

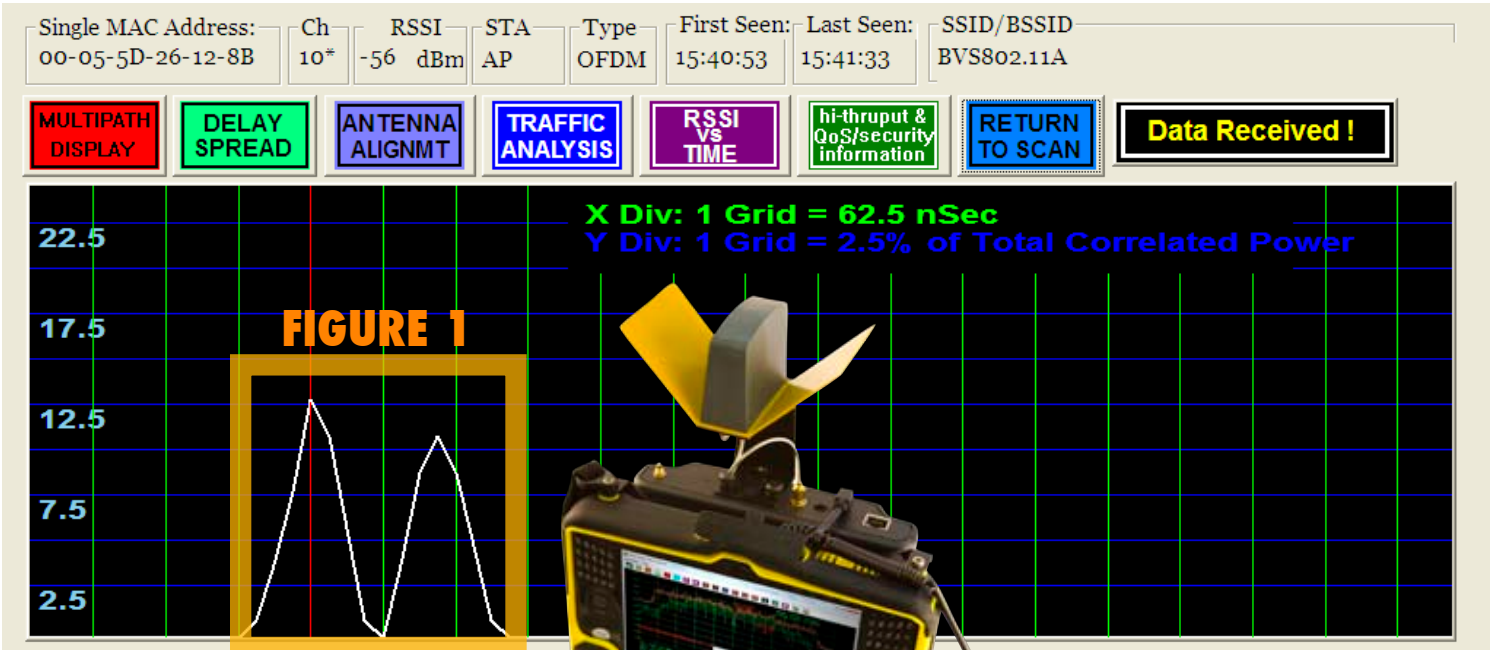
Multipath Detection

BVS Yellowjacket®-TABLET WhitePaper Series



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When radio signals impact objects in the environment, they are absorbed, transmitted and reflected. Depending on the properties of the objects, a significant portion of the power may be reflected. It is common to have signal power from the same transmitter arrive at the receiver through different paths. Since each of these paths typically have different lengths, the signals arrive at the receiver delayed from one another and often with a different RF carrier phase. These signals can combine destructively and reduce the signal power or, if the delays are significant enough, they can cause inter-symbol interference. The combination of signals at the receiver that arrive from different paths is called multipath.

Figure 1 shows a signal arriving at the receiver that is composed of two multipath components. These signals arrive at a time difference great enough to be completely separable.

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Yellowjacket-TABLET's calibrated receiver provides full RF spectrum analysis as well as multipath analysis.

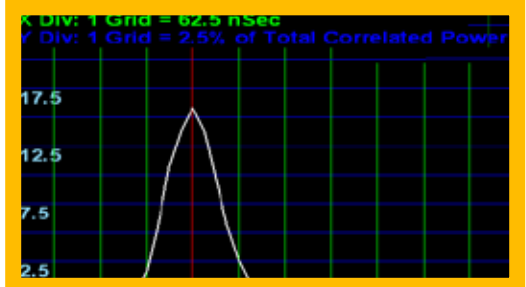


FIGURE 2

How multipath affects



reception depends of the type of modulation. The 802.11 standard has two distinct types of modulation, direct sequence spread spectrum (DSSS) and orthogonal frequency division modulation (OFDM). The DSSS demodulation can separate distinct multipath signals (like the one in the previous figure), but has difficulty with ones that are close in. Close in multipath produces a fatter, shorter looking pulse on the multipath display. In OFDM, a prefix is added to every symbol to absorb the inter-symbol interference. In this case the spread in the multipath display has to be greater then the prefix time (0.8 μs) to have inter-symbol interference; however, multipath still has a filtering effect on the bandwidth of the received signal, so significant multipath is still a concern for OFDM reception.

Multipath analysis on the Yellowjacket allows the operator to identify graphically these different signal paths. The multipath display shows signal power verses time of arrival for a received signal. Allowing the user to see how the signal is being spread out across arrival time. Figure 1 shows a signal arriving at the receiver that is composed of two multipath components. These signals arrive at a