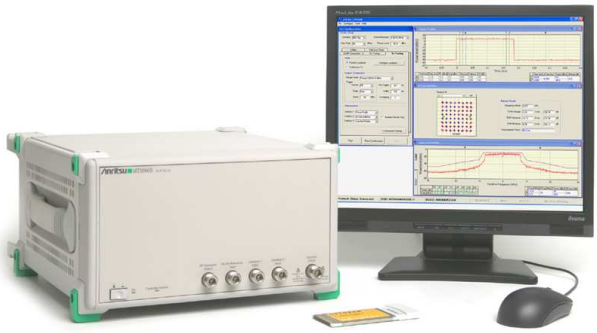
Anritsu
Release Note



MMD
Short Range Wireless Business Unit (SRWBU)

July 2009 **MT8860B WLAN Test Set**

Release Note for Firmware 10.0

Anritsu maintains a policy of continuous development and enhancement of instrument firmware. This release note provides information related to firmware release 10.0 for the MT8860B WLAN Test Set. The release note contains information concerning;

- Summary of new features and capabilities
- Functionality vs MT8860B build configuration constraints
- Advanced Notification regarding future firmware releases
- Additional differences between MT8860B firmware 10.0 and 9.00
- Known release 10.0 limitations / issues
- Changes to the MT8860B remote command set
- Differences between LANLook 10.0 and 9.00

Summary of new features and capabilities

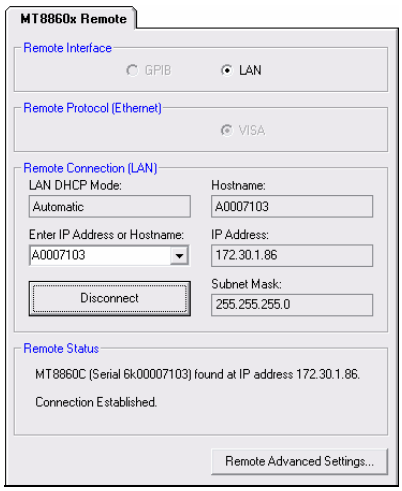
Remote operation via Ethernet (RJ45) interface

All MT8860B instruments are fitted as standard with both a GPIB and Ethernet connector. However, for release 9.00 (and earlier), remote operation is only possible using the GPIB connector.

With the introduction of release 10.0, LAN communication is now supported by the MT8860B via the Ethernet connector on the rear panel of the instrument. It is functionally equivalent to the GPIB connector. The Ethernet connector enables the MT8860B to be remotely configured by a LAN-connected computer. The following LAN interface protocols are supported;

- VXI-11 using VISA
- Sockets LAN
- TELNET
- File Transfer Protocol (FTP)

VXI-11 and sockets LAN are used for general instrument control. A VISA installation on the controller is required for remote control over LAN when using VXI-11 protocol. TELNET is used for interactive, single command at a time instrument control. FTP is provided for file transfer and should only be used when upgrading the instrument firmware.

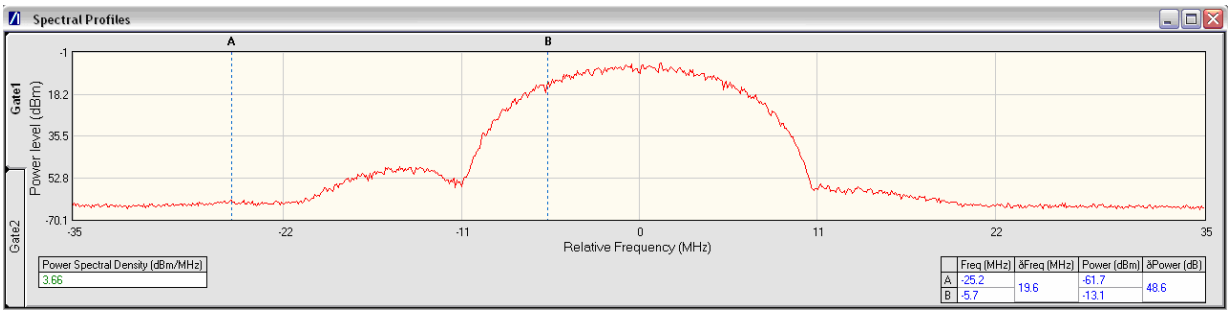


LANLook Remote Connection using a LAN interface

New TX measurement – Power Spectral Density (PSD)

The Chinese Government shall shortly be releasing a new qualification requirement for fixed, mobile and portable wireless devices that use wideband modulation techniques in the 2.4 GHz Industrial, Scientific and Medical (ISM) frequency band. In order for a WLAN device to be qualified for use in China, the RF spectrum performance must comply with both an Occupied Bandwidth (OBW) and Power Spectral Density (PSD) specification.

Release 10.0 extends the TX measurements supported by MT8860B to include PSD. With this measurement selected, MT8860B returns the highest mean power measured in a 1 MHz bandwidth, with the measurement result expressed in dBm / MHz.



Power Spectral Density Measurement

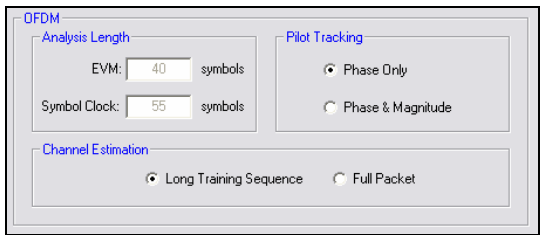
'Full Packet' channel estimation for OFDM signals

All OFDM packets transmitted by 802.11g and 802.11a WLAN devices include a PLCP preamble. This occurs at the start of the packet and is used for receiver synchronization. The IEEE standard defines the PLCP preamble to be;

- 8 µs duration consisting of 10 repetitions of a 'short training sequence'. The short training sequence is used for timing acquisition and coarse frequency acquisition in a receiver.
- 8 µs duration consisting of 2 repetitions of a 'long training sequence'. The long training sequence is used for channel estimation and fine frequency acquisition in a receiver.

When calculating the modulation accuracy of a transmitter, firmware release 9.00 (and earlier) performs the channel estimation over the 'long training sequence' part of the PLCP preamble.

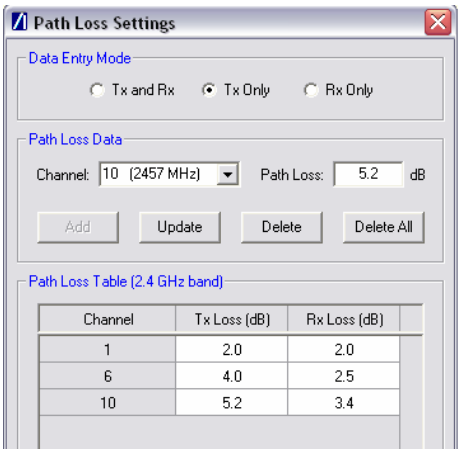
According to a number of chipset developers, most of today's WLAN receiver designs use the entire packet duration for channel estimation. Full packet channel estimation improves the EVM of the received signal and gives better throughput because higher data rates can be used without degradation.



LANLook 'Channel Estimation' selection

When analyzing the EVM performance of OFDM signals, release 10.0 allows a user to select whether long training sequence or full packet channel estimation is performed during the initial receiver synchronization process.

Independent TX and RX path loss tables



LANLook "Path Loss Settings" window

Release 9.00 (and earlier) provides a signal level correction table that can be used to compensate for test system and cable loss effects. For each channel, a single value can be specified which is applied to both the TX and RX paths.

When WLAN modules are tested using a test fixture, with connectivity via a series of test pins, a variation in signal loss (due to parasitic inductance) can occur between the TX and RX paths. Consequently, the amount of correction that needs to be applied during TX testing can differ from the amount of correction that is required during RX testing.

With the introduction of release 10.00, the path loss settings utility has been extended so that independent path loss tables for TX and RX testing can be defined. The remote command set has been modified so that the existing path loss operation is retained, thus allowing a single path loss value for both TX and RX paths to be specified.

Enhancement to Network Mode testing – ERP Information Element

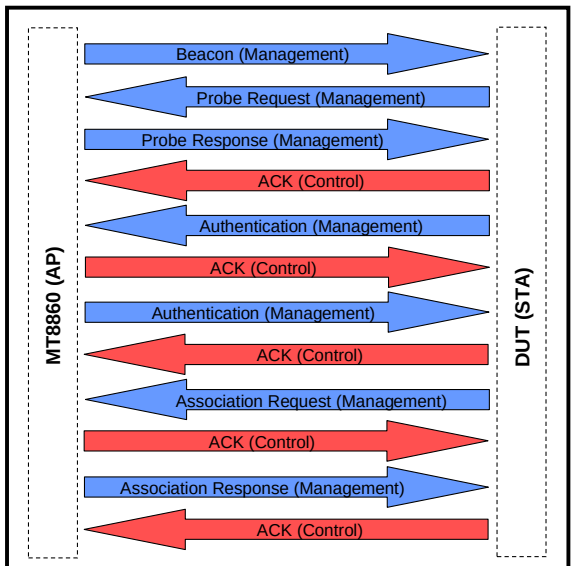
MT8860B remains the only WLAN Test Set to offer generic testing through 'Network Mode' operation. With Network mode selected, protocol-based messaging is used by the MT8860B to dynamically configure the Device under Test (DUT).

During the connection process between two WLAN devices, management frames are exchanged which contain information about the supported capabilities of each device. For the case of an 802.11g access point (AP), the IEEE STD 802.11-2007 states that an ERP (Extended Rate PHY) Information Element should be present in the Beacon and Probe Request management frames that are transmitted by the AP.

Some 802.11b/g WLAN devices (e.g. CSR UniFi, Atheros AR600x) use the ERP information element to determine whether the AP they are connecting to supports the 802.11g OFDM rates. If the ERP information element is not detected, the devices assume that the AP only supports 802.11b data rates. If the ERP information element is detected, the supported rate tables are then used to determine the maximum TX rate.

For firmware release 9.00 (and earlier), the beacon and probe response frames transmitted by MT8860B do not include the ERP information element. As a result, the maximum TX rate that can be tested on CSR UniFi and Atheros AR600x devices is limited to 11 Mbps.

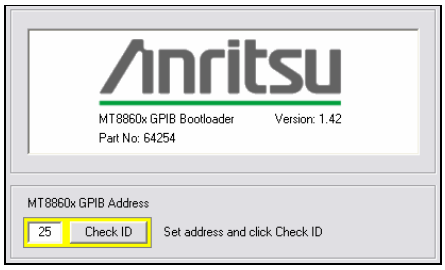
To resolve this problem, release 10.0 provides the capability to include the ERP information element in the MT8860B Beacon and Probe Request Frames, thus making it possible to test CSR and Atheros devices at data rates up to 54 Mbps. Please refer to the 'DRVCFG' command that is described in the MT8860B Remote Programming Manual (13000-00202 rev J).



Network Connection Process

New MT8860x GPIB Bootloader – Version 1.42

MT8860B can be upgraded to new firmware releases through the GPIB interface using the Anritsu software utility "MT8860x GPIB Bootloader". This software utility is automatically installed during a LANLook installation process. A new version of the MT8860x GPIB Bootloader (1.42) is installed with LANLook v10.0.



MT8860x GPIB Bootloader v1.42

When upgrading an MT8860B to firmware release 10.0, it is essential that GPIB Bootloader version 1.42 is used. The reason for this is that release 10.0 includes new file formats which will not be installed if an earlier version of the bootloader is used.

NOTE: A document containing complete step-by-step instructions on how to perform the bootload operation is supplied in the release 10.0 software package. Please use this document when upgrading MT8860B to v10.0 firmware.

Functionality vs MT8860B build configuration constraints

Release 10.0 can be installed into any MT8860B regardless of the build configuration. However, the supported measurement and feature set will be dependent upon the instrument configuration.

Release 10.0 has sufficient built-in intelligence to determine the MT8860B build configuration and configure itself to function smoothly with the actual hardware and calibration data that exists. Unsupported features are disabled.

LANLook 10.00 has been updated to support all new features. When a remote connection is established, LANLook determines the build configuration of the MT8860B. Any feature not supported by the detected build configuration is automatically disabled from the LANLook user interface. Where appropriate, LANLook provides the user with a message explaining why the function or feature is not provided.

The supported feature set based on the MT8860B build configuration can be summarized as follows;

Feature	MT8860B build configuration requirements
Remote operation via Ethernet (RJ45) interface	Available on ALL build configurations
Power Spectral Density (PSD) TX measurement	Build configuration MUST include option 11
'Full Packet' channel estimation for OFDM signals[1]	Build configuration MUST include option 11
Independent TX and RX path loss tables	Available on ALL build configurations
RF Optimization Mode	Not supported on MT8860B
ERP Information Element	Available on ALL build standards

[1] *For MT8860B instruments that do not have option 11 fitted, channels estimation is performed using 'Long Training Sequence' by default.*

Advanced Notification regarding future firmware releases

Please be advised that Anritsu is no longer able to provide support for MT8860B in future firmware releases. As a result;

- Release 10.0 shall be the last firmware release to be made available for use with MT8860B
- Future firmware releases shall only support MT8860C build configurations

Existing MT8860B users wishing to take advantage of new capabilities being offered in future firmware releases can do so by upgrading to MT8860C. Please contact your local Anritsu Sales office for further information regarding MT8860B to MT8860C upgrade requests.

Additional differences between MT8860B firmware 10.0 and 9.00

1. The following changes have been made to improve the connection / reconnection process between MT8860 and a DUT when Network mode operation is used;

   a) All management packets shall be transmitted at the lowest supported data rate. For 11b/g this is 1 Mbps. For 11a this is 6 Mbps. For previous firmware releases, the management packets are transmitted at the specified data rate.

   b) The AID value transmitted in the Association Response shall be forced to 1.

   c) The capability to use unicast (direct) addressing when deauthenticating from a DUT shall be supported. For firmware release 9.00 (and earlier) broadcast addressing is used. Anritsu has observed that some WLAN devices do not respond to broadcast deauthentications and as a result do not automatically re-associate (i.e. reconnect) with MT8860B.

   d) The Probe Request and Association Request frames shall be transmitted using the same Basic Rate Set information.

2. On receipt of a deauthentication, MT8860B would sometimes stop beaconing. This problem has been resolved in release 10.0.

3. It has been identified that for release 9.00 (and earlier), the Operational Rate Set parameter is not being applied correctly in Ad-Hoc mode. This problem has been resolved in release 10.0.

4. The correct power profile response is now obtained in Network mode with the RF trigger set to 'falling edge'.

5. The WLAN packets transmitted by MT8860B in Direct Mode now include a 6 byte Logical Link Control (LLC) header. With this change it is now possible to test the receiver sensitivity of Atheros devices that are controlled using Atheros Radio Test (ART) software.

6. A new remote command ***PERDELAY*** has been added to release 10.0. This commands adds a delay between the leveling operation that takes place immediately before the actual data packets are transmitted as part of a PER measurement. The delay is of particular use in Network Mode and allows a DUT to detect a number of beacon frames prior to the PER data packets. The beacon frames are used by a DUT to automatically configure its receiver hardware in readiness for the PER packet transmission.

Known MT8860B 10.0 limitations / issues

1. V10.0 does not check for addressing conflicts that may exist between the LAN and WLAN IP properties of MT8860B. Users wishing to use the LAN interface for remote control must ensure that a unique IP address is selected. An address conflict could result in unexpected and unwanted behaviour. Validation of LAN and WLAN IP properties may be supported in a future firmware release.

Changes to the MT8860B remote programming command set

Additional remote commands have been provided to support new features and capabilities. These are;

Command description	Remote command	Additional comments
Set LAN Configuration mode	syscfg lan,mode	This command defines how the IP settings are to be assigned.
Set LAN IP Settings	syscfg lan,addr	This command is used to configure the LAN IP settings that are used when the LAN configuration is set to MANUAL.
Query LAN IP properties	syscfg? lan	This command is used to query the current IP Properties of the LAN interface.

Command description	Remote command	Additional comments
RF Optimization mode	measfg 1,rfopt	When testing the spectral mask performance of a WLAN device at DSSS data rates, this command provides the user with the capability to adjust the input level range of MT8860B so that it is optimized for either signal-to-noise or low distortion (ACP) performance.
EVM channel estimation	measfg 1,evmcfg,chanest	This command selects the method of channel estimation used by MT8860B when performing an EVM measurement.
Reference Radio driver configuration	measfg 1,drvcfg	This command is used to change the control information that is contained in the beacon and data frames transmitted by MT8860B in Network mode.
PER Measurement Delay	measfg 1,perdelay	This commands adds a delay between the leveling operation that takes place immediately before the actual data packets are transmitted as part of a PER measurement.
Power Spectral Density (PSD) measurement	measfg? 1,meas,sd	This command requests MT8860B to perform a Power Spectral Density measurement.

The following remote commands have been modified as follows;

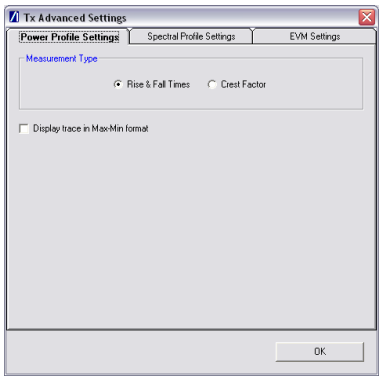
Command description	Remote command	Additional comments
Add a value to the path loss table	measfg 1,pathadd <channel>,<offset>,[direction]	This command adds an entry to the path loss table. An optional parameter [direction] has been added, allowing the user to specify whether the offset is applied to the TX path or RX path. If this parameter is not included in the command string, the offset is applied to both TX and RX paths.
Delete a value to the path loss table	measfg 1,pathdel <channel>,<offset>,[direction]	This command deletes an entry to the path loss table. An optional parameter [direction] has been added, allowing the user to specify whether the offset is removed from the TX path or RX path. If this parameter is not included in the command string, the offset is removed from both the TX and RX paths.
Read the path offset table	measfg? 1,pathtbl,[direction]	This command returns the path loss values specified. An optional parameter [direction] has been added, allowing the user to query only the TX or RX offsets.
EVM configuration commands	measfg? 1,evmcfg,alpha measfg? 1,evmcfg,bt measfg? 1,evmcfg,chipclk measfg? 1,evmcfg,evmchip measfg? 1,evmcfg,evmsym	For release 9.00 (and earlier), the response strings included extra 'white space' characters. For release 10.0, the response string formats have been corrected.

Please refer to the MT8860B remote programming manual (13000-00202 rev J) for further details on the above mentioned remote commands.

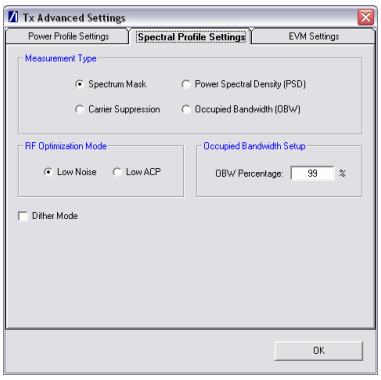
Differences between LANLook 10.0 and 9.00

To support the new transmitter measurement features and capabilities, a number of changes have been made to LANLook that are both intuitive and beneficial to new and experienced users.

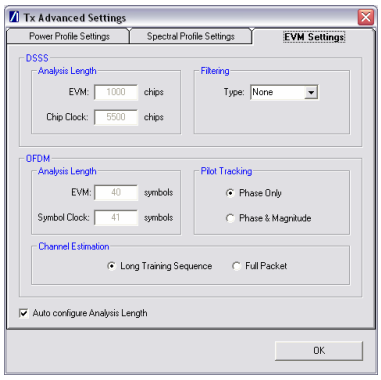
1. For LANLook 10.0, the [*EVM Advanced Settings…*] is replaced with a more generic [*Tx Advanced Settings...*] button that contains 3 selection tabs;
   - ***Power Profile Settings*** - From this tab, settings specific to the Power Profile measurement window are available.
   - ***Spectral Profile Settings*** - From this tab, Spectrum Mask, PSD, Carrier Suppression and OBW measurement types can be selected. In addition, the new RF Optimization Mode can be specified.
   - ***EVM Settings*** - From this tab, all the EVM configuration settings, including the new Channel Estimation, can be accessed.



'Power Profile Settings'



'Spectral Profile Settings'



'EVM Settings'

2. LANLook 10.0 resolves a problem where a 'No MAC Address found' error is reported when attempting to establish a connection with an AP.
3. For DSSS data rates, the mask segment numeric results are displayed when a user-defined spectral mask is selected.
4. A more explicit 'LANLook Running in Simulation Mode' message has been incorporated in LANLook 10.0.