Rohde & Schwarz Network Analyzers Use New Method to Measure Group Delay Over Long Distances

Rohde & Schwarz has developed a unique method that accurately measures group delay and phase linearity on satellite links. With the new R&S ZVA-K10 software option, users can perform measurements using two network analyzers located at separate sites. In open-area tests, for example, the analyzers can bridge long distances between a transmitter and a receiver. Unlike with all other test methods on the market, network analyzers do not need to access the local oscillator when measuring frequency-converting DUTs. With the new method, Rohde & Schwarz has solved a persistent and difficult problem in satellite T&M. The new R&S ZVA-K10 option is available for the R&S ZVA and R&S ZVT high-end network analyzers.

Precise measurement of group delay and phase linearity is vital in order to determine satellite communications quality. Today's ever-increasing transmission rates also place more stringent demands on transmission quality. Key parameters for transmission quality are group delay and phase linearity within the useful band. With the test setup from Rohde & Schwarz, users can perform accurate measurements on up- and downconverters used in satellite communications, as well as on complete transmission systems or individual components such as transmitters, receivers or mixers.

The conventional approach to measuring group delay and phase linearity is to connect the input and output of a DUT to a network analyzer via RF cables. However, if the input and output are located far apart, cable losses will degrade the measurement's signal-to-noise ratio. In open-area measurements, cables need to bridge distances of several hundred meters. In addition to causing high loss, cables also introduce significant phase errors even if they are just slightly moved.

The new test method from Rohde & Schwarz provides reliable results. In a test setup with the R&S ZVA-K10 software option, the user connects one network analyzer to the transmit port and one to the receive port. The two network analyzers communicate with each other and synchronize the test sequence between each other via a LAN connection.

Conventional test methods need to access the local oscillator in order to determine group delay and phase shift. This is often not possible, however, because the local oscillator is integrated in the DUT. To solve this problem, Rohde & Schwarz developed a two-tone method. The R&S ZVA stimulates the DUT with a two-tone signal and measures the phase difference between the two carriers at the input and the output. From the phase difference, the R&S ZVA calculates the group delay and the relative phase of the DUT's transfer function. Any changes in the local oscillator's frequency and phase have an identical effect on both carriers and are eliminated by the difference measurement; they do not, therefore, affect measurement accuracy. Users are provided with accurate results.

The R&S ZVA-K10 software option is now available from Rohde & Schwarz. For detailed information about the high-end network analyzer R&S ZVA go to http://www.rohde-schwarz.com/product/zva.html [1].

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