FORTIFY YOUR LTE DAS SYSTEM

Make Antenna Selection a Top Priority

Over the past few years, the wireless communications market witnessed a surge in new installations and upgrades of Distributed Antenna Systems (DAS) worldwide.[1] DAS systems are used to overcome isolated areas of poor coverage within a venue, and typically use a fiber link to distribute transmission signals from a base station to a series of RF antenna nodes located throughout a floor, or across multiple floors in a building site. Wireless carriers reported a shift in network traffic from voice to data, with data now occupying a 98% share of network traffic. The spike in data traffic is a direct result of a change in human communications activities, prompted by greater use of data and video driven wireless personal devices, such as smartphones and tablets both at home and at the work place.[2]

The shift to data quickly overwhelmed the capacity of legacy voice-based cellular DAS systems. The inability of these systems to handle the enormous bandwidth requirements of data transmissions has caused real difficulty for network operators and carriers to maintain quality service. Enterprise and consumer users alike demand faster connectivity to support their day-to-day communication. To compound the problem, recent mandates for public safety require more interoperable networks that optimize wireless coverage and enhance communications among first responders and users in both indoor and outdoor public venues.

In order to remain competitive and compliant with new market demands, carriers and venue managers began to upgrade their legacy networks by implementing 4G Long Term Evolution (LTE) standards. 4G LTE based networks provide faster data rates and improved bandwidth capacity while operating along a wider range of RF frequencies. Market estimates forecast more than 3.7 billion 4G LTE subscriptions globally by the end of 2020[3]. As a result, DAS network upgrade projects are taking place in entertainment sites, sports arenas, subway train stations, embarkation ports and university campuses, as well as corporate and commercial retail plazas worldwide.

While network operators have deployed cellular DAS systems for many years, the convergence of voice and data has presented new challenges as these networks get upgraded to support multiple vendors in venues servicing a large number of users. DAS networks must be host-neutral to provide clear voice communications, fast real-time data rates and maintain a positive user experience. Because the 4G LTE standard covers a wider range of frequencies, DAS network operators are hard-pressed to maintain quality levels among carriers, who each use higher power RF signals to strengthen their own communications link, often to the detriment of other carriers' network signals.

REFERENCES

1. "Distributed Antenna Systems Market." October, 2015. 03 May 2016 <http://www.marketsandmarkets.com/Market-Reports/distributed-antenna-system-equipment-market-25689918.html>.
2. "State of the Radio Access Network (RAN)." www.amdocs.com. 2014. 24 April 2016 <http://www.amdocs.com/news/pages/amdocs-research-mobile-data.aspx>
3. "Ericsson Mobility Report." June 2015. 24 April 2016 <http://www.ericsson.com/res/docs/2015/ericsson-mobility-report-june-2015.pdf>

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In order to mitigate the problem, network designers must reduce Passive Intermodulation (PIM) distortions caused by the presence of two or more signals that mix or multiply, resulting in undesired noise in the communications stream. This interference often results in dropped calls or slower data transmission rates. Several unintended factors can produce noise and signal distortions among the mechanical components of a communications network. These include, but are not limited to, loose connections, metal-to-metal interaction among components, oxidation, or other contaminants. It is, therefore, extremely important to reduce the overall PIM risk in a network by selecting only the lowest PIM components at the planning stage, prior to installation and deployment.

While certainly not the only PIM-susceptible component in the network, the antenna is arguably the most crucial component to the success of the entire DAS system. Unfortunately, low PIM antenna selection is often overlooked or underestimated with disastrous and costly consequences to the project. 4G LTE DAS antennas must be able to provide multiple RF band coverage, with consistent signal strength and optimal noise suppression, regardless of the carrier network. In order to achieve this level of performance, many new DAS systems require diversity (two antennas per DAS node site) to improve connectivity. In denser RF locations, many integrators also incorporate 802.11ac Wi-Fi multiple input, multiple output (MIMO) technology for network redundancy, as a fail-safe measure. As a result, the demands on DAS antenna RF design and development have become more rigorous and complex for RF efficiency, radiated pattern shaping and PIM mitigation.

In parallel, aesthetic considerations are now more important, and durability requirements are more stringent, with the increased deployment of DAS networks in public venues. Not only must network designers consider architectural and government ordinance aesthetic or installation requirements, but antennas must also be rugged, compact, and resistant to theft and vandalism in both indoor and outdoor environments.

The mechanical properties required to satisfy these requirements, coupled with the cost pressures of supporting more complex RF designs, require cost-effective antenna solutions that do not compromise the quality of the network.

Consequently, performance-to-price ratio should be the top antenna selection criterion for network designers and considered early in the planning stages of a 4G LTE DAS project. Designers should choose antennas developed by RF companies with a reputation for designing and manufacturing quality RF products for Original Equipment Manufacturers (OEMs) and carriers. Preferred antenna suppliers must not only be able to design and manufacture durable and efficient antenna products to support the complex RF environment of today's DAS systems, they must also offer service programs and channel partners that are knowledgeable and prepared to provide technical and sales support throughout the project. In addition, their products must be backed by solid Quality Assurance programs to ensure the success and long-lasting performance of the DAS project.

> Cost effective solutions are clearly needed to address the RF complexity and modularity of 4G LTE DAS networks, but price alone should not be the most important consideration. As these networks become part of the critical communications network in public safety, consequences are severe for using sub-par antennas. In an ever-changing environment, DAS networks are only as strong as their weakest link: *make antenna selection a top priority.*

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