

Rollout of commercial 5G networks is accelerating worldwide. In addition to faster smartphone and tablet data connections, 5G NR also has applications in the industrial fields, including automobiles and disaster prevention. As a key infrastructure for implementing sustainable societies, 5G NR is expected to help solve a variety of issues, including reducing information gaps between people, preventing road accidents, and more.

Anritsu's measurement solutions help ensure compatibility with international standards as well as communication quality at every stage, including the development, manufacturing, installation, and maintenance of smart devices, mobile and fixed networks, cloud data centers, and more for 5G NR communications.



5G NR Smart Device Development

More 5G NR terminals are entering various markets following the rollout of commercial 5G NR services. Companies aiming to reach these markets with competitive, high-quality products offering excellent reliability ahead of the competition need to perform a multitude of tests from the initial design to the product completion stage, to ensure efficient implementation of key functions. The two key points in the development of 5G NR devices are: 1. Support for new functions, such as standalone (SA) operation on all 5G networks, support for VoNR and FR2 (mmWave), conformance tests required at commercial launch in each country, carrier acceptance tests (CAT), and regulatory conformance tests, and 2. Ability to transition quickly to new test solutions required for market penetration.

For Developing 5G Applications without Protocol and Scenario Creation Skills

SmartStudio NR MX800070A



Anritsu developed the SmartStudio NR MX800070A software for controlling the Radio Communication Test Station MT8000A test platform by leveraging its experience in 3G and 4G technologies and listening to customers' development requirements for new 5G NR devices. By operating the MT8000A as a Call Box the built-in state-machine based GUI makes it easy to simulate 5G NR/4G LTE base station operation and core networks without requiring specialist knowledge about protocols or scenario creation. The operation of customer-developed applications over 5G networks, including testing Throughput, simulating quasinormal and abnormal conditions when using IMS, SMS, PW, and Network Trigger, and connecting to the Internet, can be examined easily to facilitate efficient confirmation of actual device performance.

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3GPP-Compliant RF Conformance Test System

New Radio RF Conformance Test System ME7873NR



The New Radio RF Conformance Test System ME7873NR is an automated system for 3GPP TS 38.521/TS 38.533 5G NR RF/RRM tests and it is registered by GCF and PTCRB as RF/RRM test platform TP250 for 5G NR. It supports both standalone (SA) and non-standalone (NSA) modes for 5G NR; combined use with the CATR Anechoic Chamber MA8172A for implementing a 5G OTA (CATR) test environment covers the frequency band from Sub-6 GHz to mmWave used by 5G.

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Acceptance Tests for Key World Carriers Protocol Conformance Test System for Carrier Acceptance Tests (CAT)

5G NR Mobile Device Test Platform ME7834NR



The 5G NR Mobile Device Test Platform ME7834NR is for 3GPP based Protocol Conformance Tests (PCT) and Carrier Acceptance Testing (CAT) of mobile devices incorporating Multiple Radio Access Technologies (RAT). The ME7834NR covers the 5G frequency bands defined by 3GPP including Sub-6 GHz and mmWave when combined with an OTA chamber and RF converter.

Furthermore, testing can be transitioned easily to 5G from LTE, LTE-Advanced (LTE-A), LTE-A Pro, and W-CDMA.

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5G NR Base Station Development

Commercial 5G NR services are already being rolled out. Both 5G NR mobile devices and 5G NR base stations are needed to make the best use of the fast and large-capacity, multiple-connection, and low-latency features of the 5G communications standards. In addition to using the sub-6 GHz frequency band now used by the 4G LTE standard, 5G NR also sends and receives using higher frequency bands at about 30 GHz, called the millimeter waveband (mmWave band). Additionally, the development of devices supporting wideband signals is required to implement high-speed, large-capacity radio communications.

For Cost-Effective Evaluation of High-Frequency, Wideband 5G NR Base Station Signals

Signal Analyzer MS2850A



The Signal Analyzer MS2850A supports evaluation of TRx characteristics at R&D of 5G NR (sub-6 GHz, mmWave) devices. It is also for researching new applications and base stations using 5G NR. It includes a built-in vector signal analyzer covering a frequency range of 9 kHz to 32 GHz/44.5 GHz with a maximum analysis bandwidth of 1 GHz. The high-speed, large-capacity digitizer function coupled with optional modulation analysis function combine to off er a high-performance, multifunction, benchtop signal analyzer with excellent cost-performance ratio for both R&D and manufacturing applications.

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Waveform Generation for Evaluating 5G NR Base Station RF TRx

Vector Signal Generator MG3710E



The Vector Signal Generator MG3710A is a high-general-purpose signal generator with excellent RF performance and baseband functions for outputting modulation signals required by communications systems, including 5G NR (sub-6 GHz), LTE-Advaned FDD/TDD, 802.11ac, etc. It has a 2-waveform addition function for tests combining wanted and interference/AWGN waveforms, as well as an optional 2nd RF output.

5G NR Sub-6 GHz to mmWave Small Vector Network Analyzer for Passive Device Development

Modular 1 port Vector Network Analyzer MS46131A



The ShockLine[™] MS46131A series consists of three modular, PC-controlled 1-port vector network analyzers (VNAs) with frequency ranges from 1 MHz to 8/20/43.5 GHz. Anritsu's patented nonlinear transmission line (NLTL) technology VNA-on-chip technology simplifies the internal VNA architecture, reducing the size and cost of the instrument while enhancing accuracy and measurement repeatability. The ShockLine MS46131A series is small and portable enough to bring the VNA port to the device under test (DUT), improving measurement stability and simplifying test configuration by eliminating test port cables.

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5G NR Field Test Solution

In addition to leveraging the sub-6 GHz frequency band currently used by 4G LTE, 5G NR also sends and receives in higher frequency bands around 30 GHz, called the mmWave band. From the perspective of the radio wave environment, not only are 5G NR signals being added to an already congested frequency bands. Network operators must commission and test these new 5G NR deployments using different methodologies all while ensuring that their existing 4G LTE network services remain uninterrupted.

For On-Site 5G NR IQ Data Analysis and EMF Power Testing

Field Master Pro[™] MS2090A



The Field Master Pro[™] MS2090A can capture IQ data at frequencies up to 54 GHz and bandwidths up to 110 MHz. Intermittent interference can be analyzed from detailed 5G NR signals captured onsite. Additionally, the MS2090A helps assure safe radio-wave environments by confirming that total radiated power does not exceed government (FCC and ICNIRP) recommendations using power measurements corrected by the optional EMF meter.

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Compact, Lightweight, and Economic CPRI-Based RF and PIM Analyzer

IQ Fiber Master™ MT2780A



The new IQ Fiber Master MT2780A solution is a first line of defense in detecting PIM. This CPRI-based solution conducts critical PIM diagnosis across multiple bands and sectors using live traffic. Cell sites remain active during testing as this instrument uses a non-invasive process identify PIM levels, locations, and conduct RF spectrum analysis to efficiently hunt and debug PIM and interference issues.

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All-in-One support from network equipment testing & evaluation to network I&M

Network Master Pro MT1000A/MT1040A



The portable Network Master Pro MT1000A/MT1040A tester supports various network interfaces, including Ethernet from 1.5M to 100G, OTN (OTU1 to OTU4), eCPRI/CPRI/OBSAI, FC, etc. Its wide application range includes PTP clock sync accuracy evaluation for Ethernet up to 25G, IP broadcast circuit quality evaluation, 4K/8K video streaming IP network evaluation, 5G/local 5G network evaluation (latency), GIGA-scale construction evaluation and more.

Additionally, MT1040A has built-in function for analyzing the essential Forward Error Correction (FEC) used by 400G Ethernet, facilitating quality and performance evaluation of QSFP-DD and OSFP optical modules.

(For further information of the MT1000A, see page 99) (For further information of the MT1040A, see page 95)

400G/800G/PCIe® High Speed Solution

Data centers supporting next-generation, high-speed, large-capacity 5G mobile communications are progressing with introduction of equipment meeting the 400GbE communications standard, while also starting investigation of 800GbE and 1.6 TbE standards to facilitate even faster speeds. The PAM4 transmission method used by 400GbE expresses digital data using four voltage levels per unit time to transmit twice as much data compared to the earlier conventional NRZ*6 method. However, due to the narrower differences between the four voltage levels, the greater susceptibility to noise and transmission path losses makes error-free transmission more difficult than using the conventional NRZ method. As a result, error correction using FEC is applied to assure transmission quality. Consequently, evaluation of devices and transceivers supporting PAM4 not only requires jitter tolerance and sensitivity evaluations based on conventional bit error and error-free measurements, but also requires measurement of error correction capability using FEC.

Support 400 GbE/800 GbE and PCIe 4.0-5.0. All-in-One Support for Evaluating Next-Generation NRZ/PAM4 Network Interfaces and High-Speed Serial Buses

Signal Quality Analyzer-R MP1900A



The Signal Quality Analyzer-R MP1900A is a plug-in modular multichannel BERT; the PAM4 BERT module supports bit error rate (BER) measurements of 400G high-speed interfaces as well as next-generation 800G. With high-quality waveforms up to 64 Gbaud and high input sensitivity performance, it provides strong support for PAM4 device certification. Additionally, the all-in-one Jitter Addition, Clock Recovery, Equalizer, Emphasis, PAM4 Pattern Editing, Capture, SER functions, and more, make it easy to configure a PAM4 measurement system with high-reproducibility measurement results.

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Development and Manufacturing of Multi-channel Optical Modules for 10G to 800G

BERTWave[™] MP2110A



The BERTWave[™] MP2110A supports all-in-one simultaneous bit error rate (BER) and Eye pattern analysis of eCPRI/RoE optical modules used by 5G mobile networks, helping improve work efficiency. Moreover, a sampling oscilloscope supporting both NRZ and 53-Gbaud PAM signals offers easy analysis of Eye patterns at CPRI to eCPRI/RoE bit rates.

(For further information, see page 82)