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As more smart phones and wireless devices are being used every day to stay connected and share contents, people are interested in finding ways to improve their wireless coverage and capacity. According to Cisco, the number of mobile-connected devices per capita will reach 1.5 by 2020, and many of those connections will take place inside buildings over the cellular network. However, since the early days of cellular phones, wireless service providers have struggled with in-building wireless coverage. Steel-framed high rise buildings and concrete warehouses interface with and block wireless signals, creating communication problems for tenants inside the building.

There are many different technologies used to improve the cellular coverage inside the building, with Distributed Antenna Systems (DAS) being one of the proven technologies. It is used in medium to large buildings, stadiums, public venues, airports, and outdoor environments. A DAS links an array of antenna modules to a central controller, usually called a head end, which then connects to the wireless service provider's base station. Because DAS operates on a licensed spectrum, an enterprise cannot undertake a DAS deployment without involving the operators. (See Figure 2.)

One of the key benefits of DAS compared to small cells or other in-building wireless solutions is that it can support a large number of people and redistribute a variety of frequency bands and technologies. In other words, it is the only realistic system that can enhance the cellular coverage and the capacity for multiple carriers in one system. DAS can be designed to support either single or multiple wireless service providers, and to maximize the financial investment it is recommended to choose the DAS equipment that is simple to design and install, and is easily upgraded to add new wireless carriers or frequencies in the future.
Three Funding Models

One of the most crucial factors to consider in deciding on an in-building solution is who is going to pay for the system. There are 3 basic funding models for DAS deployment.

Funding Model Type #1. Carrier-Funded -- In this case, the wireless service provider owns and pays for the equipment, service, and maintenance. DAS can be expensive and the wireless service providers will select venues that fit within their network plans, covering a large number of subscribers or filling an obvious gap in their serviced regions. That means densely populated areas, such as stadiums, airports, shopping malls, hotels, and hospitals are likely candidates for DAS deployments. (See Figure 3.)

Funding Model Type #2. Building Owner Funded -- Unfortunately, wireless service providers may not choose to invest their money in improving the wireless coverage for smaller buildings and venues. In this case, the building owners can pay for the system. In this scenario, it is important for building owners to study and choose the DAS equipment that is most compatible with the existing building structure and work with design and installation requirements. The key in this scenario is that building owners must be diligent in finding the required frequencies they need to cover their building. They must also determine the right wireless carrier for their needs. When purchasing equipment they should be sure it is easy to install and maintain. And finally, they should consider a system that can be easily expanded or upgraded so they don’t need to rip and replace the entire system when the wireless technology evolves in the future.

Funding Model Type #3. Neutral-Host System -- In this case, a neutral-host third party provider owns and pays the upfront costs of the equipment and installation as well as any maintenance and upgrade costs later on. The neutral host company aims to support more than one wireless service provider on the network and lease the equipment to service providers that attach to the DAS and/or with the building owner.

This is a shared cost model, but similar to wireless service providers, the buildings or venues need to fit within their cost models.

If the wireless service providers and neutral host providers refuse to deploy DAS within a facility, the building’s IT organization has to evaluate and find a
Some DAS manufacturers like Advanced RF Technologies, Inc. (ADRF) offer enterprise-friendly, in-building wireless products that are compact and simple to design and install. Unlike other traditional DAS, this type of DAS platform uses modular architecture with a flexible platform allowing enterprise owners to only pay for what they need now. The system supports both cellular and public safety bands required by the FirstNet. (See Figure 1.)

Beyond budgeting issues, there are a number of technical and environmental considerations to keep in mind when planning DAS solution. They include building architecture and size, number of tenants inside the building, number of wireless carriers, frequency requirements, public safety requirement, HVAC, fiber availability, available space to house equipment, building aesthetics, power requirements, and who will maintain the system. While each venue is distinctive, they generally share common design, installation, and construction issues.

If the neutral-host system model is the one chosen, it is important to work with experienced system integrators who can manage and monitor the projects and get approvals from the service providers. If planned and prepared properly in the initial planning stage, the building owners can save significant installation time, improve design efficiency and reduce costs.

Endnote

Seri Yoon is a Marketing Director at Advanced RF Technologies, Inc. (ADRF). She has more than 12 years of experience in the wireless and telecommunications industry. For more information, please email syoon@adrftech.com or visit www.adrftech.com.