Anritsu envision : ensure

Measurement Improves CPE Product Quality

Radio Communication Test Station MT8000A
Radio Communication Analyzer MT8821C
Wireless Connectivity Test Set MT8862A

1. Rapid spreading of CPE (Customer Premises Equipment)

The recent popularity of high-definition video streaming services, such as Netflix, Amazon Prime, etc., is driving the high growth rate of Internet traffic. Additionally, the increase in home-based teleworking and e-learning as a result of the COVID-19 pandemic requires faster network speeds. Although optical fiber networks are good candidates for fixed communications, they are still less common, especially in the US and EU, due to the cost and time required to install optical fiber to the home (FTTH).

As an alternative, there are high expectations for adoption of 4G and 5G NR communications as Fixed Wireless Access (FWA) WAN offering high throughput for large data transfer. Consequently, the latest WLAN IEEE 802.11ax standard is being adopted widely for indoor LAN. FWA networks use 4G/5G Customer Premises Equipment (CPE) as the terminal unit. Moreover, leading companies are starting industrial digital transformation trials using Local/Private 5G networks to improve efficiency and productivity, creating a new trend in 5G CPE use cases. Accordingly, by late October 2020, CPE ranks second after smartphones in number of commercial 5G devices (GSA, 5G DEVICES EXECUTIVE SUMMARY).

Overview of FWA with CPE

2. Why Measure?

Measuring CPE performance before commercialization using the following tests **enhances product quality and user satisfaction**. Additionally, CPE vendors can add product value by acquiring operator approval.

- Generally, compliance with 3GPP and IEEE802.11 standards, such as **RF parametrics,** is guaranteed by module vendors, but sometimes RF characteristics of finished CPE change due to shape/materials/parts placement, so CPE vendors should re-check finished products by themselves.
- 4G IoT **operator acceptance** test criteria differ with each operator; some use module acceptance tests and list approved modules on their website. However, this may change with 5G rollout, because mmWave stability depends on useage conditions, so CPE vendors need to preprare an OTA chamber/box to start mmWave pre-testing.
- End-device venrdors are required **OTA** test as a part of operator's acceptance test from 4G era, and it will be required consequently as the efficient indicator for antenna performance with 5G as well.

- **Functional tests** check device behavior using stress conditions, such as maximum throughput rate while running multiple applications, etc., to check battery life, thermal status, firmware regression, etc. Historically, functional tests to improve the user experience are run on cellular systems, including LTE-A and 5G NR, using vendor-specific indicators with devices under end-user usage conditions.

Test Types	Indicators	Purposes
RF Parametric	• NR: 3GPP RF TRx test specification • WLAN: IEEE 802.11 - Output power, Frequency error, EVM, OBW, Receiver sensitivity level, etc.	• Checks RF TRx performance in accordance with common test specificatons • Mostly required by operators
Operator Acceptance	• Operator-specific test criteria	• Verifies whether device meets with operator's test criteria
OTA	• CTIA OTA test specification - TRP, TIS	• Verifies antenna performance • Sometimes required by operators
Functional	• Throughput measurement at IP layer - Internet connection - Max., Avg., Min. throughput value - Device security robustness • Operation stability during connection - Application software operation • SMS • USIM/eSIM authentication	• Tests to improve customer safisfaction • Tests device behavior to check: - Battery life, Thermal status - Firmware regression - Benchmark for selecting wireless module - CPE under heavy load • Generally, end-device vendor-specific parameters (as well as RF parametric, operator acceptance, OTA tests)

3. Answer from Anritsu

Anritsu offers three products for CPE R&D and QA. These testers have a Signaling Mode to establish call connection by functioning as a base station or access point. The Signaling Mode is effective for evaluating end-device RF performance, such as OTA TRP/TIS, because there is no need to use test firmware or a device control interface.

✧ **Key advantages**

- MT8000A + MT8862A with unique Signaling Mode for both 5G NR + WLAN
- MT8000A + MT8821C supports efficient parallel NR + LTE spectrum, EVM, TPUT tests for RF parametric test
- MT8000A/MT8862A with wider dynamic range optimized for stable OTA test of CPE supporting 5G + WLAN
- MT8000A/MT8862A are integrated in partnership with third-party makers of OTA chambers
- MT8000A GUI; SmartStudio NR script-editing-free, turnkey solution for operator acceptance pre-tests
- MT8000A supports FR1 DL2CA+4x4MIMO, FR2 DL8CA+2x2MIMO, ready for the throughput test with SA
- MT8821C supports LTE DL6CA and 4x4MIMO[*1] which are already supported by the latest chipsets for NSA
- Wide module-vendor installed base using same testers
- Powerful tool for automating RF parametric test

Model	Name	Outline
MT8000A	Radio Communication Test Station	5G NR: Sub-6 GHz/mmW[*2], FDD/TDD, NSA/SA, RF/Functional tests
MT8821C	Radio Communication Analyzer	Legacy systems: 2G/3G/LTE-A FDD/TDD, LTE Anchor in 5G NSA[*3]
MT8862A	Wireless Connectivity Test Set	WLAN: IEEE 802.11a/b/g/n/ac/ax, STA/AP mode

[*1]: Requires multiple MT8821C units, depending on CA + MIMO configuration
[*2]: Requires OTA chamber/box separately. We provide MA8172A for CATR method RF test, MA8161A for functional.
[*3]: By interlocking with MT8000A

Radio Communication Test Station
MT8000A

Radio Communication Analyzer
MT8821C

Wireless Connectivity Test Set
MT8862A