St. Elizabeth Hospital, Ohio, US

Active DAS Solutions for the Healthcare Sector

Overcoming interference Issues from mission-critical medical equipment to provide a robust and cost-effective wireless network

Hospital Coverage Challenges

Mobile coverage at hospitals suffers from heavy interference from medical equipment radiation (e.g. MRI machines) when deploying the traditional coverage solutions such as neighboring outdoor macro systems or dedicated indoor BTS systems. The outdoor networks usually provide insufficient indoor coverage due to large building penetration losses and the high cost of indoor BTS deployment poses a challenge in providing cost-effective network solutions.

Besides coverage problems, the indoor hospital areas encounter crowds with superior QoE demands. Such environments require strong SINR levels to deliver high data throughputs.

The DAS system at a hospital needs to be designed for providing a robust voice and data network.

Project Background

A major hospital in Boardman, Ohio, United States, was experiencing poor coverage issues due to inadequacy of the existing IBS DAS. It was unable to meet KPI requirements with bad to almost no signal at all. The hospital comprises of 7 floors with a new hospital wing under construction.

An upgrade and expansion of the existing network was required to accommodate a multi-operator (AT&T, Verizon) and multi-frequency (700/850/1900/AWS) mobile system which provides cellular, PCS and LTE capabilities. As a result, Comba proposed a full turnkey cost-effective DAS solution to satisfy these network demands.

Solution

Comba proposed an off-air active DAS solution composed of ComFlex optical repeaters. This is a cost-efficient alternative to a dedicated BTS for providing reliable indoor mobile coverage. A wholly passive DAS solution would have been inadequate due to high coaxial cable losses along hospital corridors. In this case, a donor antenna mounted on the roof receives wireless signals from a nearby BTS and feeds them to the mBDA for enhancement. Next, the signals are sent to the ComFlex MU for conversion to optical signals before transmitting them over optical fibers to the RU for signal regeneration and amplification. Finally, these signals are distributed to the antennas through the use of splitters, couplers and coaxial cables.

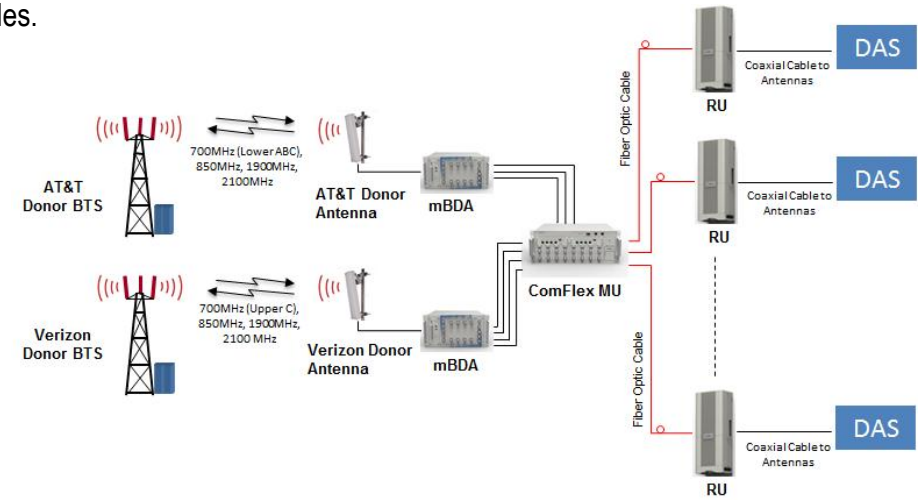

Figure1: Off-Air Active System Diagram

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At the site, Comba's ComFlex 1W DAS was used to deliver the requisite cellular, PCS and LTE services. Each floor used 1 low power RU to provide adequate coverage while avoiding impact to medical apparatus. A total of 7 ComFlex RUs and 1 ComFlex MU were deployed for distributing signals to 42 omni-antennas throughout the hospital. As a result, coverage within the new hospital wing showed an improvement of 20~30dB. In the future, this ComFlex DAS will provide the capability for fast and easy upgrades due to its compact and modular structure.

Coverage Results

The LTE RSRP and RSRQ waltest results for a typical floor plan are shown below.

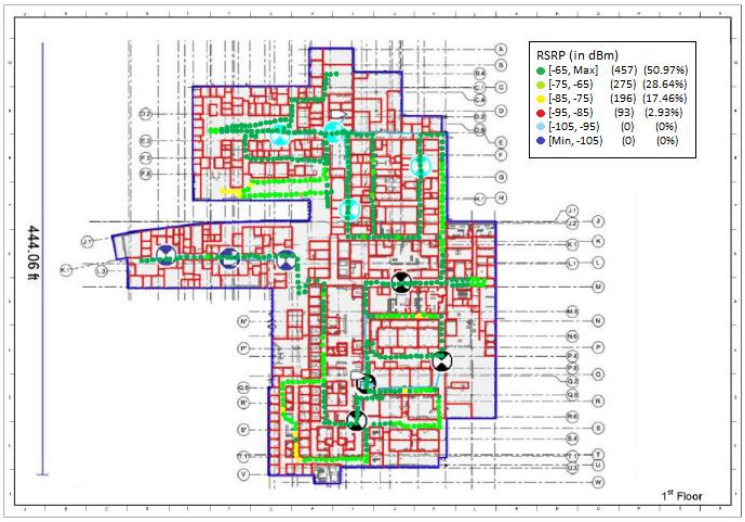

Figure 2: LTE RSRP Walktest Plot

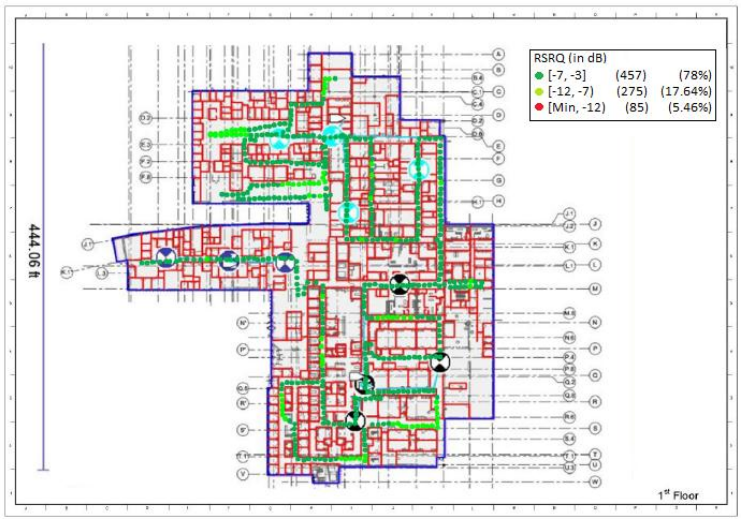

Figure 3: LTE RSRQ Walktest Plot

Site Photos

ComFlex MU
8 RFUs and 7 optical links to RU

Low Power ComFlex RU
30dBm Output Power

mBDA, ComFlex MU and RU Installation
Main Equipment Room

Single Port Donor Antenna
Installed on Roof

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