearts. All three must be present for a successful project. The "smarts" is fulfilled by the systems integrator and is one of the most critical aspects for a successful DAS project. The systems integrator is responsible for a broad list of deliverables, including:

- Radio frequency (RF) survey.
- Benchmark testing.
- RF design.
- Rough order of magnitude.
- Site walk.
- Final RF design and proposal.
- Equipment selection, procurement and staging.
- Installation, testing and commissioning.
- Integration with the macro network(s).
- Final close-out package.
- Ongoing monitoring and maintenance.

The systems integrator is the bridge between the venue owner, carriers and other interested parties such as the local authority having jurisdiction (AHJ) and/or fire marshals. A needs assessment is the first step toward scoping a DAS project. The numerous stakeholders in a DAS project will have slightly different perspectives on the critical requirements. The systems integrator ensures all critical requirements of a DAS project are identified, agreed upon, incorporated into the project proposal and delivered.

In some cases, the venue owner or a third party will own the DAS infrastructure instead of the wireless service provider. To ensure a DAS enhances a customer's experience at the venue, the venue owner may have specific system requirements including:

- Coverage must be ubiquitous, work everywhere and be reliable.
- Support for one or multiple carriers.
- Availability and accessibility for all employees.
- Cost-effective, or in some cases, at no cost to the venue.
- Invisible and aesthetically installed.
- Support for additional services as an overlay to the system (e.g., Wi-Fi).
- Public safety communications.
- Installation performed via safe practices, during restricted hours and not disruptive to the venue or guests.

The wireless service provider will also have specific DAS system requirements. For example, system design and RF engineering must meet best practices for a quality end-user experience; be reliable, provide robust in-building coverage and offload traffic from the macro system. Providers will want the DAS to achieve a return on investment (ROI) and be able to handle future capacity needs. The system must therefore be flexible enough to accommodate technology enhancements with the equipment easily accessible for upgrades and maintenance. A DAS designed today might need to take into account the skyscraper being built across the street. Future-proofing the network for growth is a wise practice. Wireless providers may also require the system to satisfy safe installation practices per the venue, public safety or AHJ requirements.

The local AHJ, fire marshal and first responders may have specific requirements for a DAS pursuant to local building codes, such as the International Code Council (ICC) IFC 510.1 code and the National Fire Protection Association's (NFPAs) NFPA 72-2010, Chapter 24. The code language contains specific requirements for DAS related to coverage, quality, survivability, power backup and license. In some cases, compliance to the codes must be demonstrated before installation to secure the construction plan approval.

Once all the roles and requirements are understood, the design must be tested, validated, fine tuned and approved for implementation. Specialized RF propagation and modeling software tools are utilized by the systems integrator, along with a site walk, to ensure a high quality design, proposal and accurate cost estimate for the project.

During installation, project management tools and strong communication and coordination with all stakeholders will keep the project timeline and budget on track. Technical expertise and field installation experience results in a DAS with proper cable management, equipment labeling, pleasing appeal and safe practices.

Certification, training and strong relationships with the DAS original equipment manufacturers (OEMs) can also help to correctly engineer, procure, install, commission and integrate the DAS into the existing RF environment with no interference to the macro network. Some OEMs offer comprehensive training programs for product, installation, maintenance, monitoring and design. These programs can help increase your knowledge, ensure best practices and establish a relationship with the OEM. Certain distributors are also versed in DAS and can

provide knowledge, expertise and other services to help you with your business.

Common Mistakes to Avoid

A lot can go wrong in the installation and maintenance of a DAS simply because there are many moving parts. It is critical to completely understand the project scope and requirements and set accurate expectations up front with all involved parties. For complicated builds, a site walk is likely mandatory and prearranged objectives for the walk should be established. Poor initial assessments, including a lack of qualified RF engineering expertise, can lead to underestimating the cost of the DAS. Money and time are wasted when there are significant change orders needed for the DAS to become functional.

Another common mistake is underestimating the critical role of the wireless service provider. In the early days of DAS, a passive system could be installed in a building to bring better wireless coverage to that building without the wireless provider's knowledge. As long as the DAS did not interfere with the macrocellular signal, the venue owner could address wireless needs with limited interaction with the provider. That is no longer the case. Wireless service providers have invested billions of dollars to build out their networks. They are focused on giving their customers a quality experience. Anything that causes their macro network to perform sub-par will be found and turned off. Each wireless provider has its own set of standards and processes that must be followed in a DAS deployment. Just because a DAS has been installed, do not assume that the provider will attach to it. Getting proper buy in and cooperation at the beginning of the project cannot be overstated.

Accommodations should be made at the head-end for carrier RF sources and OEM equipment to house the DAS equipment. During a DAS deployment, wireless providers will each need space for their head-end equipment. Do not forget about heating, ventilation, and air conditioning (HVAC) systems, power availability, building access, risers and runs during the information gathering process.

During a DAS deployment, wireless providers will need space for their head-end equipment (Source: Connectivity Wireless).

Industry standard software applications are available for use in the DAS business. These should be used for large-scale designs to acquire provider acceptance for the design. Many integrators do not take the time to invest in the training and tools available in the DAS industry. Not doing so is a recipe for failure. In many cases, providers will mandate some sort of training certification for DAS projects where they play a role.

Conclusion

Many firms that enter the DAS space do so to complement to their existing business models. While that is a logical path, due diligence is required. Suggestions for success include the following:

- Develop a strategic partnership model with other partners to scale each other's core competencies and provide the best overall value proposition.
- Invest heavily in RF headcount and OEM trainings.
- Use the right design software tools.
- Understand and focus on specific geographic areas.
- Know the stakeholders and their needs and work to prove your value to them.

Wireless broadband connectivity is becoming as important as heat and electricity. One could argue it is the fourth utility. New venues should have the right infrastructure in place to address increased wireless demand, while older venues need robust wireless coverage to remain relevant in the ever-changing real estate market. Taking a long-term approach to wireless coverage by working with all the stakeholders in the ecosystem will ensure that the installation meets current and future needs without having to re-address coverage and capacity issues in the future. END