VECTOR NETWORK ANALYZERS
ARM THEMSELVES FOR NEW CHALLENGES

FIFTH-GENERATION (5G) NETWORKS are expected to require wider bandwidths and higher frequencies. As a result, characterizing power amplifiers (PAs) and other components will become even more complicated. To measure these devices, a wide-bandwidth vector network analyzer (VNA) measurement approach can be utilized. In the white paper, "Millimeter-wave VNA characterization using modulated signals," Anritsu discusses how a VNA-based measurement platform can benefit higher-frequency PA measurements for 5G and related applications.

Characterizing PAs for future 5G applications will be extremely vital. However, accomplishing this will be more challenging for a number of reasons. For example, measurement stability and repeatability can be more difficult as a result of higher carrier frequencies. And wider bandwidths and higher frequencies tend to mean lower return losses, which can affect measurement accuracy. The white paper discusses other challenges, as well as PA parameters that play an important role when it comes to wider bandwidths. A wide-intermediate-frequency (wide-IF) VNA platform is one approach to solving these challenges, as it has intrinsic match characterization and correction capabilities. Its inherent capability to ratio helps with stability and accurate power delivery. In addition, the VNA's normal low-level sweep capabilities can help with measurement speed.

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The white paper discusses a measurement setup based on the MS464XB VNA equipped with several options. Modulated signals can be generated by using an external modulated source alongside the VNA. By using either the internal VNA source or an external synthesizer as a local-oscillator (LO), the output of the external source is then upconverted to the desired frequency. The document also discusses calibration, which can significantly impact measurement accuracy.

Several example measurements and scenarios are demonstrated. The first example presents output power measurements of an amplifier supplied with a 60-MHz bandwidth signal. Measurements were performed with both a VNA match correction and a normalization calibration. Another example demonstrated phase-deviation measurements for a 60-GHz amplifier with both VNA and normalization calibration. AM/AM and AM/PM measurements of an amplifier at 40-GHz are also presented for both continuous-wave (CW) and modulated waveforms.

DISCERN BETWEEN WIRELESS MODULES FOR IoT APPLICATIONS

MANY FACTORS MUST be taken into account when developing an Internet of Things (IoT) hardware solution. Wireless embedded modules have simplified the development of IoT hardware. However, one still must consider many factors when selecting such a module for an IoT development project. In the tutorial, "Selecting the Right Wireless Module," Tektronix discusses some of the important aspects that are associated with selecting a wireless module for an IoT application.

The tutorial discusses several different approaches to IoT hardware development. One option is to utilize a chip-design solution, which is a development approach that begins with components like wireless transceiver and microcontroller unit (MCU) chips. A system-on-a-chip (SoC) design solution is another option, as this approach allows development teams to utilize SoCs that can integrate wireless transceivers and MCUs. Yet another approach is to take advantage of an embedded module solution, which is closer to the final product. Embedded modules are ready-to-use solutions that drastically reduce the amount of hardware development work.

Choosing an embedded wireless module also means choosing a wireless standard. These modules are generally developed to follow standardized wireless protocols. IoT communications can be enabled by a number of wireless protocols, which include cellular and wireless-local-area-networking (WLAN) standards. Bluetooth technology is another connectivity option, as well as the IEEE 802.15.4 standard. Additional standards for the IoT include SIGFOX, LoRa, and more. Furthermore, the document discusses compliance requirements, which must be considered when selecting a wireless module. A list of some of the current embedded module vendors is also provided. When selecting a module vendor, it is important to consider additional factors like quality and long-term availability, among others.

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The document concludes by explaining design and pre-production test considerations. To bring a high-performance electronic device to market, it must be tested in all development phases from design to production. Integrating a complete device without performing the required testing can lead to project delays. It is therefore important to use an appropriate set of hardware and software testing tools for IoT devices.