

# Off-Air Repeater Solution

## For Indoor and Outdoor Coverage Extension



### High Power RX Series Repeater

- Support Bands:  
700/850/900/1800/  
1900/2100/2600MHz
- Output Power:  
37/40dBm
- Indoor/Outdoor



### Medium Power mBDA Repeater

- Support Bands:  
700/800/850/900/  
1800/1900/AWS/  
2100/2600MHz
- Output Power:  
27/30/33dBm
- Indoor/Outdoor



### Low Power Pico Repeater

- Support Bands:  
1800/2100MHz
- Output Power:  
13dBm
- Indoor

### Comba's Off-Air Repeater

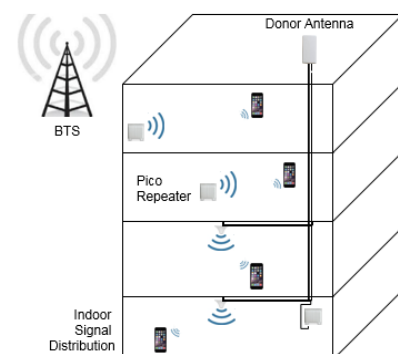
Wireless network ubiquity and connectivity has now become the norm irrespective of indoor or outdoor environments. To meet these expectations, network operators often turn to a tried-and-tested solution that revolves around the deployment of *wireless off-air repeaters*. Repeaters are an extremely flexible solution that can be applied for a wide range of scenarios: from blind spot infill to large area integrated network coverage.

Comba's portfolio of cost-effective off-air repeaters supports multi-operator and multi-band technologies such as GSM, CDMA, WCDMA, LTE and TETRA. With a wide frequency range (700MHz to 2600MHz), it is ideal for rapid network deployment and extension for high-rise buildings, underground car parks, industrial warehouses and many other applications.

### Indoor and Outdoor Coverage

*Indoor off-air repeaters* amplify wireless signals from a base station and enables coverage inside a building. *Outdoor off-air repeaters* are used to extend service coverage into areas that are blocked by other buildings or geographic conditions such as hills. Both indoor and outdoor repeaters incorporates *Interference Cancellation Systems (ICS)* with additional gain, thus greatly extending signal coverage areas.

Figure 1: Indoor Coverage with Off-Air Repeater



Reference Case:



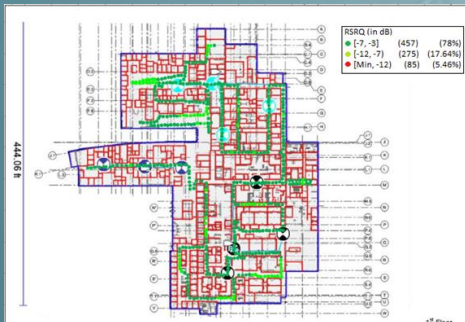
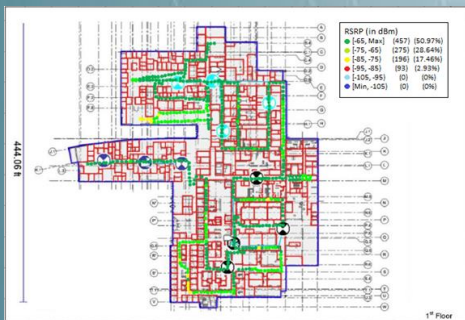
A Major Hospital in Boardman, Ohio, US

Challenges:

- Poor Indoor Coverage
- New Building Expansion
- Upgrade to LTE

Solutions:

- Comba Full Turnkey Off-Air Repeater Active DAS Solution
- Support multi-operator and multi-frequency (700/850/1900/AWS)
- mBDA repeater multi-band signal extension
- Modular design, ease of future upgrade and expansion



LTE RSRP & RSRQ Walk Test Plots



Figure 2: Off-Air Repeater Deployment Scenario

Interference Cancellation System (ICS)

One of the key challenges in deploying off-air repeater is managing the isolation between the donor and service antennas. The isolation is needed to prevent the feedback of unwanted output signal backtrack to the repeater input. Oscillation may also occur at the repeater output if there is insufficient isolation. Traditionally, off-air repeater isolation requirements are larger than the system gain. With an ICS feature, the system gain can be set larger than the isolation requirement. Thus, the ICS function can cancel the interference up to 30dB. Whenever oscillation occurs, an Automatic Gain Control (AGC) algorithm will adjust the gain accordingly to prevent oscillation.

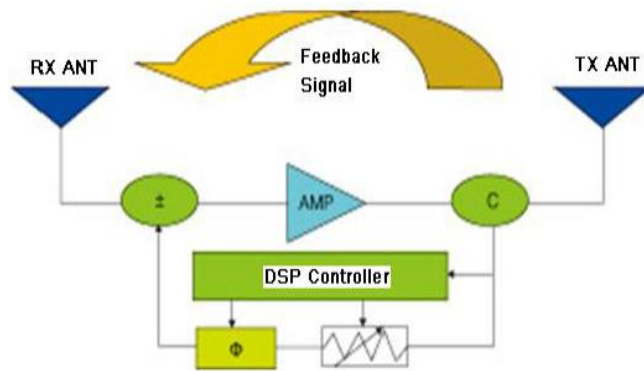


Figure 3: Off-Air Repeater Interference Cancellation System

Effective Coverage Extension

An efficient mobile network signal with data coverage is necessary to facilitate fast and reliable communications. For this purpose, Comba offers the off-air repeater solution which can provide effective indoor and outdoor wireless coverage extension. This solution will also ensure network operation efficiency and yield a superior mobile user experience.