

Case Study

Antenna Isolation Testing with CellAdvisor

Quickly and easily identify radio link issues

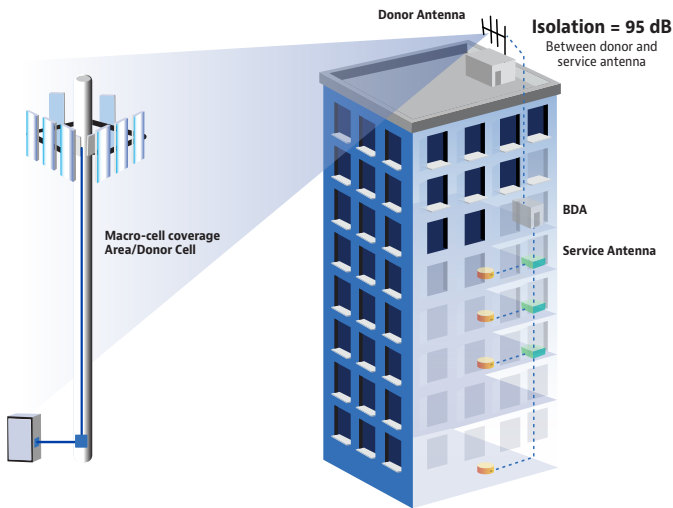
Bidirectional amplifiers (BDA) boost cellular signals inside a building to ensure adequate and reliable cellular coverage. The most frequent problem with an in-building installation is inadequate isolation (path loss) between the roof antenna and those within the building. When isolation is insufficient, the system oscillates due to positive feedback and causes interference. Identifying and correcting these issues in a timely manner is critical for service

A cellular repeater contains a BDA consisting of forward and reverse power amplifiers and duplexer filters for forward and reverse paths. The repeater has two antennas. A donor antenna communicates to the donor base station, and is typically a high-gain (narrow beam) antenna with a high front-to-back ratio to reduce coupling to the coverage/service antenna. A service antenna provides coverage in-building to users.

Background

For several months, a service provider was experiencing problems at one of their in-building networks. Initially, it was thought that the repeater at the site was causing interference, so the repeater was replaced. Yet after the repeater replacement, the performance issue persisted. VIAVI Solution partnered with the service provider and ran an antenna isolation test. The industry standard for minimum antenna-to-antenna isolation is calculated as follows:

$$\text{Antenna to antenna isolation} = \text{BDA gain} + 15 \text{ dB}$$



In this case, the BDA gain was 80 dB, so an isolation of 95 dB was required.

Challenge

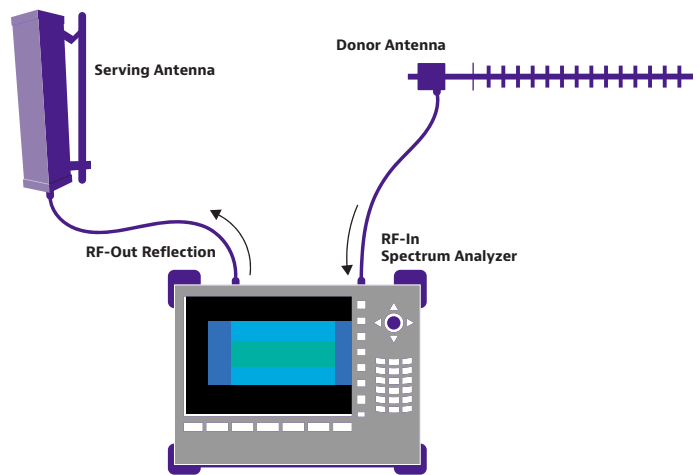
Quickly and easily identifying radio link issues like interference and antenna isolation is a major challenge for the RF industry. Customers require tools that can quickly identify the source of a problem so that correct actions are taken in a cost-effective way.

Solution

The VIAVI CellAdvisor™ with independent CW signal generator and spectrum analyzer functions is a powerful tool for testing antenna isolation. It simultaneously generates a CW signal and measures the RF power from the spectrum analyzer.

Technicians connected two antennas (donor and service) as shown in the figure. The CellAdvisor generated a CW signal at a defined signal level and sent it to the serving antenna. Connected via an input port to the donor antenna, the spectrum analyzer measured RF. The delta between the generated signal level and the received (lower) power level represented the antenna isolation.

Having identified the issue, the technicians tested different antenna locations for the serving antenna until the target isolation and RF coverage was satisfied.



Summary

The ability to identify, isolate, and eliminate interference-related issues in a timely manner is an absolute must-have for service providers. The VIAVI CellAdvisor spectrum analyzer with signal-generation features is a perfect tool for this application.