Wireless Connectivity Test Set
MT8862A
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Market Trend & Solutions
Rise of Non-cellular IoT Devices and Diversifying Wireless Standards

Increase in non-cellular IoT devices

The number of Short-range IoT devices is expected to increase in future and will exceed the number of mobile phones. It is assumed that IoT devices will be used for IoT that will expand in the future.

Source: ERICSSON MOBILITY REPORT JUNE 2017

OTA testing and IEEE 802.11ax spread rapidly

11ax (Wi-Fi 6) is growing rapidly from 2019, it will be the main standard on WLAN specification behalf on 11ac. Also The demand of OTA test is expected to be increasing for the quality assurance with a focus on Smartphone market.
Expanding WLAN Applications & Increasing Device Complexity

Expanding WLAN applications

WLAN applications are expanding, and usage environments and quality requirements are changing. On this background OTA test with network mode is paid a lot of attention.

Increasing device complexity

Devices are using more wireless technologies and antennas year-by-year, increasing device complexity. Therefore, shipping products need evaluation more than ever.

Applications

- Industry (Industrial IoT)
- Automotive (In-Vehicle Infotainment)
- Consumer Electronics (Smart Home)

LTE (MIMO)  
WLAN (MIMO)  
GNSS NFC ...Others  
Bluetooth
Solutions from Development to Production

Anritsu has solutions for every stage.
Changing mode Tailored to Use

Choices matching measurement use because MT8862A has two measurement mode.

<table>
<thead>
<tr>
<th>Network Mode</th>
<th>Direct Mode</th>
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<tr>
<td>Advantage</td>
<td>Easy test environment with no DUT control because measured using standard connection</td>
</tr>
<tr>
<td>Disadvantage</td>
<td>Time to establish connection</td>
</tr>
<tr>
<td>Use</td>
<td>Product development  Design validation  End-product verification</td>
</tr>
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</table>

Wireless Connectivity Test Set
MT8862A
MT8862A Product Introduction
Quality Assurance of Diverse and Complex Devices

The Wireless Connectivity Test Set MT8862A supports an RF performance measurement environment under realistic operation conditions (Network Mode).

**Wide Connectivity Support**
Connections are supported in the IEEE802.11a/b/g/n/ac/ax*1 2x2MIMO AP and STA modes. Additionally, supporting securities, WEP, WPA-Personal and WPA2-Personal, makes measuring various devices connect in the Network Mode.

**Intuitive GUI**
Setup and measurement use a browser GUI with access to Web servers from the PC controller using a Web browser. Control software installation and firmware matching are unnecessary, and there is no dependence on the PC controller OS.

**Built-in IP Data Ports**
Ethernet ports for IP data are built-in and IP continuity tests, such as ping between the external PC client and DUT can be performed under the same fixed-parameter conditions as at measurement. Tx measurements are also supported during IP data communication *2.

*1: 11ax supports SISO and HESU(Single user) and HETB(Multi user for STA).
*2: 11as doesn’t support IP data communication.
Advantages of RF Measurement in Network Mode

The MT8862A Network Mode supports configuration of an RF measurement environment without test firmware, chipset control, and hardware modification.

No Test Firmware
Firmware used by commercial products can be tested and RF measurements can be made without needing test firmware. RF control faults which can’t be found with test firmware can be analyzed.

No Chipset Control
Chipset control required by test firmware is unnecessary and measurement is performed at the required data rate using a unique data rate control algorithm, helping unify the measurement environment for different parts used by chipsets.

No Hardware Modification
Since no interface is required for chipset control, RF tests can be run without modifying devices. This is ideal for RF measurements of devices without interfaces due to needs for miniaturization, enhanced durability, and cost control.
MT8862A’s feature

**Provides flexible RF tests from OTA to Conducted**

**Data Rate Control Function**
MT8862A can control data rate on the all standard in IEEE 802.11 a/b/g/n/acはIEEE802.11a/b/g/n/ac/ax. The other WLAN tester cannot control data rate on 11ac/ax. Data rate control is required to check the antenna performance of DUR.

**Wide Dynamic Range**
MT8862A can demodulate low power and wide-band Wi-Fi signal by wide dynamic range. It is very important key feature on the OTA test environment has a big air loss. All Anritsu RF testers has this feature with priority.

**MIMO measurement**
MT8862A realizes 2x2 MIMO test on OTA. MT8862A is only WLAN tester to measure RF performance on MIMO OTA environment. The demand of MIMO OTA test is increasing for User experience.

**High Speed measurement**
MT8862A measures RF performance so quickly by maintaining the connection when parameters are changed.
DUT Tx Test

- RF transmit tests are based on IEEE 802.11.
- The headers of packets received from the DUT are analyzed and RF measurements, such as power, modulation accuracy, spectrum, etc., are performed to display results. Pass/Fail evaluation of measurement results is performed based on the set reference values.
- At ACK measurement, the MT8862A sends an Test Packet to the DUT; at Data measurement, it sends a ICMP Echo Request packet. Tx measurement is performed when either the ACK or ICMP Echo Reply sent from the DUT is received.
- Packets sent using the IP data TRx ports can also be measured.
DUT Rx Test

- RF receiver tests are based on IEEE 802.11.
- PER/FRR is measured by counting ACK frames sent from DUT in response to Test Packet.
- Configuring a measurement environment is easy by changing power automatically.
- The PER (Packet Error Rate) standard of the Receiver Blocking test in ETSI EN 300 328 V 2.1.1 has been added for broadband wireless devices operating in the 2.4 GHz ISM Band, including WLAN. This test is done easily using the PER measurement function of the MT8862A and a signal generator to generate the interference wave.
Frame Capture for Troubleshooting DUT Connections

- The WLAN Measurement Software MX886200A captures WLAN frames sent to and received from the DUT. Captured logs can be saved by the PC controller in pcap format for analysis by software such as Wireshark. This eliminates the need for a separate packet sniffer to capture WLAN frames and supports troubleshooting of WLAN frames in the RF measurement environment.
2x2MIMO Tx Test / Rx Test

- RF Performance of 2x2MIMO signals can be measured by 2 boxes in IEEE802.11n/ac.
- RF Tx test results will be showed by measurement of power and spectrum and analysis a packet header received from DUT.
- RF Rx test results will be shown as PER and FRR measurement by counting ACK frames.
Remote Control Environment

- Using the MT8862A, remote-control protocols, such as HiSLIP, VXI11, etc., for controlling instruments using the general-purpose Raw-Socket connection method, can be selected to match an existing remote-control environment.
- The same remote-control commands are used for the GUI running on the Web browser and the GUI remote control command log can also be captured. Creation times are greatly reduced by using remote-control command sequences.
- In addition, sample sequences are also provided for the SmartStudio Manager MX847503A for the MT8862A.
MT8862A Applications
OTA Measurements using OTA Chamber

- As WLAN applications diversify, WLAN devices and their usage environment are becoming more complex, resulting in a growing need to quantify and verify that antenna characteristics meet the design specifications by testing antenna characteristics, such as TX power range, receiver sensitivity, etc.
- Anritsu supports an OTA measurement test environment with OTA chamber vendors for measuring the reception power range and receiver sensitivity, such as TRP/TIS, to validate RF performance in WLAN final-use environments.
IP Data Transfer

- The Ethernet port on the back panel of the MT8862A can be used for exchanging IP data with an external server.
- IP connections between the client PC connected to the DUT and the external server connected to the MT8862A can be checked using the ping function, etc.
- Connections can be checked and RF measurements can be made under fixed parameter conditions, such as data rate.
- When it is necessary to access a specific server on the Internet at DUT connection, the MT8862A can also be used for connection maintenance purposes.
- IP Data transfer supports IEEE 802.11a/b/g/n/ac.
MT8862A measures output power, specified on the radio low, of all frame including connection attempt period by this function.

**Normal mode**
RF measurement starts after call connection established, with Single/Continuous buttons. This mode complies with IEEE procedure.

**Tx Power mode**
RF measurement starts from before connection established at all frames.

**Purpose:** Measure Tx Power before connection is established. Because some devices output max power during the period.

**Target Customer:** Smartphone/PC/Tablet, Operators, Automotive, CE, Test House etc
Appendix
MT8862A – Key Specifications

Connectivity Test Set MT8862A

- RF Input/Output: Main 1, Main 2, Aux (Aux: output only)
- Frequency Range: 2.4 to 2.5 GHz, 5.0 to 6.0 GHz (in 1 Hz steps)
- Input Level Range: –65 to +25 dBm (in 0.1 dB steps)
- Output Level Range: –120 to 0 dBm (in 0.1 dB steps)
- Dimensions: 426 (W) × 177 (H) × 390 (D) mm (excluding protruding parts)
- Mass: 14 kg max.
- Power Supply: 100 to 120 Vac/200 to 240 Vac, 50/60 Hz, ≤ 350 VA
- Environmental Conditions: +5°C to +45°C (operating), –20°C to +60°C (storage)
## WLAN Connectivity (1/2)

<table>
<thead>
<tr>
<th></th>
<th>802.11a</th>
<th>802.11b</th>
<th>802.11g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>5180 MHz to 5825 MHz</td>
<td>2412 MHz to 2484 MHz</td>
<td>2412 MHz to 2484 MHz</td>
</tr>
<tr>
<td>Operation Mode</td>
<td>-</td>
<td>-</td>
<td>ERP-OFDM</td>
</tr>
<tr>
<td>Modulation</td>
<td>OFDM(BPSK, QPSK, 16QAM, 64 QAM)</td>
<td>DSSS, CCK</td>
<td>OFDM(BPSK, QPSK, 16QAM, 64 QAM)</td>
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<tr>
<td>Data Rate</td>
<td>6, 9, 12, 18, 24, 36, 48, 54 Mbps</td>
<td>1, 2, 5.5, 11 Mbps</td>
<td>6, 9, 12, 18, 24, 36, 48, 54 Mbps</td>
</tr>
<tr>
<td>Security*2</td>
<td>WEP, WPA-Personal, WPA2-Personal</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>802.11n</th>
<th>802.11ac*1</th>
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<tbody>
<tr>
<td>Frequency Range</td>
<td>2412 MHz to 2484 MHz</td>
<td>5180 MHz to 5825 MHz</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>20 MHz, 40 MHz</td>
<td>20 MHz, 40 MHz, 80 MHz</td>
</tr>
<tr>
<td>MCS</td>
<td>MCS0 to MCS7</td>
<td>MCS0 to MCS9</td>
</tr>
<tr>
<td>FEC</td>
<td>BCC</td>
<td>BCC</td>
</tr>
<tr>
<td>PPDU Format</td>
<td>HT-mixed, HT-greenfield</td>
<td>VHT</td>
</tr>
<tr>
<td>Guard Interval</td>
<td>Long, Short</td>
<td>Long, Short</td>
</tr>
<tr>
<td>RF Chain</td>
<td>Single (SISO), 2x2MIMO*3</td>
<td>Single (SISO), 2x2MIMO*3</td>
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<tr>
<td>Security*2</td>
<td>WEP, WPA-Personal, WPA2-Personal</td>
<td></td>
</tr>
</tbody>
</table>

*1: 802.11ac connection requires MX886200A-001.
*2: Secure connections require the MX886200A-020.
*3: 2x2MIMO requires MX886200A-010.
## WLAN Connectivity (2/2)

<table>
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<th>802.11ax*¹</th>
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<tr>
<td>Frequency Range</td>
<td>2412 MHz to 2484 MHz</td>
</tr>
<tr>
<td></td>
<td>5180 MHz to 5825 MHz</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>20 MHz, 40 MHz, 80MHz</td>
</tr>
<tr>
<td>MCS</td>
<td>MCS0 to MCS11</td>
</tr>
<tr>
<td>FEC</td>
<td>LDPC, BCC</td>
</tr>
<tr>
<td>PPDU Format</td>
<td>HE SU, HE TB</td>
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<tr>
<td>GI+ LTF Size</td>
<td>HE SU:</td>
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<tr>
<td></td>
<td>“0.8us GI, 1xHE-LTF”, “0.8us GI, 2xHE-LTF”,</td>
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<tr>
<td></td>
<td>“1.6us GI, 2xHE-LTF”, “0.8us GI, 4xHE-LTF”, “3.2us GI, 4xHE-LTF”</td>
</tr>
<tr>
<td></td>
<td>HE_TB:</td>
</tr>
<tr>
<td></td>
<td>“1.6us GI, 2xHE-LTF”, “3.2us GI, 4xHE-LTF”</td>
</tr>
<tr>
<td>RF Chain</td>
<td>Single (SISO)</td>
</tr>
<tr>
<td>Security*²</td>
<td>WEP, WPA-Personal, WPA2-Personal</td>
</tr>
</tbody>
</table>

*¹: 802.11ax connection requires MX886200A-002.
*²: Secure connections require the MX886200A-020.
## Comparison with MT8860C

<table>
<thead>
<tr>
<th></th>
<th>MT8862A</th>
<th>MT8860C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WLAN Connectivity</strong></td>
<td>802.11a/b/g/n/ac/ax 80 MHz bandwidth SISO / 2x2MIMO*1</td>
<td>802.11a/b/g 20 MHz bandwidth SISO</td>
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<tr>
<td><strong>Operating Mode</strong></td>
<td>Network mode [AP/STA]</td>
<td>Network mode (AP/STA/AdHoc) Direct mode</td>
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<tr>
<td><strong>Security</strong></td>
<td>WEP, WPA-Personal, WPA2-Personal</td>
<td>-</td>
</tr>
<tr>
<td><strong>RF In/Out</strong></td>
<td>Main In/Out (N-Type) x 2 Aux Out (N-Type)</td>
<td>Main In/Out (N-Type) Interference In, WLAN Ref In (N-Type)</td>
</tr>
<tr>
<td><strong>RF Maximum Output Level</strong></td>
<td>0 dBm [2.4/5 GHz band]</td>
<td>–3 dBm [2.4 GHz band]/–8 dBm [5 GHz band]</td>
</tr>
<tr>
<td><strong>Control Software</strong></td>
<td>Control GUI on web browser</td>
<td>LANLook, CombiTest (Windows app)</td>
</tr>
<tr>
<td><strong>Remote Interface</strong></td>
<td>Ethernet (VXI-11/HiSLIP/Raw)</td>
<td>GPIB, Ethernet</td>
</tr>
<tr>
<td><strong>Remote Command</strong></td>
<td>MT8862A Native</td>
<td>MT8860C Native</td>
</tr>
<tr>
<td><strong>IP Data Interface</strong></td>
<td>Gbit Ethernet*1</td>
<td>-</td>
</tr>
<tr>
<td><strong>Packet Log</strong></td>
<td>pcap Output</td>
<td>-</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>1MW 4U 390 mm</td>
<td>3/4MW 4U 350 mm</td>
</tr>
</tbody>
</table>

*Red: Additional items, Bold: Changed items*  
*1: It doesn’t support 11ax.*

- Supports 802.11n/ac and AP/STA security connections for more DUT measurements
- Improved usability with separate Tx and Rx RF ports, higher maximum output level, and OTA measurements
- Renewed control software and simpler DUT connection for easier measurement
- Built-in IP data interface for IP continuity tests in reproducible test environment
- Frame capture logs and messaging logging

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**Anritsu** envision: ensure
**Supported status of 11ax**

11ax has four frame formats (PPDU format*). MT8862A supports two use cases, and will add one use case.

- **Single User (STA)**
  - HE SU (not OFDMA)
  - HE SU (not OFDMA)

- **Single User (AP)**
  - HE SU (not OFDMA)
  - HE SU (not OFDMA)

- **Multi User (STA)**
  - HE TB (OFDMA)

- **Multi User (AP)**
  - HE MU (OFDMA)

- **Single User for IoT (DUT)**
  - HE ER SU (Not support)

- **Single User for IoT (AP)**
  - HE ER SU (Not support)

*PPDU = PLCP Protocol Data Unit

*RX test is not defined with IEEE
# 802.11ax Option Test Coverage

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<th>Chapter</th>
<th>Title</th>
<th>Detail</th>
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<th>DUT</th>
<th>Measurement</th>
<th>Remarks</th>
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<td>27.3.14.1</td>
<td>Introduction</td>
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<td>symbol clock error</td>
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<td>HETB Tx</td>
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<td>the arrival time of the HE TB PPDU at the AP</td>
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<td>STA</td>
<td>HETB Tx</td>
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<td>AP/STA</td>
<td>HESU Tx, HETB Tx, HEMU Tx*</td>
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<td>-</td>
</tr>
</tbody>
</table>

* HEMU Tx は 1 2月商品化時は非対応
MT8862A – RF Input/Output Port Specifications

- All ports support output up to 0 dBm for easier configuration of OTA measurement environment.
- A simple system can be configured even when an external amplifier is required by separating Tx/Rx using Aux Output.
- DUTs can be switched during measurement by using the Main 1 and Main 2 ports, supporting automated measurement of multiple DUTs.
- The input level range is –65 to + 25 dBm (Main 1/2).
- The output range is –120 to 0 dBm (Main 1/2 / Aux).
5 GHz Band DFS testing

WLAN, weather radar, marine radar, etc., use the same frequency bands in the 5.3 GHz (Ch52-Ch64[W53/U-NII-2A]) and 5.6 GHz bands (Ch100-Ch140[W56/U-NII-2C]), so the DFS (Dynamic Frequency Selection) technology is used to prevent signal interference when these signals are detected.

Combining the Vector Signal Generator MG3710E with the waveform pattern product supports the DFS test defined by TELEC, ETSI, and FCC for 5 GHz band WLAN devices.
Documents and Firmware Web Downloads

• **Anritsu Web Site**
  - Download catalogs, product introduction, etc.
  - Open access by anyone
  
  https://www.anritsu.com/en-GB/test-measurement/products/mt8862a

• **My Anritsu**
  - Download operation manuals, firmware, tools, etc.
  - Requires creation of My Anritsu account and product registration
  
  https://login.anritsu.com/signin?