

The Neutral Host
Model For Distributed
Antenna Systems

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As mobile operators strive to improve services to their customers, they compete for access rights to indoor and outdoor venues and businesses and community's desire access from all service providers, not just one. Because of this, single operator systems are not the only way to get coverage and capacity inside of buildings and campuses. The Neutral Host model is gaining prominence for deploying wireless services. The Neutral Host model can reduce mobile operator costs, speed time to market for multi-operator service, and offload the responsibility for maintaining a distributed antenna system (DAS) from a carrier to a third party.

The Neutral Host Model

The traditional approach to deploying a DAS for a mobile operator is to negotiate rights to a venue, secure necessary permits and authorizations, fund the deployment of the DAS, and manage the DAS after deployment. But with millions of venues around the world, many mobile operators are seeking a way to reduce the capital cost of delivering services to those venues. This includes places like: universities, sports arenas, stadiums, hotels, casinos, malls, airports and subways, and even urban and suburban areas.

The Neutral Host model offloads the responsibility of the mobile operators for securing access, deploying and managing a DAS and in some cases, funding portions of the project. Under the Neutral Host model, an independent, third-party company invests its own money into the project to deploy, maintain all or part of the system, and leases space or access to the system to the mobile operator(s). The process has several steps. The Neutral Host partner:

- Secures exclusive rights to provide a DAS in the venue
- Negotiates with one or more mobile operators to provide services through the DAS
- Signs a 10- or 20-year lease with the venue
- Signs a 10- or 20-year agreement with one or more mobile operators
- Secures the necessary permits and attachment agreements
- Deploys the DAS
- Connects one or more mobile operators to the DAS
- Provides on-site maintenance and monitoring through its own Network Operations Center (NOC)
- Adds more mobile operators to the DAS over time

Neutral Host companies in the United States include American Tower, Bingo, Crown Castle, ExteNet, InSite Wireless, and Mobilitie. In addition, major mobile operators also act as Neutral Hosts at times. A mobile operator may choose to do this so that they can control decisions related to the system type, design or commercial terms.

Typically, the Neutral Host system are typically designed with the needs of all service providers in mind. Some deployments may start out with one mobile operator tenant, but the Neutral Host provider will seek to add more mobile operators to it. This along with the managing typical capacity and service changes inherent in the mobile network, necessitates changes and upgrades to the DAS over time. They assume the upkeep of the network as capacity changes are needed or as adjustments are made by the operators to the surrounding service area.

Neutral Host Stakeholder Benefits

There are at least three participants in the Neutral Host model: the venue, the mobile operator, and the Neutral Host organization. Each has a role to play.

The venue owner – The venue owner wants to ensure strong and consistent wireless services for visitors and guests. The venue owner wants a solution that will not visually impact their property and may also ask for a piece of the revenue. The network might enable back-of-house communication, security, or amenities for customers and visitors. The venue might be a sports stadium or an enterprise, but it is always an enclosed space for indoor projects. Given the choice between spending its own money to deploy a DAS and offloading that responsibility to a Neutral Host operator, the venue owner often chooses the Neutral Host approach.

Business Models

The financial models for Neutral Host installations vary widely. In some cases, the Neutral Host provider will fund the entire project and simply lease access to the DAS to mobile operators. In other cases, the mobile operator(s) will contribute capital to the deployment in exchange for a lower monthly lease rate. And in other cases, the mobile operator(s) will deploy its own DAS alongside a Neutral Host system.

In indoor venues, the typical model is for the Neutral Host partner to deploy and "own" the DAS, providing maintenance and upgrade services for the life of the project to the mobile operator.



DAS Antennas at Target Field



DAS Head-End



DAS Antennas at Target Field

In outdoor venues, the Neutral Host may simply provide fiber for the deployment and lease access to the fiber. In this case, the mobile operator will deploy its own DAS equipment.

In another model, the Neutral Host provider will provide fiber access, deploy, manage and maintain the DAS for one or more mobile operators. In this case, the Neutral Host partner may fund all of the DAS and lease back to the mobile operator; or deploy the DAS and the mobile operator owns the radio components deployed.

In some cases, the mobile operator(s) build out the system and sell it to the Neutral Host provider. This way, capital can be used to fund other projects and the leased DAS becomes an expense for the operator. This process has been used in North America at some university campuses.

Whether the solution is for indoors or outdoors, the Neutral Host provider could design a mobile operator in a variety of ways. The primary decision relates to how the system RF power will be distributed. The design could have dedicated amplifiers (related to the DAS remote) for each mobile operator, shared amplifiers among the mobile operators, or a hybrid design where one operator gets a dedicated amplifier(s) and the others share. Some things to note:

- Dedicated amplifier model requires each mobile operator to have its own dedicated layer of amplifiers allowing for individual power control for each operator.
- Shared amplifier model requires each mobile operator's spectrum to be combined together and share the power output of the amplifier.

The total cost is not predictable as capacity loading impacts the available power output of the amplifier. Many times an analysis is completed to show the impact of one method compared to another. However, typically the service providers may choose to demand a set of amplifiers dedicated to their spectrum or services to mitigate interference and service impact should the other carriers modify their network capacity on the system.

DAS Equipment for Neutral Host Projects

The DAS equipment and vendor used for Neutral Host projects should meet three key requirements in order to minimize costs and maximize service flexibility for the Neutral Host operator.

Multi-carrier capability – The DAS should support several mobile operator frequencies in a single system. This minimizes the amount of equipment needed and improves the business case for the Neutral Host.

Scalability – The DAS should scale to support additional sectors, new mobile operators, and new sections of a venue as needs change over time.

Technology Investment – The DAS vendor should be conducting ongoing research and development into methods to support new protocols and technologies that meet future demands.

CommScope's FlexWave digital DAS solutions meet these needs, and are among the most popular systems for Neutral Host deployments. FlexWave DAS supports up to eight mobile operator frequencies with a single set of electronics. CommScope's DAS architecture delivers maximum flexibility for design and maintenance since it's highly modular on the front end with the ability to interface both RF and digital connections and at the remote end by being able to add RF amplifiers incrementally. CommScope DAS can even expand to thousands of remote antennas. CommScope's digital systems are designed to allow investment in-line with today's needs but last as networks evolve.

CommScope has been a DAS market leader for more than twenty-five years and invests millions of dollars each year in research and development to remain at the forefront of DAS technology. CommScope's has been deploying digital DAS solutions commercially for more than fifteen years at some of the most high profile global sporting events, political conventions, and more. Tens-of-thousands of CommScope DAS systems have been deployed around the globe for multi-operator applications in stadiums, hotels and convention centers, malls, campuses, in high-rise buildings, and in urban and suburban areas to help people share information and make connections.

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