

# **Active Antennas Improve Wireless Performance**

## BACKGROUND

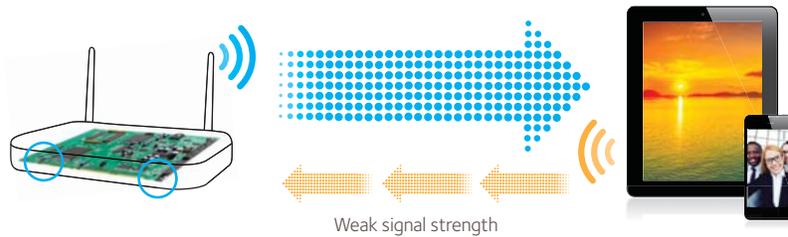
The growing number of wireless devices in the home, coupled with the increasing demand for high speed WiFi connectivity, has placed extraordinary demand on the wireless infrastructure. In response to this demand, many wireless routers now employ external antennas and high power amplifiers to maximize signal power and extend WiFi coverage throughout your home.

While the increased signal power on the router is important, it is important to understand that effective WiFi connectivity requires two-way communication between the WiFi router and clients such as smartphones, tablets, and laptops. The client must acknowledge every WiFi data packet sent by the router; otherwise the router will resend the data packet. Therefore, having a strong signal from the router to the client without a corresponding boost in signal from the client to the router will not provide the full benefit to the user.

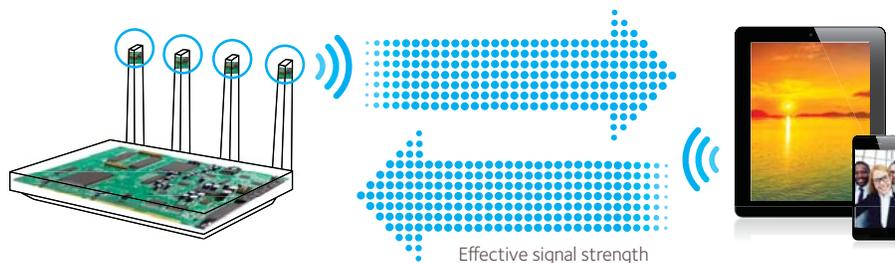
While conceptually this seems simple enough, the challenge lies in the fact that client devices continue to get smaller while integrating more functions and capabilities and simultaneously reducing power consumption to provide enough battery life. As a result, WiFi signal power and performance has not improved on these mobile devices as required, which adversely impacts their WiFi connectivity and performance.

## PROBLEMS WITH TRADITIONAL APPROACHES

In an attempt to compensate for this mismatch, low noise amplifiers (LNA) have been added to the router board to amplify the received signal and external antennas help transmit the received WiFi signal to the router board. The issues with this approach are two-fold. First, transmitting the signal from the external antenna to the router board results in further deterioration of signal



Traditional WiFi router has harder time receiving weaker mobile device signals.



Nighthawk X8 Active antennas compensate for weaker mobile device signals and effectively improve signal strength.

strength and quality. In addition, the router board where the amplification takes place injects noise from other components that reside on it. As a result, not only is the original received signal quality deteriorated during transmission, but noise is also injected from the router board. So the router receives a deteriorated noisy signal for amplification, thereby reducing overall efficacy of the received transmission.

## **ACTIVE ANTENNAS PROVIDE THE SOLUTION**

Active antennas solve these problems. Unlike their passive counterparts that do the amplification on the the router's board, active antennas move the powered amplification component (LNA) to the antenna itself. As a result, there is no signal loss during transmission since the amplification of the received signal is performed in the antenna itself. In addition, since no noise from the router board is present in the antenna, the amplified signal is cleaner. As a result, with active antennas the router receives a much cleaner and less noisy signal for amplification, thereby significantly improving the receive signal and providing a clean, powerful signal that extends the WiFi coverage and performance.

Active antennas help reduce the mismatch between the sent and the received signal by compensating for the relatively poor WiFi on the client side. This WiFi improvement will have a positive effect on a wide range of devices, both new and old, especially mobile devices that are currently experiencing the greatest connectivity challenges.