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Remote-Controlled Handheld Analyzers: Opening Up A World of New Possibilities for Remote Monitoring and Education

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KEYSIGHT TECHNOLOGIES

Remote-Controlled Handheld Analyzers: Opening Up A World of New Possibilities for Remote Monitoring and Education

by Wilkie Yu, Agilent Technologies

For technicians and engineers testing RF communications infrastructure, having the ability to make accurate measurements in the field has always been a top priority. The advent of handheld RF and microwave analyzers with performance rivaling that of their benchtop counterparts offered an answer to this need. With these instruments, technicians and engineers gained the ability to make precision measurements in the field, even when conditions were less than hospitable, such as during a snowstorm, aboard a ship sailing through rough seas or at a satellite trailer in a sandstorm. But what about when those measurements need to be made in areas where users can't stay long due to extremely harsh or unsafe conditions? And, how do technicians and engineers working in the field deal with the increasing technology complexity that threatens to make problems easier for them to miss and harder to solve? Moreover, how can future engineers get the hands-on expertise and exposure to modern RF and microwave instrumentation they need to tackle challenging measurement issues?

One capability promising to provide an answer to these dilemmas is remote control. It sounds simple enough, granted, but the ability to remotely control a measurement instrument once it's deployed in the field opens up a world of new possibilities. At the very minimum, it allows instruments to be placed in areas that were previously considered off limits and provides the ideal platform from which educators can expose their students to real-world measurements on actual instruments. As technology grows ever more complex, such capabilities will be critical to ensuring optimal RF communications networks and infrastructure.

Figure 1: FieldFox handheld combination analyzers—known for their precision, durability and multi-functionality—can be configured with up to ten different instruments in a single unit. With FieldFox's remote control capability and the Remote Viewer iOS application, users gain the ability to remotely view and control the analyzer anywhere in the field.

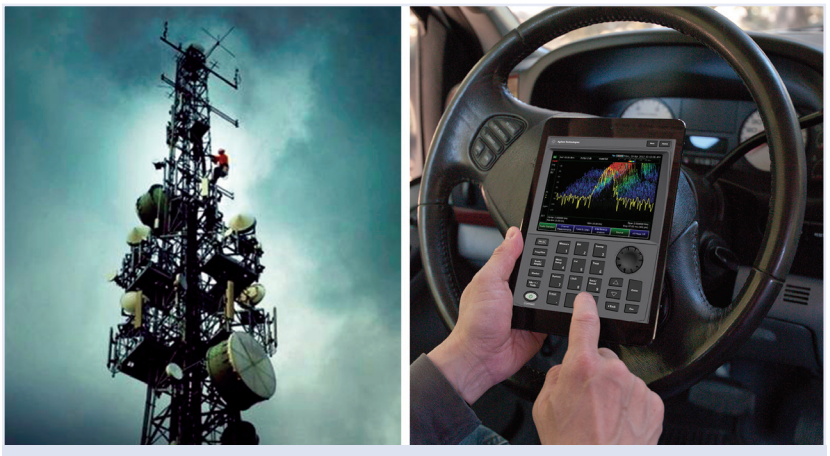

Figure 2: In this scenario, an engineer steps in to remotely help a field technician having trouble solving a problem in the network.

Making Remote Control a Reality

To access the exciting new possibilities that remote control promises, infield measurement instruments must first be able to offer that capability. Unfortunately, most are not designed to operate in the midst of real-world moisture, rain, humidity, dust, or temperature changes, let alone offer a remote control capability. Additionally, they produce results that seldom agree with lab or production-line results and have too short a battery life for field work. Clearly, enabling remote control capability requires access to the technology necessary to remotely connect an instrument to the technician or engineer, wherever they may be located. However, the true value of that capability can only be realized when the instruments in question also have the ability to provide precise measurements and are specifically designed with field-ready ergonomic features.

One way to obtain the remote control capability is by leveraging the power and pervasive reach of the Apple iOS. As an example, consider the FieldFox handheld RF and microwave analyzers, which feature a remote control capability that enables connection to the Remote Viewer iOS application available at the Apple app store. By itself, the Remote Viewer iOS application enables the user to remotely view measurements. Together, the remote control capability and the Remote Viewer allow technicians and engineers to remotely control the instruments via a WLAN or cellular broadband data connection using an iOS device such as an iPad or iPhone (Figure 1).

What makes this remote control capability all the more practical and functional in an instrument like FieldFox is that it delivers precise measurements on par with today's highest performance benchtop microwave solutions and can operate in harsh and wide ranging environments. Additionally, it offers a host of other features specifically tuned for making infield measurements.

Emerging Use Cases

The availability of remote control capabilities in a field-ready, handheld analyzer makes a number of different use cases possible. The most obvious scenarios include remote monitoring and remote education.

Increasingly, high-performance handheld analyzers are being called on to test the power and bandwidth of jamming systems, check the alignment of antennas in point-to-point microwave links, and validate antenna and cable systems in commercial and military aircraft. However, more and more, these measurements must be carried out in areas with extremely harsh or unsafe conditions. In these cases, remote monitoring offers the ideal solution. It allows

users to place the analyzers in areas where they do not wish to go repeatedly due to the difficulty in reaching the location (e.g., at the top of a tower) or, in some cases, can't stay long due to highly hazardous environmental conditions. Additionally, if one technician or engineer has trouble making a measurement or determining the source of a problem in the field, another more technically experienced person not on site can quickly step in to remotely troubleshoot and help solve the problem, which helps minimize rework and multiple trips (Figure 2).

The Remote Viewer iOS application also helps speed the time it takes to find and resolve issues. It provides FieldFox users—assuming the iOS device is already hooked up to WiFi or 3G/4G—quick and easy access to a range of content pertaining to the instrument, including demo videos and technical literature such as user guides, technical overviews, application notes, and datasheets (Figure 3). Having access to this rich resource of information helps technicians and engineers in the field quickly find the data they need to resolve network issues as they arise, right from their iPad. Access to this sort of information also makes remote controllable measurement instrumentation highly advantageous for training and educational purposes.

Increasingly, electronic instrumentation is becoming portable and handheld. Unfortunately, most undergraduate engineering students generally aren't exposed to these types of instruments until they are actually in the workplace. The advent of remote education, enabled by remote controlled instruments, promises to change this situation by providing students the important hands-on test and design experience they need to prepare them for the realities of their future electronics careers.

In a classroom environment, professors can now link to a RF and microwave analyzer in a remote location via an iPad to provide their students instruction on how to remotely control the instrument and make RF measurements (Figure 4). The link, which occurs through LAN connectivity, makes it easy for students to record and analyze measurement readings at a later time. The LAN connection also allows the analyzer display to be converted to a large format for classroom use, and makes the instrument directly accessible to students in distance learning courses. That means a student in Asia, for example, could sign up for an online course offered by the University of Washington and easily access equipment halfway around the world.

With this remote capability, professors are able to directly expose their students to contemporary methods of RF measurement, system debug and design verification. It also provides professors the flexibility to address topics rarely included in undergraduate electromagnetics courses, such as cable fault identification, impedance matching, EMC leakage, filter tuning, interference identification and mitigation, scattering parameters, and spectrum access and allocation.

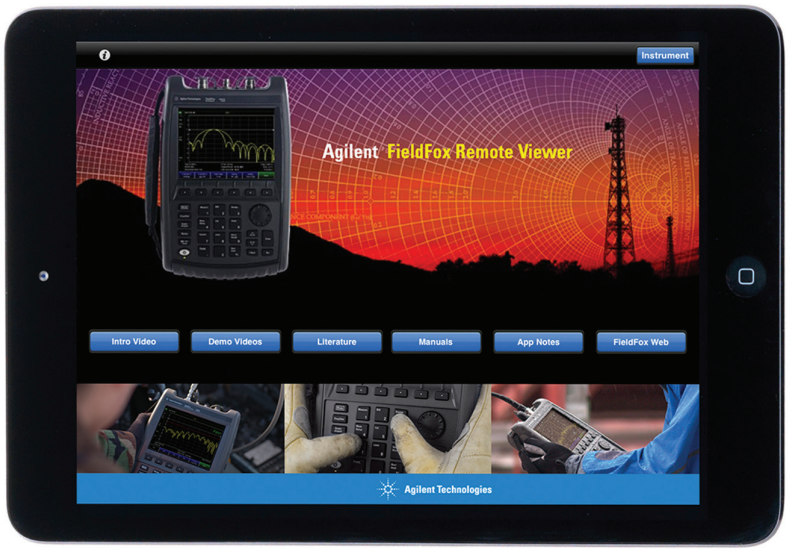

Figure 3: With the Remote Viewer iOS application, available in the Apple apps store, users can view FieldFox measurements and instantly access technical literature on their iPad or iPhone.

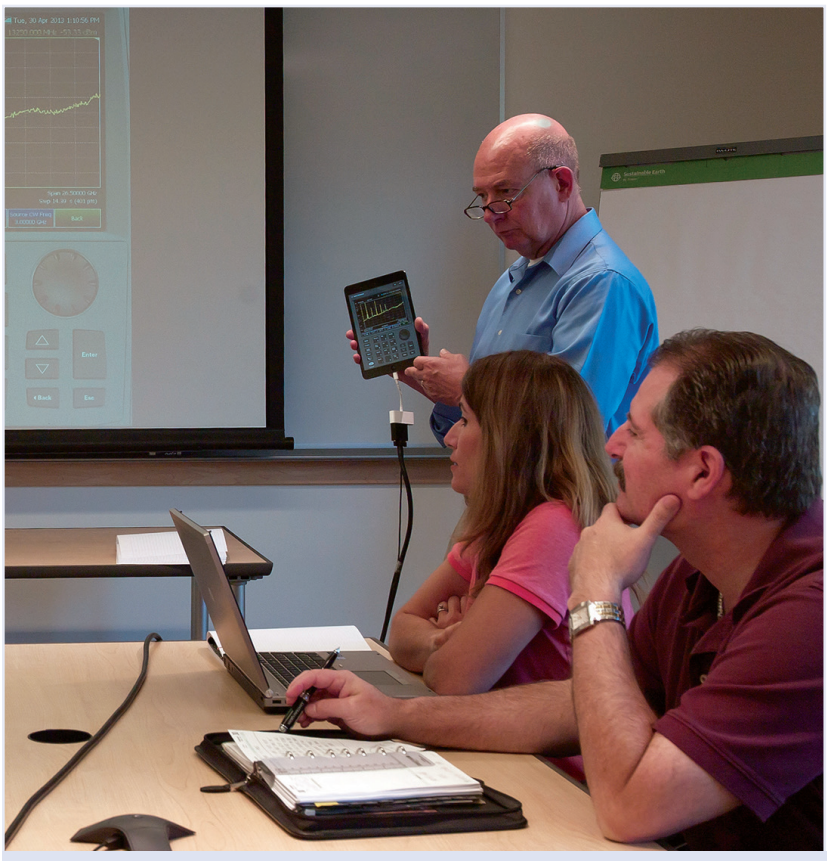

Figure 4: In this scenario, a professor in a classroom teaches his students how to remotely control the FieldFox analyzer.

Conclusion

When testing the RF communications infrastructure in the field, having access to precision instrumentation that's flexible, durable and multifunctional is essential. With remote control capabilities making their way into handheld instruments like RF and microwave analyzers, technicians and engineers now have the ability to conduct remote monitoring in difficult to reach or unsafe environments. Also, they have the flexibility to seek out help from their more experienced co-workers when they encountered a problem they find too difficult to solve, saving both time and money. The benefits of remote control for engineering students are just as pronounced. Educators can use an instrument's remote capability to show students how to make real-world measurements in the field and expose them to some of the more challenging issues they may encounter. At the end of the day, whether used for remote monitoring or education, remote-controllable instruments are quickly becoming essential to helping ensure the optimal operation of current and future RF communications networks and infrastructure.

About the Author

Wilkie Yu is the worldwide marketing manager for Agilent's RF and microwave handheld analyzers. Prior to this role, he was the product manager for Agilent's PXA and X-Series signal analyzers and the Asia business development manager for signal sources. Wilkie also spent some time in China as the market development manager and helped build the local marketing organization. Wilkie holds a Bachelor of Science degree in electrical engineering and computer science from the University of California, Berkeley.

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