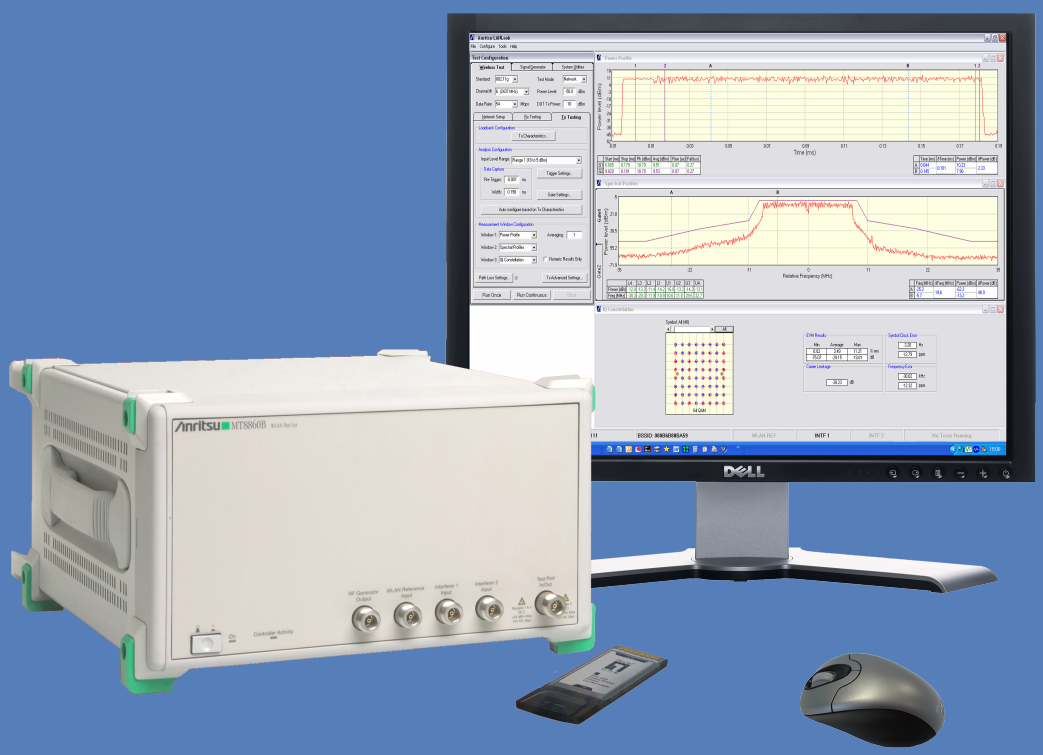
Remote Programming Manual

Anritsu

MT8860B

WLAN Test Set



Remote Programming Manual

MT8860B
WLAN Test Set

The MT8860B is discontinued and has been replaced by the MT8860C.

Sustaining software releases for the MT8860B shall be developed at the discretion of Anritsu.

This manual provides details of the operation and functionality of the following software version(s):-

MT8860B: 10.0

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Morgan Hill, CA 95037-2809
USA

P/N: 13000-00202
Revision: J
Printed: September 2009

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DECLARATION OF CONFORMITY

Manufacturer's Name: Anritsu Limited MMD-E

Manufacturer's Address: Rutherford Close
Stevenage, Hertfordshire
United Kingdom

declares that the prodcut specified below:

Product Name: Wireless LAN Test Set

Model Number: MT8860B

conforms to the requirement of:

EMC: Council Directive 89/336/EEC as amended by the Council Directive 92/31/EEC & 93/68/EEC
LVD: Council Directive 73/23/EEC as amended by the Council Directive 93/68/EEC

Electromagnetic Interference:

Emissions:	EN61326: 1997/A3: 2004	Class A
Immunity:	EN61326: 1997/A3: 2004	
	IEC61000-4-2 (ESD)	Class B
	IEC61000-4-3 (EMF)	Class A
	IEC61000-4-4 (BURST)	Class B
	IEC61000-4-5 (SURGE)	Class B
	IEC61000-4-6 (CRF)	Class A
	IEC61000-4-11 (V dip/short)	Class C
Voltage Harmonice:	EN61000-3-2: 2000	Class A
	EN61000-3-3: 1995 + Amendment 2001	

Electrical Safety Requirement:

LVD EN61010-1:2001 (Pollution Degree 2)

Anritsu Limited 27th September 2006

Nich Orchiston,
Quality Assurance Manager

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Materials Declaration for the People's Republic of China

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印刷线路板 (PCA)	×	○	×	×	○	○
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CE

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N274

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Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, please read the information carefully *before* operating the equipment.

Symbols Used in Manuals

Danger

This indicates a very dangerous procedure that could result in serious injury or death, or loss related to equipment malfunction, if not performed properly.

Warning

WARNING ⚠

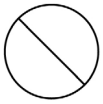
This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

Caution

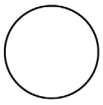
This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manuals

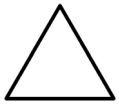
The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.



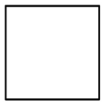
This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.

This indicates that the marked part should be recycled.

For Safety

Warning

Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. There is a risk of personal injury if operations are performed without heeding the advice in the operation manual. In addition, the equipment performance may be reduced. Moreover this alert mark is sometimes used with other marks and descriptions indicating other dangers.

Warning

or

When supplying power to this equipment connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

Warning

This equipment can not be repaired by the operator. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Caution

Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

Table of Contents

Appendix C—Terminology Glossary

Chapter 1 — General Information

1-1 About this Manual

This manual provides detailed information of the GPIB mnemonics for the Anritsu MT8860B WLAN Test Set.

1-2 Comments on this Manual

Every effort has been made to ensure that this manual is thorough, easy to use, and free from errors. However, to ensure continued improvement, we would welcome your comments on this, or any other Anritsu document.

Please contact us at the address below if you have any comments, good or bad, find any errors or omissions, or have any suggestions on how our documentation could be improved further.

wlan.support@anritsu.com

Your comments will be logged and reviewed, and whenever possible, will be reflected in a subsequent release of the document.

1-3 Software Versions

This manual provides details of the remote operation of the following software versions:

MT8860B: 10.0

Some of the features documented in this manual may not be available to users of software versions prior to those detailed above. Follow the procedure below to check the versions of the software you are using.

1. Start LANLook by selecting [Programs] > [Anritsu] > [LANLook] from the Windows [Start] menu.
2. Establish a remote connection with the MT8860B. To do this, follow the procedure detailed in chapter 5 of the MT8860B Operation Manual.
3. Select [About Anritsu LANLook] from the LANLook [Help] menu. Check the MT8860B and LANLook version numbers that display in the dialog.

Note	LANLook is provided free of charge on the Product CD shipped with the MT8860B. Refer to chapter 3 of the MT8860B Operation Manual for installation details.

1-4 Notification of Software Release

The MT8860B software is periodically updated as new features are added to meet market demands. To receive automatic notification of software releases, send a blank e-mail with the subject heading of "MT8860B Software Notification Request" to wlan.support@anritsu.com. You will receive an e-mail when new software is available to download.

1-5 Associated Documentation

In addition to this manual, the following document is also available on the Product CD shipped with the MT8860B WLAN Test Set.

Part number	Document
13000-00201	MT8860B WLAN Test Set Operation Manual

The pdf file listed above can be viewed using Adobe Reader™ , a freeware program that can be downloaded from http://www.adobe.com/.

1-6 Conventions

The following conventions have been adopted in this manual.

MT8860B WLAN Test Set

The official name of the product detailed in this manual is the MT8860B WLAN Test Set. This name may be shortened to MT8860B throughout this manual.

IEEE802.11

IEEE802.11 may be shortened to 802.11 throughout this manual.

PER / FER

The IEEE 802.11b specification uses the term "frame error rate" (FER) whilst the specifications for 802.11g refers to "packet error rate" (PER). For the sake of convenience, the term "packet error rate" or PER is used throughout this manual.

"Test Port In/Out"

Text that appears on the MT8860B front or rear panels is enclosed in quotation marks when used within a body of text.

1-7 Command Format

The commands are presented in a structured manner as shown below.

Set command format	For each command, the command name and syntax are detailed. For example: `COMMAND<ws>[<param1>,<param2>,<paramN>]` Each of the allowable values for the command argument(s) is described.
Remarks	An expanded description of the command, how to use it, and programming hints or restrictions.
Example	An example of the command in use.
Query command format	The command used when requesting a response from the MT8860B.
Response	The command string returned from the MT8860B.
Example	An example of a response from the MT8860B.

Chapter 2 — Remote Operation Overview

The MT8860B WLAN Test Set can be operated remotely by means of an interface that conforms to:

- IEEE Std 488.1-1987, which defines the electrical, mechanical, and low-level protocol characteristics of the bus structure, the GPIB (General Purpose Interface Bus).
- IEEE Std 488.2-1987, which defines standard codes, formats, protocols, and common commands for use with the IEEE Std 488.1.

2-1 Requirements when using GPIB

A GPIB card, cable, and the associated control software are required to communicate with the MT8860B over the GPIB bus.

2-2 LAN Interface Configuration

LAN communication is 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 programmed by a LAN connected computer. The distance between the computer (or network connection device) and the MT8860B is limited to 100m (10BaseT and 100BaseT).

Setting up the LAN Interface

For LAN operation, the MT8860B must be connected to the LAN and an IP address assigned to the MT8860B either manually or by using DHCP server.

Typically, there are four ways in which the MT8860B can be connected to a LAN.

Method 1: Direct connection to a “Corporate” (Enterprise) network.

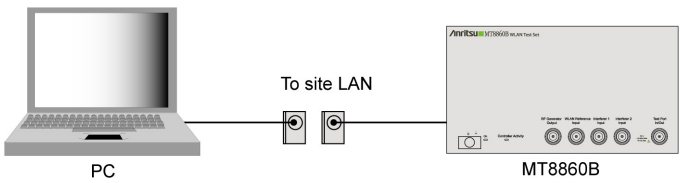


Figure 2-1. Direct Connection to Corporate Network

Method 2: Ethernet switch / hub connection to a “corporate” (Enterprise) network.

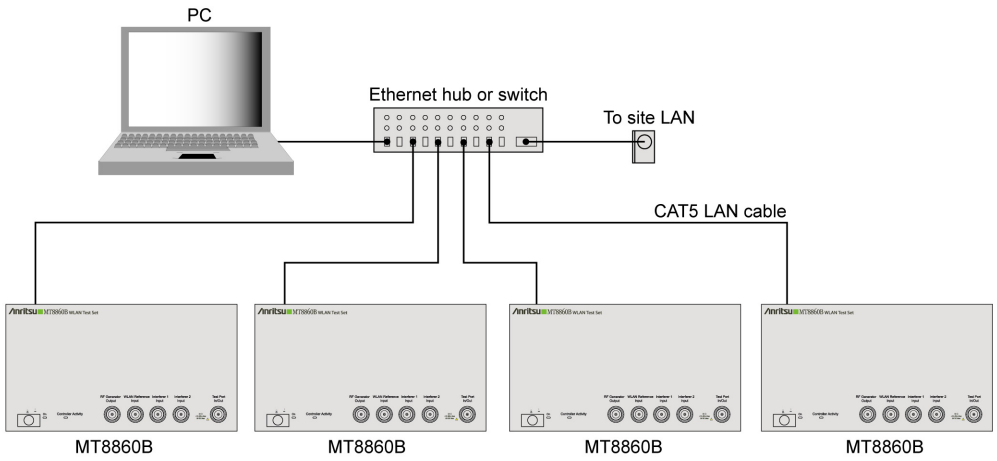


Figure 2-2. Ethernet Switch Connection to Corporate Network

Method 3: Direct connection to a private LAN.

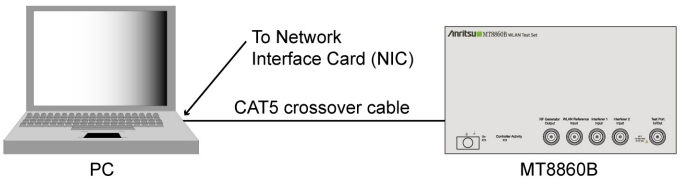


Figure 2-3. Direct Connection to a Private LAN

The interface hardware does not support auto MDIX ('Auto-cross'). Consequently, when connecting the MT8860B directly to a PC, a CAT5 crossover cable must be used. It is also recommended that DHCP is disabled on both the MT8860B and PC.

Method 4: Ethernet switch / hub connection to a private LAN.

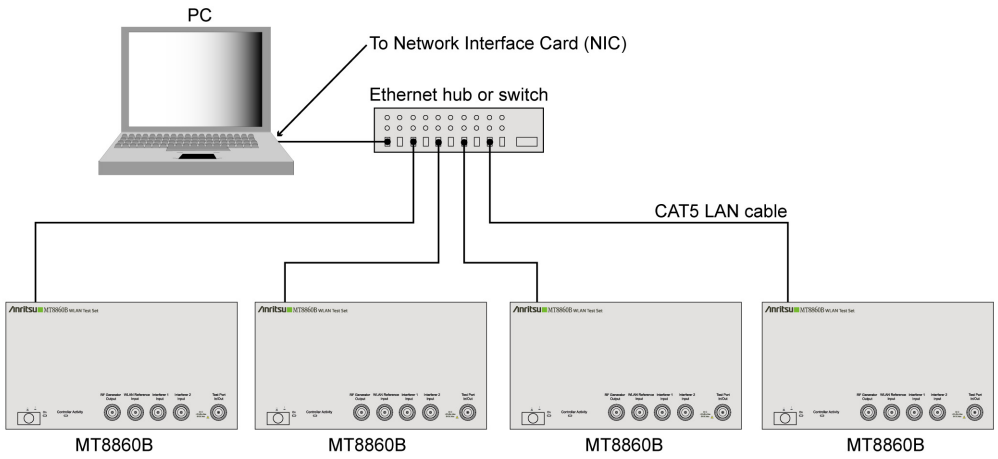


Figure 2-4. Ethernet Switch Connection to Private LAN

For all methods described above, the following steps should be taken when connecting the MT8860B to the LAN.

1. Power OFF the MT880C.
2. Connect the MT8860B as illustrated.
3. For methods 2 and 4, apply power to the Ethernet Hub or switch.
4. Power ON the MT8860B.

For further information regarding the LAN interface, refer to Appendix G of the MT8860B Operation Manual (13000-00201J.pdf).

2-3 Syntax

The following rules must be adhered to when sending remote commands to the instrument.

1. An ASCII space must be present between the command mnemonic and the first parameter.
2. All subsequent parameters must be separated by commas (,).
3. Multiple commands may be sent on the same line, but each must be separated by a semicolon (;).

The conventions used are detailed in the table below.

Table 2-1. Remote Command Syntax Rules

Item	Meaning
< >	The parameters or characters within the angled brackets '< >' must be present. Throughout this document the angled brackets '< >' are employed merely as a convention to help users interpret the commands. They must not be included in the command string when issuing commands over the remote interface.

Table 2-1. Remote Command Syntax Rules

Item	Meaning
Ws	White space character.
[ ]	Optional parameters. Do not include the square brackets in the command string.
,	Parameter separator. All remote commands having more than one parameter must use the comma (,) separator between each parameter.
;	Message unit terminator. A message can comprise of a number of remote commands called command units, that are separated by the semicolon (;), as seen in the following example. COMMAND param1a,param1b;COMMAND2 param2a The mnemonics and all the parameters can use either upper or lower case characters unless specified otherwise.

2-4 Termination

All commands sent over the remote interface to the MT8860B must be terminated with either (or both) of the following:

End Of String (EOS): The '\n' or 0x0A character.

End Of message Indicator (EOI): A hardware line on the remote interface bus.

2-5 Suffixes

Parameters containing floating-point values can use the E-0x convention or a suffix multiplier. The unit conventions specified by the IEEE have been implemented for the suffix units and multipliers. The suffix unit is always allowed but is not required and is shown in brackets where appropriate.

The following table lists the numeric suffixes for the MT8860B WLAN Test Set. Suffix units are optional and can be omitted.

Table 2-2. Suffix Multipliers and Units

Suffix Multipliers		Suffix Units	
Definition	**Mnemonic**	**Definition**	**Mnemonic**
1E18	EX	Decibels	DB
1E15	PE	dB ref to 1 mW	DBM
1E12	T	dB ref to 1 mW	DBMV
1E9	G	dB ref to 1 uV	DBUV
1E6	MA	Percent	PCT
1E3	K	Seconds	SEC
1E-3	M	Seconds	S
1E-6	U	Volts	V
1E-9	N	Watts	W

Table 2-2. Suffix Multipliers and Units

Suffix Multipliers		Suffix Units	
Definition	**Mnemonic**	**Definition**	**Mnemonic**
1E-12	P	Hertz	HZ
1E-15	F	Kilo Hertz	KHZ
1E-18	A	Mega Hertz	MHZ

For example 10 microseconds can be represented in any of the following formats: -

a. Straight value format 0.000010

b. With the E format 10E-6

c. Suffix multiplier format 10U

Chapter 3 — IEEE 488.2 Mandatory and Register Commands

*CLS (Clear GPIB Status Bytes)

Command format	*CLS
Remarks	Clears all the GPIB status data structures, including the Event Status Register and Status Byte Register, except for the MAV bit. *CLS does not clear the Output Queue.

*ESE (Event Status Enable)

The bits in the Standard Event Status Enable Register are the same as those in the Event Status Register. A bit wise AND is performed on the two registers to determine which event(s) will generate an SRQ.

Set command format	`*ESE<ws><val>`
Remarks	<val>: Decimal representation of an 8 bit binary mask.
	<val> is the sum of the binary weights of each of the bits to be enabled. Refer to the earlier explanation of the bits in the event status register and event status enable registers.
Example	To enable bit 4 (Execution Error)
	`*ESE 16`
	To enable bit 5 (Command Error)
	`*ESE 32`
	To enable both bits
	`*ESE 48`
Query command format	`*ESE?`
Response	<val>
	<val> is a decimal representation of the 8 bit mask as defined above.
Remarks	*ESE? Does not clear the event status enable register. Use *ESE 0 or *CLS for this purpose

*ESR (Event Status Register Query)

Query command format	`*ESR?`
Remarks	Returns the current state of the Event Status Register (ESR).
Example	A return value of 5 indicates that bits 0 (Operation Complete) and 2 (Query Error) are set.

*IDN (Identification Query)

Query command format	`*IDN?`
Remarks	A string is returned containing the manufacturer's name, the model number, the serial number, and the software revision. Commas separate the items.
Response	`ANRITSU,MT8860B,6K00000031,10.0`

*INE (Instrument Status Enable)

The bits in the Instrument Status Enable Register are the same as those in the Instrument Status Register. A bit wise AND is performed on the two registers to determine which event(s) will set the INS bit in the status register.

Set command format	`*INE<ws><val>`
	<val> : Decimal representation of an 8 bit binary mask.
Remarks	<val> is the sum of the binary weights of each of the bits to be enabled. Refer to the earlier explanation of the bits in the instrument status register and instrument status enable registers.
Example	To enable bit 1 to produce an SRQ (NWS).
	`*INE 1`
Query command format	`*INE?`
Response	`<val>`
	<val> is a decimal representation of the 8 bit mask as defined above.
Remarks	*INE? Does not clear the event status enable register. Use *INE 0 or *CLS for this purpose

*INS (Instrument Status query)

Query command format	`*INS?`
Remarks	Returns the current state of the Instrument status register. *INS? Does not clear the instrument status register.
Response	`<val>` <val> is a decimal representation of the 8 bit mask as defined above.

*OPC (Operation Completed Indication)

Set command format	`*OPC`
Remarks	The operation complete command sets the operation complete bit (bit 0) in the standard event status register (*ESR) when execution of the preceding operation(s) has completed. This bit can be used to initiate a service request.
Query command format	`*OPC?`
Remarks	The operation complete query places an ascii character '1' in the output queue when the preceding operation(s) has completed. The OPC bit in the *ESR register is not set.

*RST (Instrument Reset)

Set command format	`*RST`

Remarks	All MT8860B parameters (with the exception of those listed below) are reset to their default settings. Neither the GPIB Status registers nor the Input and Output queues are cleared.
	Parameters not affected by *RST
	• 10 MHz reference:
	`SYSCFG REF`
	• GPIB Address:
	`SYSCFG GPIBADDR`
	• MT8860B LAN settings:
	`SYSCFG LAN,MODE`
	`SYSCFG LAN, ADDR`
	• MT8860B WLAN IP settings:
	`MEASCFG 1,IPPARMS`
	• User Path Loss Table:
	`MEASCFG 1,PATHSTATE`
	`MEASCFG? 1,PATHTBL`

*SRE (Service Request Enable Register)

Set command format	`*SRE<ws><val>`
	<val>: Decimal representation of an 8 bit binary mask.
Remarks	The bits in the Service Request Enable Register (SRE) are the same as those in the Status Byte Register except for bit 6, which is not used in the SRE. With the exception of bit 6 the two registers are bitwise AND to determine which condition(s) will generate a SRQ.
	<val> is the sum of the binary weights of each of the bits to be enabled. Note that bit 6 should never be set.
Example	To enable bit 4 (Message Available)
	`*SRE 16`
	To enable bit 2 (Internal Error)
	`*SRE 4`
	To enable both bits
	`*SRE 20`
Query command format	`*SRE?`
Response	<val>: Decimal representation of the 8 bit mask as defined above.
Remarks	*SRE? Does not clear the Instrument Status Enable register. Use *SRE 0 or *CLS for this purpose. Bit 6 is never set.

*STB (Status Byte Register Query)

Query command format	`*STB?`
Response	<val>: Decimal representation of the binary value of the Status Byte Register.
Remarks	Returns the current state of the Status Byte Register with the RQS bit replaced by the MSS bit (bit 6). See section 11.2.2.3 of the IEEE488.2 – 1987 specification for a description of the MSS bit.

*TST (Self Test Query)

Query command format	`*TST?`
Response	<val>
	<val> is a decimal representation of a 32 bit mask.
Remarks	This command invokes a Self-Test and then returns the results as a bit mask.

*WAI (Wait to Continue)

Set command format	`*WAI`
Remarks	This mandatory IEE488.2 command is decoded but produces no action because the Overlapping Commands feature is not implemented on MT8860B.

Chapter 4 — Status Reporting

An instrument within a GPIB system contains a set of registers that reflect the current state of the instrument and whether a particular event has occurred. It is also sometimes necessary for an instrument to generate an alert if that condition exists or if that event has occurred.

The MT8860B status registers contain information about the condition of the instrument and its measurements. Using these registers, it is possible to find out whether an error has occurred with a command, if a particular measurement has completed, if a measurement is out of limits, and other problems or conditions that may make a measurement unreliable. These registers can be used either by reading the contents directly when needed, or by configuring them to generate an interrupt signal (SRQ, service request) when the condition of interest occurs. The status system consists of three readable registers as shown in the figure below.

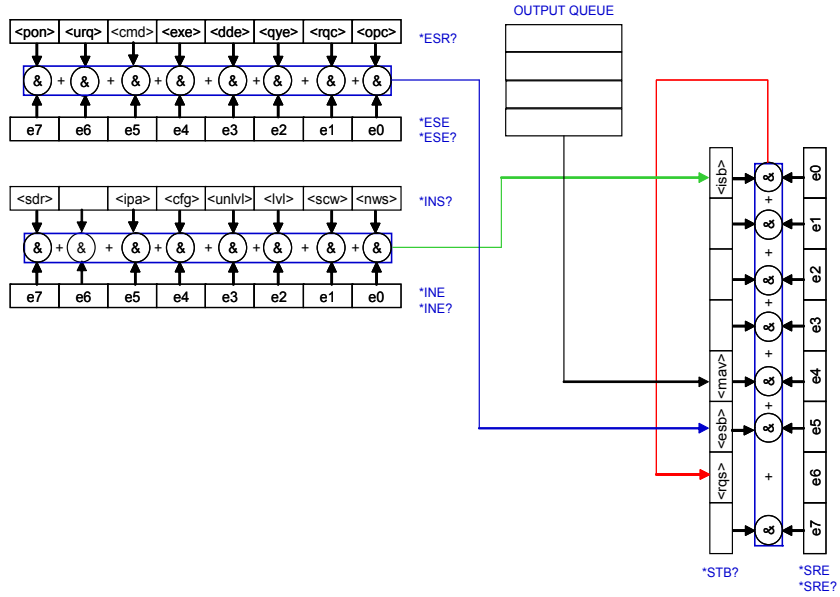


Figure 4-1. Status System Registers

Status Byte Register

This 8 bit register is used to represent particular conditions or events in an instrument. The status byte register (defined by IEEE 488.1) is read using the *STB? Command or by serial poll. When read by serial poll, an SRQ (service request) is generated that alerts the controller. Associated with the status byte register is the service request enable (*SRE) register, which allows control over which bits of the status byte contribute towards the generation of the SRQ signal. When read by *STB?, bit 6 of the status byte is known as the *master summary status* function (MSS), and is the OR function of the other seven bits of the register.

Standard Event Register

This 8 bit register extends the status reporting structure to cover various other events, defined by IEEE 488.2. The register is read using the *ESR? Command. The standard event enable register (*ESE) allows control over which bits of the standard event register affect the summary bit output (esb). The summary bit is recorded in bit 5 of the status byte.

Instrument Status Register

This 8 bit register further extends the status reporting structure by providing information specifically related to the MT8860B. The register is read using the *INS? Command. The instrument status enable register (*INE) allows control over which bits of the instrument status register affect the summary bit output (isb). The summary bit is recorded in bit 0 of the status byte.

4-1 Reading Status Information

As stated previously, two techniques can be used to interact with the status reporting structure as detailed below.

Direct-Read (Polling) Method

In many cases it is adequate and convenient for the controller to simply read the appropriate registers when necessary in order to determine the required status information.

This technique does not involve the use of SRQ and therefore does not require any interrupt handling code in the application program. The following steps are used to monitor a condition:

1. Determine which register contains the bit that monitors the condition.
2. Send the query command that reads the register.
3. Examine the bit to see if the condition has changed.

The direct-read (or polling) method works well when it is not necessary to know about changes the moment they occur. However, for test applications that require the immediate detection of condition changes, the SRQ method is recommended.

Service Request (SRQ) Method

In the SRQ method, the instrument plays a more active role, in that it tells the controller when there has been a condition change without the controller asking. This is beneficial when:-

- When you need time-critical notification of changes
- When you are monitoring more than one device that supports SRQs
- When you need to have the controller perform another task while waiting
- When you cannot afford the time penalty inherent to polling.

The programming language, I/O interface and programming environment must support SRQ interrupts. When using the SRQ method, the following steps are required to monitor a condition:

1. Determine which register sets, and which of its bits monitors the condition.
2. Determine how that bit reports to the request service (RQS) bit of the status byte (some report directly while others may report indirectly through other register sets).

3. Send remote commands to enable the bit that monitors the condition and to enable the summary bits that report the condition to the RQS bit.
4. Enable the controller to respond to service requests.

When the condition changes, the instrument sets its RQS bit (bit 6) and the GPIB's SRQ line; the controller is informed of the change as soon as it occurs. Setting the SRQ line informs the controller that a device on the bus requires service. The program then instructs the controller to perform a serial poll; each device on the bus returns the contents of its status byte register in response to this poll. The device with the RQS bit is set to '1' is the device that requested service. After the status byte is read the RQS bit is reset to '0'; the other bits are not affected.

Another reason for using SRQ is the need to detect errors in the various devices within the instrument. Since the timing of errors may not be known in advance, and it is not practical for the program to check the status of every device frequently, an interrupt handling routine can be used to detect and investigate any SRQ generated.

4-2 Remote Status Reporting Structure

Status Byte when Read by *STB?

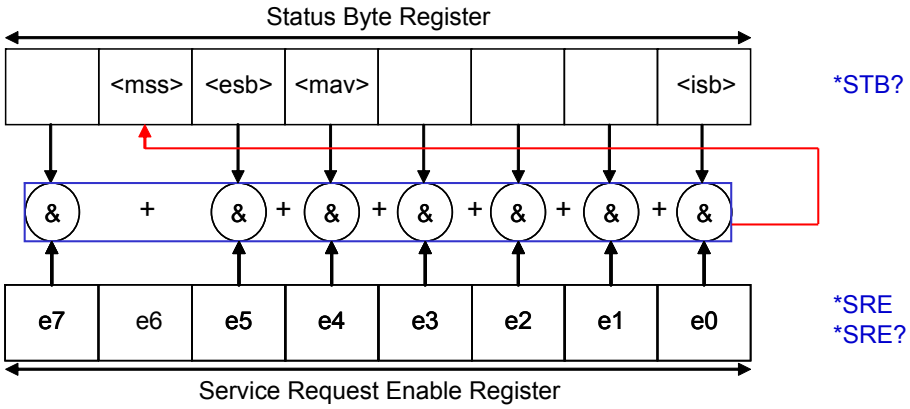


Figure 4-2. Status Byte Register

MSS Master Summary Status

This bit is set, if one of the bits in STB becomes true and the corresponding bit in the SRE is enabled.

ESB Event status bit

Summary bit of the Event Status Register (ESR). The ESB is set if one of the bits in the ESR is set and enabled by the corresponding bit being set in the Event Status Enable Register (ESE). The setting of the ESB bit implies a serious error which can be investigated in further detail by polling the ESR.

MAV Message available

This bit is set when there is data available to be read from the output buffer, and always cleared when the output buffer is empty. Data requested remains in the output buffer (in the order in which it was requested) until it has been read or until a device clear has been received.

ISB Instrument status bit

Summary bit of the Instrument Status Register (INS). The ISB is set if one of the bits in the INS is set and enabled by the corresponding bit being set in the Instrument Status Enable Register (INE). The ISB bit is cleared on initialisation and when the *CLS command is issued.

Note	The STB register is not cleared by the *STB?

Status Byte when Read by Serial Poll

In a serial poll, just as with command "*STB", the status byte of an instrument is queried. However, the query is realized via interface messages and is thus clearly faster. The serial-poll method has already been defined in IEEE 488.1 and used to be the only standard possibility for different instruments to poll the status byte. The method also works with instruments which do not adhere to SCPI or IEEE 488.2.

The quick-BASIC command for executing a serial poll is "IBRSP()". Serial poll is mainly used to obtain a fast overview of the state of several instruments connected to the IEC bus.

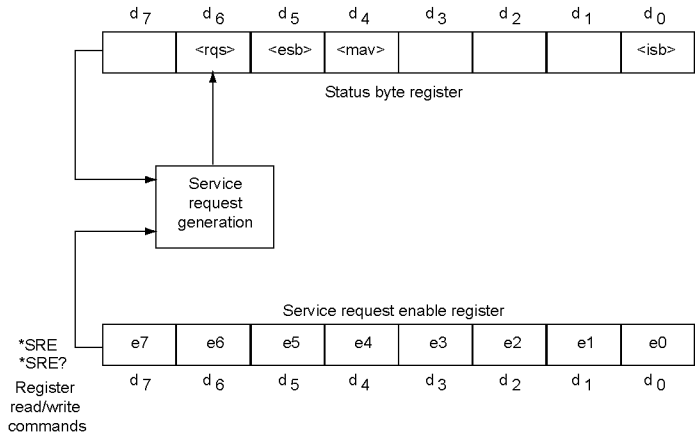


Figure 4-3. Serial Poll

RQS Request service

The bit is set when one of the other bits in the status byte register is set and the corresponding bit in the service request enable register (SRE) has been set. When this bit is set, an SRQ is indicated over the GPIB bus, which triggers an interrupt in the controller if this is appropriately configured. The SRQ is cleared by a serial poll and the status byte register is returned to the controller. The status byte register is cleared except for the MAV bit that is dependent on the state of the output queue.

ESB Event status bit

Summary bit of the Event Status Register (ESR). The ESB is set if one of the bits in the ESR is set and enabled by the corresponding bit being set in the Event Status Enable Register (ESE). The setting of the ESB bit implies a serious error which can be investigated in further detail by polling the ESR.

MAV Message available

This bit is set when there is data available to be read from the output buffer, and always cleared when the output buffer is empty. Data requested remains in the output buffer (in the order in which it was requested) until it has been read or until a device clear has been received.

ISB Instrument status bit

Summary bit of the Instrument Status Register (INS). The ISB is set if one of the bits in the INS is set and enabled by the corresponding bit being set in the Instrument Status Enable Register (INE). The ISB bit is cleared on initialisation and when the *CLS command is issued.

Note	The STB register is cleared by either reading the status register with a serial poll or issuing the *CLS command.

Standard Event Register

The register is defined by IEEE 488.2 and each bit has the meaning shown below.

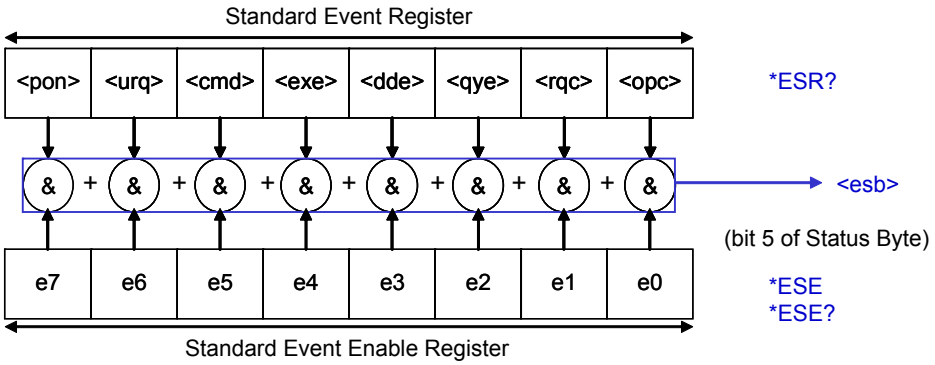


Figure 4-4. Status Event Register

PON Power On bit

This bit is set on power up of the MT8860B and is cleared if the instrument is reset or receives a *CLS command. This bit only indicates that a power on has occurred.

URQ User Request

This bit is not used.

CMD Command error

This bit is set if a command which is undefined or syntactically incorrect is received.

EXE Execution error

This bit is set if a syntactically correct command is received but cannot be executed for other reasons. For example, a parameter is out of the allowable range.

DDE Device Dependent Error

This bit is set if an MT8860B specific error occurs. The actual error can be found by using the SYSCFG? ERRLST and MEASCFG? 1,ERRLST commands.

QYE Query error

This bit is set if the controller –

wants to read data from the MT8860B without having sent a query command or does not fetch requested data and sends new instructions to the instrument instead. The cause is often a faulty query that cannot be executed.

RQC Request Bus Control

This bit is not used

OPC Operation Complete

This bit is set when a message that includes the *OPC command has been completed and the GPIB interface is idle. For example, if the last command in a configuration sequence is *OPC, the OPC bit in the event status register is set when that configuration list has been completed.

Note	The ESR register is cleared by reading its state with the *ESR? command or by issuing a *CLS command. The ESE register is cleared when a *CLS command is issued.

Instrument Status Register

The register is defined by IEEE 488.2 and each bit has the meaning shown below.

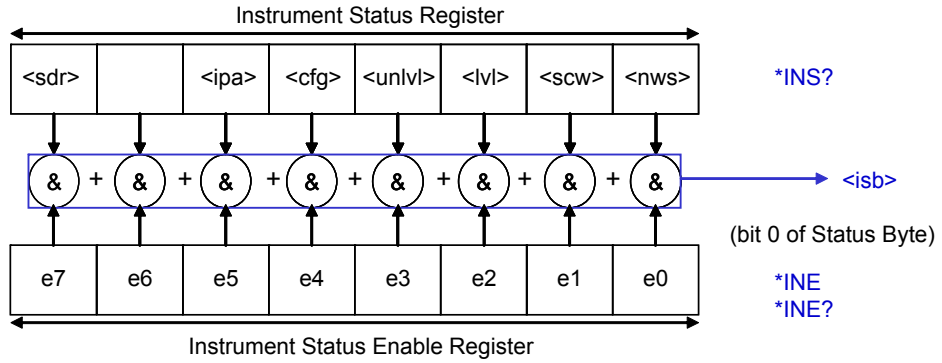


Figure 4-5. Instrument Status Register

SDR Shutdown ready

This bit is set when the shutdown sequence is complete and the instrument may be powered off. The shutdown sequence is invoked by the SHUTDOWN command.

IPA IP address assignment

This bit indicates when the unit is waiting for an IP address to be assigned to the DUT. It is cleared when a connection is made, and set when an IP address has been assigned to the DUT.

CFG Configuration change

This bit indicates when a configuration parameter has been changed by the instrument. The CFG bit is cleared when the configuration change "MEASCFG? 1,CFGCHG" is read.

UNLVL This bit is set when the instrument is unable to achieve the specified output power level. The highest achievable level is set in this condition. This bit is cleared on the next measurement taken.

LVL External gold card level complete

This bit indicates when the external gold card level is complete. This bit is cleared when MEASCFG 1,EXTLEVEL is received, and set when the leveling is complete.

SCW Status change window

This bit indicates that the measurement status has changed. Determine the instrument status using the command MEASCFG? 1,STATUS. The SCW bit is cleared when the status is read.

NWS Network scan

This bit is cleared when a network scan is started and set when the network scan is complete. The NWS bit will also be cleared after a serial poll.

Note	The INS register is not cleared by reading its state or by issuing a *CLS command. The INE register is cleared when a *CLS command is issued.

Chapter 5 — General Remote Commands

BOOTSTATUS? (Initial Start-up Self Test Status Request)

Query command format	`BOOTSTATUS?`
Remarks	On start-up the instrument performs a self test as well as initialising the instrument. The instrument status during the start up can be requested using this command. The command returns the status of the instrument during power up. 0 Passed the self test. Instrument ready. 1 Start-up still running the self test. –1 Self test or initialisation FAILED. During the start-up procedure all commands except BOOTSTATUS?, and the 488.2 event and status commands, result in an execution or command error. STERR will return the start-up results. If there is a self test failure, only the commands listed above are available.
Related Commands	`STERR`

SHUTDOWN (System Shutdown Command)

Set command format	`SHUTDOWN`
Remarks	This command must be used before powering down the instrument to ensure that the configuration settings are retained next time the instrument is powered on. The SDR bit in the INS register is set when the shutdown sequence is complete and it is safe to turn off the instrument.

Chapter 6 — System Commands

BNC (BNC Configuration)

Set command format	SYSCFG<ws>BNC,<bnc>,<state>		
	<bnc>	OUT1	BNC output 1
		OUT2	BNC output 2
		IN1	BNC input 1
		IN2	BNC input 2
	<state>	The states the BNCs can be set to are BNC dependant.	
	OUT1	VIDTRG, TXTRG, or RFTRG	
	OUT2	VIDTRG, TXTRG, or RFTRG	
	IN1	EXT, GOLDTX	
	IN2	GOLDTX, EXT	
Remarks	There are two input BNCs and two output BNCs that can be configured.		
	The output BNCs have a number of settings of which only one can be applied to a BNC at a time.		
	Output settings		
	TXTRG	Output the Tx trigger signal from the internal reference radio.	
	RFTRG	The trigger signal from the MT8860B measurement system when the trigger source is set to RF.	
	VIDTRG	The trigger signal from the MT8860B measurement system when the trigger source is set to video.	
	Input settings		
	EXT	The input for the external trigger source when the trigger source has been set to EXT.	
	GOLDTX	The Tx signal from an external GOLD WLAN card. This signal must encompass the whole of the external gold card transmission.	
Example	To set BNC input 1 to EXT the command would be		
	SYSCFG BNC,IN1,EXT		
Query command format	SYSCFG?<ws>BNC,<bnc>		
Response	The response is returned in the form of the command to set the value.		

Example

If BNC input 1 is set to EXT trigger source the request would be:

```
SYSCFG? BNC,IN1
```

The response would be:

```
SYSCFG BNC,IN1,EXT
```

FRST sets

<bnc>	<state>
OUT1	VIDTRG
OUT2	TXTRG
IN1	EXT
IN2	GOLDTX

ERRLST (System Error List)

Query command format

```
SYSCFG? <ws>ERRLST
```

Response

SYSERRLST,AAAABBBBCCCCDDDDEEEEFFFFGGGGHHHHIIII

AAAA	Message error codes Error reported from the system. See “System Error Codes” in Appendix A
BBBB	Power up error. Report to Anritsu support. See “System Error Codes” in Appendix A
CCCC	System temperature monitor error. See “System Error Codes” in Appendix A
DDDD	Reserved
EEEE	Internal error. Report to Anritsu support.
FFFF	GPIB error. See “System Error Codes” in Appendix A
GGGG	Reserved
HHHH	Reserved
IIII	Reserved

Remarks

This command reads and clears the recorded error status latch for the system. The error latch records an error and retains the error state until the instrument is reset, the power is cycled, or the error latch is read using this command. The errors are indicated via the DDE bit of the event status register (ESR).

The system ERRLST command can be used to give details on DDE errors indicated by bits being set in the ESR register. This command must be used in conjunction with MEASCFG? 1,ERRLST.

FRST and RST (System Resets)

Set command format	Factory reset (FRST):
	`SYSCFG<ws>FRST`
	Instrument reset (RST):
	`SYSCFG<ws>RST`	

Remarks	The MT8860B is reset to a default state. There are two levels of reset on the MT8860B: Factory and Instrument	
	Factory reset (FRST)	Resets all the MT8860B settings, including user path loss table, GPIB address, LAN IP settings, and all measurement configuration settings to default values. Parameters not affected: • MT8860B WLAN IP settings: `MEASCFG 1,IPPARMS`

	Instrument reset (RST)	Resets the measurement configurations to the default settings.
		Parameters not affected:
		• BNC settings:
		`SYSCFG BNC`
		• 10 MHz reference:
		`SYSCFG REF`
		• GPIB Address:
		`SYSCFG GPIBADDR`
		• MT8860B LAN settings:
		`SYSCFG LAN,MODE`
		`SYSCFG LAN, ADDR`
		• MT8860B WLAN IP settings:
		`MEASCFG 1,IPPARMS`
		• User Path Loss Table:
		`MEASCFG? 1,PATHTBL`

GPIBADDR (GPIB Address)

Set command format	SYSCFG<ws>GPIBADDR,<address>
	<address> 1 to 30
Remarks	This allows the GPIB address of the MT8860B to be changed. Note that after this command has been sent, all further communication over the GPIB bus to the device must use the new address. This setting is always saved over a power cycle.
Example	To set the GPIB address to 5 the command would be:
	SYSCFG GPIBADDR,5
Query command format	SYSCFG?<ws>GPIBADDR
Response	The response is returned in the form of the command to set that state.
Example	SYSCFG? GPIBADDR
	If the GPIB address is 6 the response would be:
	SYSCFG GPIBADDR,6
FRST sets	25

LAN (LAN IP Properties)

Query command format	SYSCFG?<ws>LAN
Remarks	This command is used to query the currently in use IPv4 properties of the MT8860B instrument
Response	If the LAN MODE of the instrument on start-up was MANUAL and the manual IPv4 address assigned was 192.168.168.10 with a subnet mask of 255.255.255.0 then the response would be:-
	LAN,MANUAL,192.168.168.10,255,255,255,0
	If the LAN MODE of the instrument on start-up was AUTO and the instrument was able to obtain an IPv4 address and a subnet mask from the DHCP server then the response would be:-
	LAN,AUTO,<ip address>,<subnet mask>
	Where the <ip address> and <subnet mask> are as dynamically allocated by the DHCP server and are in IPv4 dot-decimal notation format.
	If the LAN MODE of the instrument on start-up was AUTO and the instrument was unable to obtain an IPv4 address and a subnet mask from the DHCP server then the response would be:-
	LAN,AUTO,192.168.168.2,255.255.255.0

LAN ADDR (LAN Address)

Set command format

SYSCFG<ws>LAN,ADDR,<ip address>,<subnet mask>

<ip address> IPv4 dot-decimal notation

<subnet mask> IPv4 dot-decimal notation

Remarks

This command is used to assign the Manual IPv4 network address and subnet mask of the instruments Ethernet adapter. This is the address that the instrument will adopt on start-up if the LAN MODE is set to MANUAL.

These settings will be adopted only after a power-cycle.

The IPv4 address and subnet mask are set using the dot-decimal notation also known as *quad-dotted notation* and *dotted quad notation*.

It is a method of writing binary numbers in octet grouped base-10 (decimal) numbers separated by dots (full stops).

The instrument will allow:-

A Class A, B or C IPv4 network address where the first octet must be in the range 1 to 223 but not 127 as this is reserved for local address.

A last octet range of 1 to 254 since 0 is the subnet ID and 255 is a broadcast address.

Network Class	First Octet Range	Recommended Subnet Mask
A	1-126	255.0.0.0
B	128-191	255.255.0.0
C	192-223	255.255.255.0

The instruments default IPv4 address is 192.168.168.2 and the subnet mask is 255.255.255.0. With this subnet mask the address range for the Host PC and/or other instruments is 192.168.168.1 to 192.168.168.254 allowing a total of 254 Hosts.

Example

To set the manual IPv4 network address of the instrument to 192.168.168.10 and the subnet mask to 255.255.255.0 the command would be: -

```
SYSCFG LAN,ADDR,192.168.168.10,255.255.255.0
```

Query command format

```
SYSCFG?<ws>LAN,ADDR
```

Response

The response is returned in the form of the command to set the parameters.

```
SYSCFG LAN,ADDR,192.168.168.10,255.255.255.0
```

*RST

LAN ADDR:<no change>

FRST sets	LAN:ADDR: IP Address: 192.168.168.2 Subnet mask: 255.255.255.0

Note	Make sure that a unique IP address is selected. An address conflict could results in unexpected and unwanted device behaviour on the network.

LAN MODE (LAN Mode)

Set command format	SYSCFG<ws>LAN,MODE,<state> <state> AUTO - Automatic IPv4 address allocation MANUAL - User defined IPv4 address
Remarks	This command defines how the IPv4 network address is to be assigned to the MT8860B instrument on the next power cycle. AUTO: The instruments Ethernet adapter will have its IPv4 address and subnet mask assigned dynamically by the DHCP server connected to the network. If a DHCP server cannot be found then the unit will default to:- IPv4 Address: 192.168.168.2 Subnet Mask: 255.255.255.0 MANUAL: The instruments Ethernet adapter IPv4 address and subnet mask will be assigned by the user. See LAN ADDR system command. This setting will be adopted only after a power-cycle.
Example	To configure the LAN mode of the instrument to AUTO the command would be:- `SYSCFG LAN,MODE,AUTO`
Query command format	`SYSCFG?<ws>LAN,MODE`
Response	The response is returned in the form of the command to set the value.
Example	If the LAN mode of the instrument is set to MANUAL the response would be:- `SYSCFG LAN,MODE,MANUAL`
FRST sets	LAN MODE: AUTO

Note	Make sure that a unique IP address is selected. An address conflict could result in unexpected and unwanted device behaviour on the network.

OPTIONS (Query Enabled Options)

Query command format	SYSCFG?<ws>OPTIONS,<instrument>,<option>
	<instrument> 0 = Platform, 1= Instrument 1
	<option> Option Number: Min: 0, Max: 128
	(if option number = 0, it requests all options)
Example 1	To display the current state of option 13 for Instrument 1 the command would be:-
	`SYSCFG? OPTIONS,1,13`
Response 1	If option is enabled the response would be:-
	`SYSCFG OPTIONS,1,13,ENABLE`
	If option is disabled the option would be:-
	`SYSCFG OPTIONS,1,13,DISABLE`
Example 2	To display all of the currently enabled options for Instrument 1 the command would be:-
	`SYSCFG? OPTIONS,1,0`
Response 2	`SYSCFG OPTIONS,1,1,13`
	The above response indicates that only one option (13) is enabled. Any additional options enabled are listed in sequence.
Example 3	To display all of the currently enabled options for the Platform the command would be:-
	`SYSCFG? OPTIONS,0,0`
Response 3	`SYSCFG OPTIONS,0,1,13`
	The above response indicates that one option (13) is enabled.

REF (10MHz Reference)

Set command format	SYSCFG<ws>REF,<state>
	<state> INT Internal
	EXT External
Remarks	This command configures whether the instrument uses internal or external 10 MHz reference. The EXT setting can only be selected when an external reference is applied.
Example	To set the external reference to be used, the command would be
	SYSCFG REF,EXT
Query command format	SYSCFG?<ws>REF
Response	The response is returned in the form of the command to set the value.
Example	If the internal reference was set the response would be
	SYSCFG REF,INT
FRST sets	INT

STERR (Errors at Start-Up)

Query command format	SYSCFG?<ws>STERR		
Response	SYSSTERR,A,B,C		
	A	0	Measurement system started.
		1	Measurement system not started.
	B	0	Drivers OK.
		1	Drivers start-up error.
	C	0	System data OK.
		1	System data error.
Remarks	If "A" is "0" and the measurement system has started OK, check "MEASCFG?<ws>1,STERR" for measurement system start-up errors.		

Chapter 7 — Measurement Configuration Commands

The commands detailed in this chapter are used to configure the measurement system. For ease of reference these MEASCFG commands can be split into eight functionality-based categories and these are presented as command hierarchies in the initial pages of this chapter. Some of the commands, such as PAYLOAD and TXPWR, may appear in multiple categories and thus, to avoid repetition, the commands themselves are listed in alphabetical order following the command reference table.

The MEASCFG commands follow the format described below.

MEASCFG<ws><reserved>,<configcmd>,<params…..>

<reserved>	Must be set to '1'
<configcmd>	The following subsections of this document define each of the configuration command mnemonics and parameters.
<params>	The number and type of parameters are dependent on the configuration command.

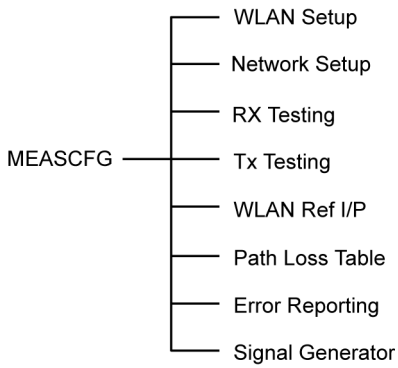


Figure 7-1. Measurement Configuration Command Groupings

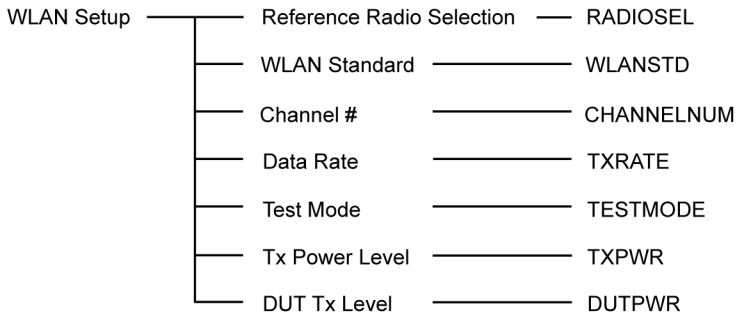


Figure 7-2. WLAN Setup Configuration Commands

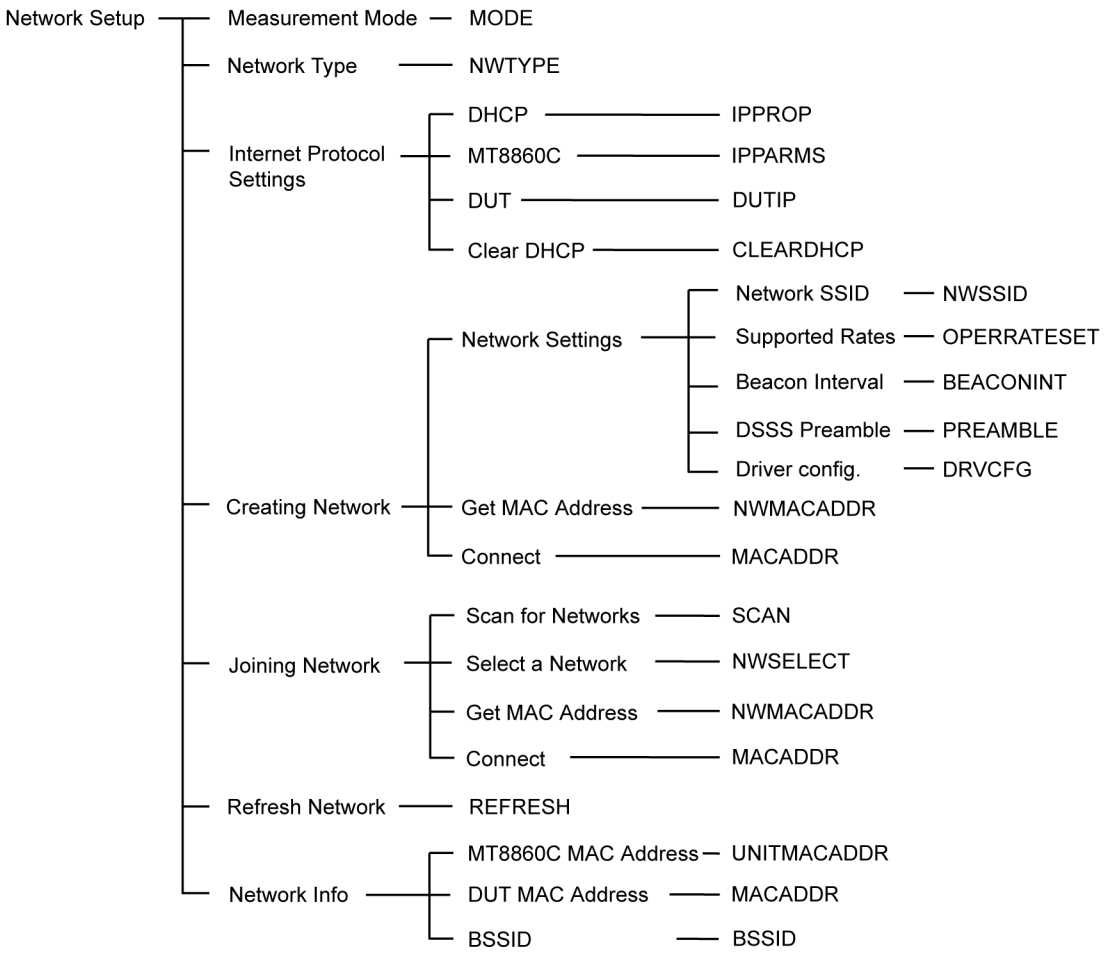


Figure 7-3. Network Setup Configuration Commands

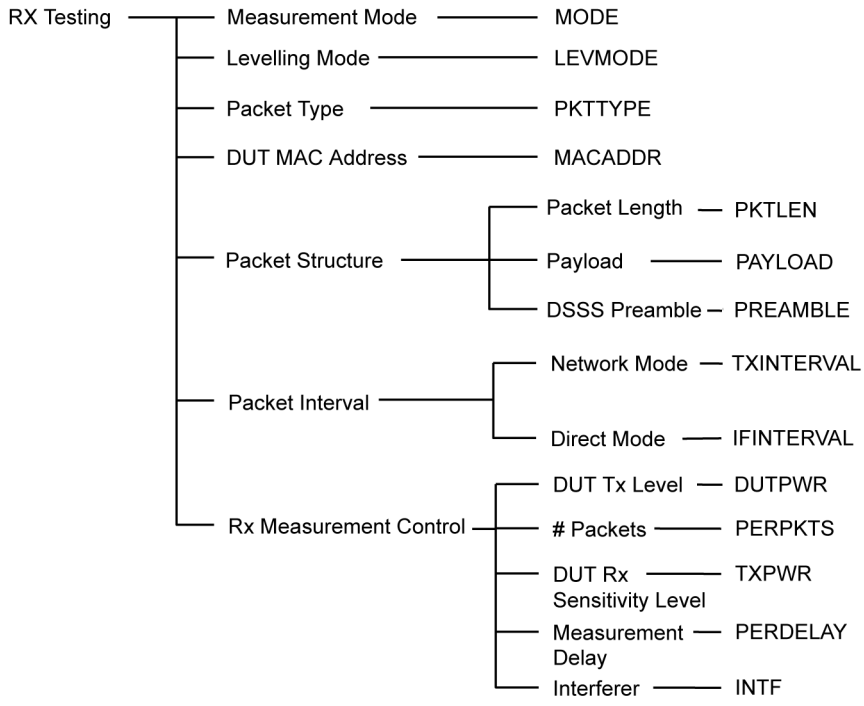


Figure 7-4. Rx Testing Configuration Commands

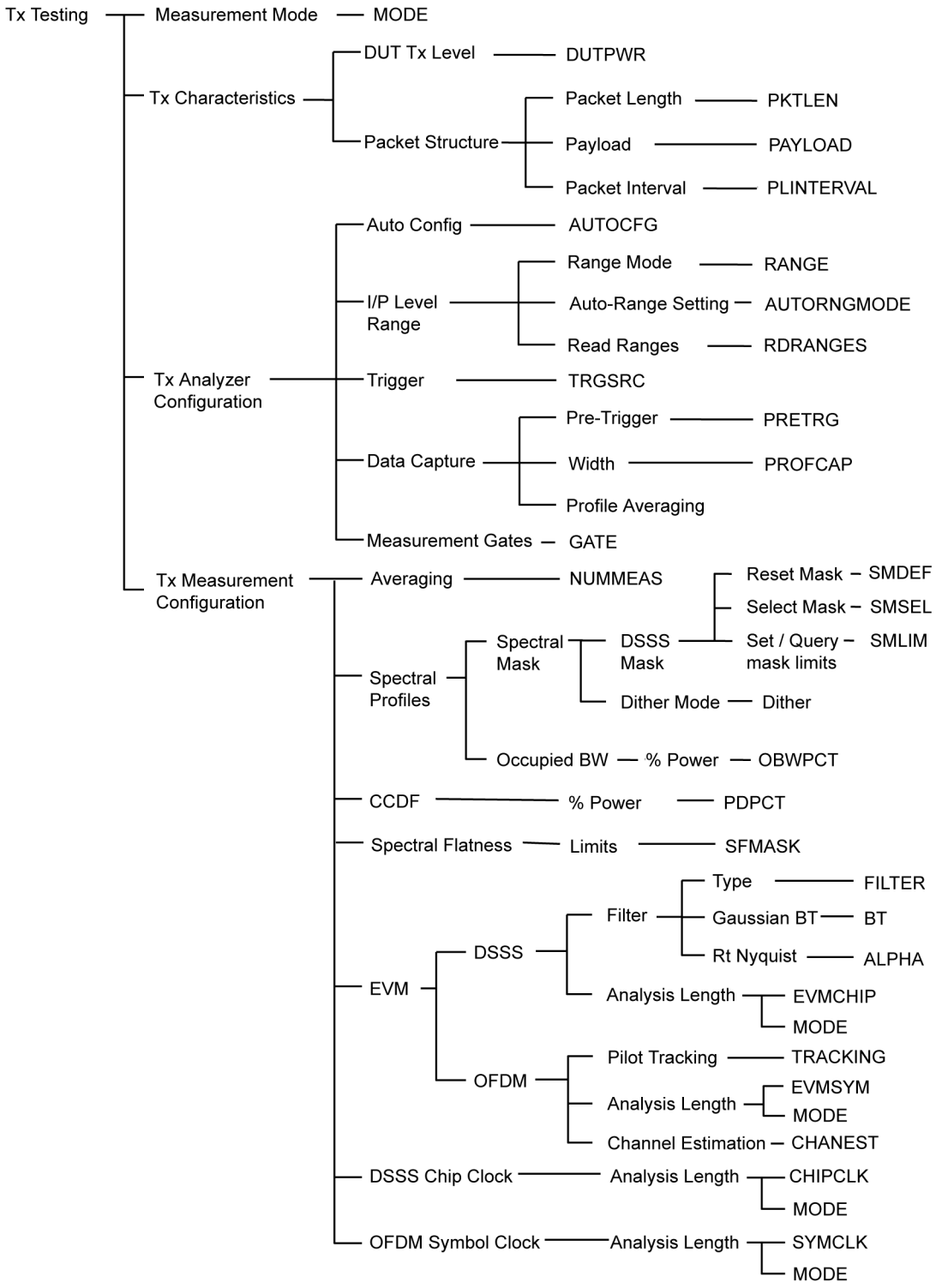


Figure 7-5. Tx Testing Configuration Commands

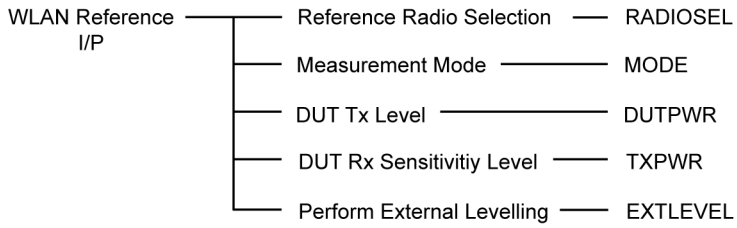


Figure 7-6. WLAN Reference I/P Configuration Commands

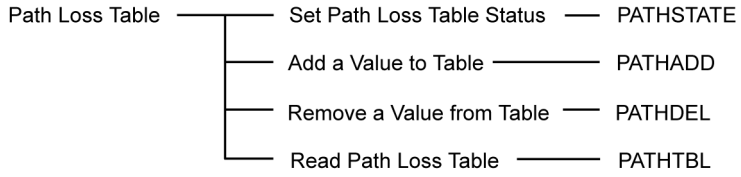


Figure 7-7. Path Loss Table Configuration Commands

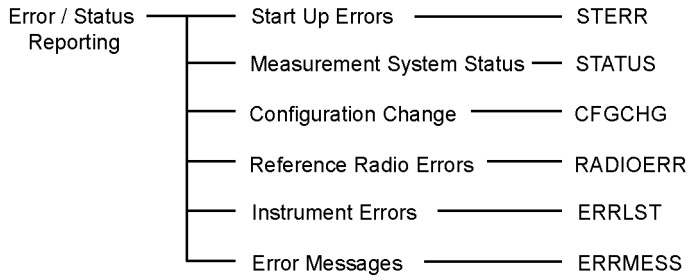


Figure 7-8. Error / Status Reporting Configuration Commands

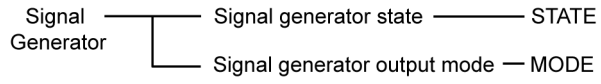


Figure 7-9. Signal Generator Configuration Commands

ABORT (Abort Measurement Operation)

Set command format	`MEASCFG<ws>1,ABORT`
Remarks	This command aborts any current measurement operations in progress. The measurement results and profile data will be invalid.
Example	To abort the current measurement, the command would be `MEASCFG 1,ABORT`

AUTOCFG (Automatic Configuration)

Set command format	`MEASCFG<ws>1,AUTOCFG`
Remarks	This command automatically configures the Input level range, trigger source, pre-trigger, capture width, and measurement gates based on the specified DUT transmitter characteristics and the selected test mode.
Note	If the EVMCFG,MODE is set to AUTO then AUTOCFG will also configure the EVMCHIP, CHIPCLK, EVMSYM and SYMCLK settings.
Response	No response

AUTORNGMODE (Auto Ranging Mode)

Set command format	`MEASCFG 1,AUTORNGMODE,<mode>` <mode> LOW: Auto ranging in ranges 1 and 2 (default) HIGH: Auto ranging in ranges 1, 2, and 3
Remarks	This command sets the range in which the MT8860B auto ranges. Refer to "RANGE" for details of the ranges.
Example	To set the auto range mode to high the command will be:- `MEASCFG 1,AUTORNGMODE,HIGH`
Query command format	`MEASCFG? 1,AUTORNGMODE`
Response	The response is in the form of the command to set the value.

Example	If the auto range mode is low the command and response would be:-
	`MEASCFG? 1,AUTORNGMODE`
	Response
	`MEASCFG 1,AUTORNGMODE,LOW`

Note	Refer to the operation manual for maximum measurement and damage power levels.

BEACONINT (Beacon Interval)

Set command format	MEASCFG<ws>1,BEACONINT,<Interval>
	<interval> 20 to 1000 ms.
Remarks	This command sets the approximate interval between beacons. This command is only applicable if network type (NWTYPE) is set to AP.
Example	To set the beacon interval to 20 the command would be
	MEASCFG 1,BEACONINT,20
Query command format	MEASCFG?<ws>1,BEACONINT
Response	The response is returned in the form of the command to set that state.
Example	If the beacon interval is 20 the command and response would be:
	MEASCFG? 1,BEACONINT
	Response
	MEASCFG 1,BEACONINT,20
*RST sets	200

BSSID (Basic Service Set Identification)

Query command format	measCfg?(ws>1,BSSID
Remarks	This command requests the BSSID of the current network.
Response	MEASCFG 1,BSSID,<BSSID>
Example	MEASCFG? 1,BSSID
	MEASCFG 1,BSSID,000B6B4E35F3

CFGCHG (Configuration Change)

Query command format	`MEASCFG?<ws>1,CFGCHG`
Remarks	This command requests only the parameters that the firmware has been forced to change to enable the configuration requested by the user. Reading the configuration changes will clear the settings and also clear the CFG bit in the INS register.
Response	`CFGCHG,1,ABCDEF`
	A 0 – packet length not changed
	1 – packet length changed
	B 0 – WLAN standard not changed
	1 – WLAN standard changed
	C 0 – Tx rate not changed
	1 – Tx rate changed
	D 0 – channel number not changed
	1 – channel number changed
	E 0 – SSID not changed
	1 – SSID changed
	F 0 – preamble type not changed
	1 – preamble type changed
Example	If a request is made to change the WLANSTD from “B” at a data rate of 11 Mbps to “G”, the firmware will automatically change the Tx rate to 54 Mbps and set the channel to 64. The response string at this time would show bits C and D set as shown below:-
	`001100`

CHANNELNUM (Channel Number)

Set command format	`MEASCFG<ws>1,CHANNELNUM,<channel>`
	<channel> Channel number. Allowed value is dependant upon WLANSTD (see below).
Remarks	This is the channel at which the MT8860B measurements will be made and the reference radio will transmit.
	The channel numbers that can be set depend on the WLAN standard selected:
	If WLANSTD is set to B or G (DSSS):
	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
	If WLANSTD is set to G (OFDM):
	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Example	To set the channel number to 11 the command would be
	`MEASCFG 1,CHANNELNUM,11`
Query command format	`MEASCFG?<ws>1,CHANNELNUM`
Response	The response is returned in the form of the command to set that state.
Example	If the channel number is 11 the command and response would be:
	`MEASCFG? 1,CHANNELNUM`
	Response
	`MEASCFG 1,CHANNELNUM,11`
*RST sets	6

CLEARDHCP (Clear IP Addresses Allocated by DHCP)

Set command Format	`MEASCFG 1,CLEARDHCP`
Remarks	This command is used to clear the local table of WLAN IP addresses that have been allocated by DHCP.

DITHER (Enable Dithering)

Set command format	`MEASCFG 1,DITHER,<setting>`
	<setting> OFF – Dithering not applied
	ON – Dithering applied
Remarks	This command is used to enable and disable dithering.
Example	To enable dithering the command would be:-
	`MEASCFG 1,DITHER,ON`
Query command format	`MEASCFG? 1,DITHER`
Response	The response is in the form of the command to set the value.
Example	If dithering is enabled the command and response would be:-
	`MEASCFG? 1,DITHER`
	Response
	`MEASCFG 1,DITHER,ON`
Note	Dithering can be used to remove internally generated spurious from the spectrum.
*RST sets	OFF

DRVCFG (Reference Radio Driver Configuration)

Set command format	MEASCFG 1,DRVCFG,<decimal value>	
	<decimal value> is a 'decimal' bit map of the following configuration options;	
	Bit 0x00000001	If set, the MT8860B beacon frame TIM Element is configured to indicate that data is buffered for the DUT.
	Bit 0x00000002	If set, the 'more data' bit is enabled in the data frames transmitted by MT8860B.
	Bit 0x00000004	If set, the 'more data' bit is enabled in the beacon frames transmitted by MT8860B.
	Bit 0x00000008	If set, the ERP Information Element is included in the beacon and probe response frames transmitted by MT8860B
	Bit 0x00000010	If set, the MT8860B shall transmit directed (unicast) DEAUTHENTICATION frames.
Remarks	This command is used to change the control information that is contained in the beacon and data frames transmitted by MT8860B in Network Mode.	
Example	To enable all setting indicated above, the command would be	
	`MEASCFG 1,DRVCFG,31`	
Query Command Format	`MEASCFG? 1,DRVCFG`	
Response	If all setting indicated above are enabled, the response would be:-	
	`MEASCFG 1,DRVCFG,31`	

Note	For the new DRVCFG settings to become effective, it is recommended that a REFRESH command be issued.
	On instrument power-on, DRVCFG has as default setting of 0.
	DRVCFG is not affected by *RST or a factory reset operation
	The DRVCFG setting is not saved to non-volatile memory. Consequently, the setting is lost when the MT8860B is power-cycled.

DUTIP (DUT IP Address)

Set command format

```
MEASCFG<ws>1,DUTIP,<ip address>
```

<ip address> IPv4 dot-decimal notation

Remarks

This command is used to set the DUT IP address.

If IPPROP is set to "MANUAL" the DUT IP address must be set manually.

- The set DUTIP command manually assigns an IPv4 address for the DUT.
- The query DUTIP command reads the manually assigned DUT IP address.

If IPPROP is set to "AUTO" the DUT IP address is automatically allocated.

- The set DUTIP command generates an EXE error.
- The query DUTIP command reads the automatically assigned DUT IP address.

The IPv4 address is set using the dot-decimal notation also known as *quad-dotted notation* and *dotted quad notation*. This is a method of writing binary numbers in octet grouped base-10 (decimal) numbers separated by dots (full stops).

The instrument will allow:-

A Class A, B or C IPv4 network address where the first octet must be in the range 1 to 223 but not 127 as this is reserved for local address.

A last octet range of 1 to 254 since 0 is the subnet ID and 255 is a broadcast address.

Network Class	First Octet Range	Recommended Subnet Mask
A	1-126	255.0.0.0
B	128-191	255.255.0.0
C	192-223	255.255.255.0

Example

To set the DUT IP Parameters the command would be: -

```
MEASCFG 1,DUTIP,192.168.168.100
```

```
MEASCFG 1,DUTIP,192.168.168.99
```

Query command format

```
MEASCFG?<ws>1,DUTIP
```

Response

The response is returned in the form of the command to set the parameters.

Example

```
MEASCFG 1,DUTIP,192.168.168.99
```

DUTPWR (DUT Transmit Power)

Set command format	`MEASCFG<ws>1,DUTPWR,<power>`		
	<power>	Min	-30 dBm
		Max	+30 dBm
		Resolution	1 dB
Remarks	This command is used to specify the expected DUT transmit power level. This value is used when:- 1. Performing Rx testing. The value specified represents the nominal power level of the acknowledgement packet (ACK) returned by the DUT in response to a correctly received data packet. In order to prevent the MT8860B reference radio receiver from being saturated, the ACK packet is attenuated internally by the MT8860B before the signal reaches the receiver. The MT8860B uses the DUT power level to calculate the amount of attenuation required in the return path. 2. Performing Tx testing. The MT8860B Tx analyzer settings can be automatically configured using the command MEASCFG 1,AUTOCFG. The DUT power level value is used to determine the Input Level Range setting most appropriate.		
Example	To configure the DUTPWR to 20dBm the command would be `MEASCFG 1,DUTPWR,20`		
Query command format	`MEASCFG?<ws>1,DUTPWR`		
Response	The response is returned in the form of the command to set the value.		
Example	If the DUTPWR is set to -10dBm the response would be `MEASCFG 1,DUTPWR,-10`		
*RST sets	10 dBm		

ERRLST (Error List)

Query command format: `MEASCFG? <ws>1,ERRLST`

Response: ERRLST,1,AAAABBBBCCCCDDDDEEEEFFFFFGGGGHHHH IIIIJJJJ!<cmd error>!<exe error>!

AAAA	Message error codes Error reported from the system. See "System Error Codes" and "Measurement Error Codes" in Appendix A
BBBB	Power up error. Report to Anritsu support. See "System Error Codes" and "Measurement Error Codes" in Appendix A
CCCC	Measurement system temperature monitor error. See "System Error Codes" and "Measurement Error Codes" in Appendix A
DDDD	Reserved
EEEE	Internal error. Report to Anritsu support.
FFFF	RF error code. See "RF Error Codes" in Appendix A
GGGG	Rx Measurement error code. See "Rx Measurement Error Codes" in Appendix A
HHHH	Tx Measurement error code. See "Tx Measurement Error Codes" in Appendix A
IIIII	DSP Error code. See Appendix A.
JJJJ	Reserved
cmd error	Command on which the last command error occurred.
exe error	Command on which the last execution error occurred.

Remarks: This command reads and clears the recorded error status latch for the measurement instrument. The error latch records an error and retains the error state until the instrument is reset, the power is cycled, or the error latch is read using this command. The errors are indicated via the DDE bit of the event status register (ESR).

This command should be used in conjunction with SYSCFG? ERRLST.

ERRMESS (Error Message Description)

Query command format	`MEASCFG?<ws>1,ERRMESS,<error number>`	
Remarks	This command requests detailed information about the error number given.	
Response	`ERRMESS,<reserved>,<error number>,<length>,<detail>`	
	<error number>	Number of error according to ERRLST
	<length>	Number of characters in the <detail> string
	<detail>	Explanation of the error number
Example	MEASCFG? 1,ERRMESS,120D	
	ERRMESS,1,120D,76,Error from reference radio. Use the RADIOERR command to obtain more details.	

EXTLEVEL (External Level)

Set command format	`MEASCFG<ws>1,EXTLEVEL`
Remarks	When using an external gold card, this command will level the output and set the LVL bit in the INS when levelling has completed.

GATE (Gate Configuration)

Set command format	`MEASCFG<ws>1,GATE,<gate>,<delay>,<width>`	
	<gate>	1 or 2
	<delay>	Min 0
		Max 5.95 ms
		Resolution1uS (1E-006)
	<width>	Min 0
		Max 5.95 ms
		Resolution1uS (1E-006)
Remarks	The gate delay is the period after the pre-trigger point that the measurement system waits before including samples in the measurements. The gate width is the period after the gate delay during which measurements are made. The MT8860B has two sets of gate delay and gate widths. The total time period from the start of the earliest gate to the end of the latest gate must be less than 5.95 ms. Refer to the figure within the description of the PROFCAP command.	
Example	To set the gate 1 delay to 100 microseconds and the width to 400 micro seconds the command would be	
	`MEASCFG 1,GATE,1,100E-06,400E-06`	
	Or	
	`MEASCFG 1,GATE,1,0.0001,400US`	
	Or	
	`MEASCFG 1,GATE,1,100US,0.0004`	
Query command format	`MEASCFG?<ws>1,GATE,<gate>`	
Response	<gate>1 or 2	
	The response is returned in the form of the command to set that state.	
Example	If gate 2 had a gate delay of 15 microseconds and a width of 22 micro seconds the response would be:	
	`MEASCFG 1,GATE,2,1.5E-005,2.2E-005`	
*RST sets	<gate>	1 2
	<delay>	0us 200us
	<width>	192us 700us

IFINTERVAL (Inter Frame Interval)

Set command format	`MEASCFG<ws>1,IFINTERVAL,<interval>`
	< interval > Min 0 slots
	Max 200 slots
Remarks	This command is used to set the interval between frame transmissions for Rx tests when Direct mode is selected.
	The duration of a slot depends on the current modulation scheme:
	DSSS 20 us
	OFDM 9 us
Example	To set the inter frame interval to 10 slots the command would be:
	`MEASCFG 1,IFINTERVAL,10`
Query command format	`MEASCFG?<ws>1,IFINTERVAL`
Response	The response is returned in the form of the command to set the parameter.
Example	`MEASCFG 1,IFINTERVAL,10`
*RST sets	5 slots

INTF (Interferer)

Set command format	`MEASCFG<ws>1,INTF,<interferer>,<state>`
	<interferer> 1 Interferer one only
	2 Interferer two only
	3 Both interferers
	<state> ON
	OFF
Remarks	There are two interferer inputs on the MT8860B that can be applied to the signal between the reference radio and the DUT. The interferers can be applied to the signal between the internal reference radio, or to an external gold card and the DUT if they are connected via the MT8860B.
	This command allows one or both of the interferers to be applied to the signal.
Example	To set interferer one on the command would be:
	`MEASCFG 1,INTF,1,ON`
Query command format	`MEASCFG?<ws><1>,INTF,<interferer>`
Response	<interferer>
	1 Interferer one only
	2 Interferer two only
	The response is returned in the form of the command to set an interferer state.
Example	To read the state of interferer one the command would be:-
	`MEASCFG? 1,INTF,1`
	The response, if interferer 1 was OFF, would be:-
	`MEASCFG 1,INTF,1,OFF`
*RST sets	OFF

IPPARMS (WLAN IP Parameters)

Set command format

MEASCFG<ws>1,IPPARMS,<ip address>,<subnet mask>

<ip address> IPv4 dot-decimal notation

<subnet mask> IPv4 dot-decimal notation

Remarks

This command is used to set the WLAN IP address and subnet mask of the MT8860B internal reference radio. When analyzing the transmitter performance of a WLAN device in Network mode, the IP parameters (address and subnet mask) of the MT8860B must be configured. When IPPROP is set to "Manual", the IPPARMS command can be used to set the IP parameters of the MT8860B. When IPPROP is set to "AUTO", an execution (EXE) error is generated if trying to configure these settings.

The IPv4 address and subnet mask are set using a dot-decimal notation also known as quad-dotted notation and dotted quad notation. This is a method of writing binary numbers in octet grouped base-10 (decimal) numbers separated by dots (full stops).

The instrument will allow:

A class A, B, or C IPv4 network address where the first octet must be in the range 1 to 223 but not 127 as this is reserved for local addresses.

A last octet range of 1 to 254 since 0 is the subnet ID and 255 is a broadcast address.

Network Class	First Octet Range	Recommended Subnet Mask
A	1-126	255.0.0.0
B	128-191	255.255.0.0
C	192-223	255.255.255.0

Example

To set the IP Parameters the command would be: -

```
MEASCFG 1,IPPARMS,192.168.168.10,255.255.255.0
```

Query command format

MEASCFG?<ws>1,IPPARMS

Response

The response is returned in the form of the command to set the parameters.

Example

```
MEASCFG 1,IPPARMS,192.168.168.10,255.255.255.0
```

IPPROP (WLAN IP Properties)

Set command format	`MEASCFG<ws>1,IPPROP,<param>`
	<param> AUTO - Automatic IPv4 address allocation
	MANUAL - user defined IPv4 address
Remarks	Defines how the WLAN IP properties are to be set. Manual indicates that the DUTIP and IPPARMS will be set by the user, AUTO indicates that they will be assigned by the MT8860B.
Example	To configure the IPPROP to AUTO the command would be
	`MEASCFG 1,IPPROP,AUTO`
Query command format	`MEASCFG?<ws>1,IPPROP`
Response	The response is returned in the form of the command to set the value.
Example	If the IPPROP is set to MANUAL the response would be
	`MEASCFG 1,IPPROP,MANUAL`
*RST sets	AUTO

LEVMODE (Levelling Mode)

Set command format	`MEASCFG<ws>1,LEVMODE,<mode>`
	<mode> NORMAL - levelling is performed on preamble and payload.
	PAYLOAD - Levelling is performed on payload only.
Remarks	This command is used to define the levelling mode to be used for Rx testing with an external reference radio.
Query command format	`MEASCFG?<ws>1,LEVMODE`
Note	This setting only applies when an external reference radio is selected. When the internal reference radio is selected NORMAL levelling mode is always used.
*RST sets	NORMAL

MACADDR (MAC Address)

Set command format	`MEASCFG<ws>1,MACADDR,<address>`
	<address> 6 byte hexadecimal string containing the address.
Remarks	This command is used to specify the MAC address of the DUT. The MAC address must be specified when performing an Rx test in Network mode and the PKTTYPE is set to UNICAST.
Example	To set the MAC address to 0x9345BCF431A9 the command would be: -
	`MEASCFG 1,MACADDR,9345BCF431A9`
Query command format	`MEASCFG?<ws>1,MACADDR`
Response	The response is returned in the form of the command to set that state.
Example	If the DUT MAC address is 0x9345BCF431A9 the response would be:
	`MEASCFG 1,MACADDR,9345BCF431A9`
*RST sets	0xFFFFFFFFFFFF

MODE (Measurement Mode)

Set command format	`MEASCFG<ws>1,MODE,<measmode>`
	<measmode> TXMODE Tx measurement mode
	RXMODE Rx measurement mode
Remarks	There are two independent measurement modes in the MT8860B as described earlier in this document. This command is used to switch between these modes or to read the present mode.
	Note: RXMODE should be selected when:-
	• establishing a Network Connection • performing an Rx test • an external reference radio is selected (see RADIOSEL)
Example	To set the measurement mode to RXMODE the command would be: -
	`MEASCFG 1,MODE,RXMODE`
Query command format	`MEASCFG?<ws>1,MODE`
Response	The response is returned in the form of the command to set that state.
Example	If the measurement mode is TXMODE the response would be:
	`MEASCFG 1,MODE,TXMODE`
*RST sets	TXMODE

NUMMEAS (Number of Measurements)

Set command format	MEASCFG<ws>1,NUMMEAS,<measnum>		
	<measnum>	Min	1
		Max	1000
Remarks	This is the number of measurements (or triggers) that will be included in the requested transmitter measurements.		
	Note: The results are returned when the specified number of measurements has been completed.		
Example	To set the number of measurements to 100 the command would be		
	MEASCFG 1,NUMMEAS,100		
Query command format	MEASCFG?<ws>1,NUMMEAS		
Response	The response is returned in the form of the command to set that state.		
Example	If the number of measurements is 15 the response would be:		
	MEASCFG 1,NUMMEAS,15		
*RST sets	1		

NWAVAIL (Read Networks Available)

Query command format	MEASCFG?<ws>1,NWAVAIL
Remarks	This command returns the number of networks that were found when a SCAN was performed. The information for each network can be retrieved using the NWINFO command. The maximum number of networks the MT8860B will report is 16.
	Note: A scan must be performed immediately prior to the use of this command.
Example	To retrieve the number of available networks the command would be
	MEASCFG? 1,NWAVAIL
	The response to the above command would be
	NWAVAIL,1,x

NWINFO (Read Network Information)

Query command format	`MEASCFG?<ws>1,NWINFO,<index>`
	<index> 1 to n
Remarks	Index in to the available list of networks found from the SCAN. The maximum number is returned by NWAVAIL.
	Note: A scan must be performed immediately prior to use of this command.
Response	This command returns the network information for each of the networks found when a SCAN was performed. The network information returned is as follows: -
	Channel The channel number e.g., 14
	SSID Network name e.g., MY ADAPTER
	BSSID BSSID number e.g., 23FAC8938E01
	RSSI RSSI figure e.g., -5
	WEP Using WEP i.e T or F for TRUE or FALSE
	Preamble type i.e LONG or SHORT
	Note: If no network name is found the text "NO NAME" will be returned in the SSID field.
Response format	`NWINFO<ws>1,<data in the order described above>`
Example	Using the examples given above the response from a request for the index 3 could be
	`NWINFO 1,14,MY ADAPTER,23FAC8938E01,-5,T,LONG`

NWMACADDR (Request MAC Addresses)

Query command format	`MEASCFG?<ws>1,NWMACADDR,<numaddr>,<time>`
	<numaddr> The number of different MAC addresses found before the search ends, 1 to 5.
	<time> The permissible time for the search to take place, 1 to 5 secs
Remarks	This command requests the MAC address of all stations in the network. The search will continue until either the number of addresses or the time set expires.
	Note: Use the NWSELECT command after a scan to join a network prior to this command.
Response	`NWMACADDR,1,<number of address>,<address>`
	<number of address>The number of comma separated addresses that follow.

NWSELECT (Select Network)

Set command format	`MEASCFG<ws>1,NWSELECT,<index>`
	<index> 1 to n
	Index in to the available list of networks found from the SCAN. The maximum number is returned by NWAVAIL.
Remarks	This command instructs the MT8860B to attempt to join the selected network.
Example	To select the third network the command would be
	`MEASCFG 1,NWSELECT,3`

NWSSID (Network SSID)

Set command format	`MEASCFG<ws>1,NWSSID,<length>,<text string>`
	<length> Length of the text string
	Min = 1
	Max = 32
	<text string> Text string up to 32 characters.
Remarks	This command is used to set the service set identity used by the MT8860B. This will cause the MT8860B to create its own network with the given SSID.
Example	To set SSID to "MT8860B network" the command would be
	`MEASCFG 1,NWSSID,15,MT8860B network`
Query command format	`MEASCFG?<ws>1,NWSSID`
Response	The response is returned in the form of the command to set that state. If no SSID is set the text string "NO NAME" will be returned.
Example	If the SSID is "TEST network" the response would be:
	`MEASCFG 1,NWSSID,12,TEST network`
*RST sets	MT8860xxxxxxxxxx where xxxxxxxxxx represents the serial number of the instrument. For example 6k00002649.

NWTYPE (Network Type)

Set command format	MEASCFG<ws>1,NWTYPE,<type>
	<type> ADHOC - Ad-Hoc connection
	AP - Infrastructure connection (MT8860B = access point)
	STA - Infrastructure connection (MT8860B = station)
Remarks	This command is used to set the type of network that will be configured when connecting with the MT8860B. The "ADHOC" type sets up an IBSS for an Ad-Hoc connection. "AP" and "STA" configures the MT8860B for an infrastructure connection. "AP" should be used when testing station ("STA") devices. "STA" should be used when testing access point ("AP") devices.
Example	To set the network type to ADHOC the command would be
	MEASCFG 1,NWTYPE,ADHOC
Query command format	MEASCFG?<ws>1,NWTYPE
Response	The response is returned in the form of the command to set that state.
Example	If the network type is AP the response would be:
	MEASCFG 1,NWTYPE,AP
*RST sets	ADHOC

OBWPCT (Occupied Bandwidth Percentage)

Set command format	MEASCFG<ws>1,OBWPCT,<percentage>		
	<percentage>	Min	0.0
		Max	100.0
		Resolution	0.1%
Remarks	This command sets the percentage of the power in the received signal to be included in the Occupied Bandwidth measurement.		
Example	To set the Occupied Bandwidth Percentage to 95% of the signal power the command would be:		
	MEASCFG 1,OBWPCT,95		
Query command format	MEASCFG?<ws>1,OBWPCT		
Response	The response is returned in the form of the command to set the value.		
Example	If the Occupied Bandwidth Percentage is set to 95% the reply would be:		
	MEASCFG 1,OBWPCT,95		
*RST sets	99.0		

OPERRATESET (Operational Rate Set)

Set command format	`MEASCFG<ws>1,OPERRATESET,<rate set>`
	<rate set> ALL
	SINGLE
	MULTIPLE
Remarks	This command defines how the operational rate set is broadcast in the beacon packets.
	ALL – All supported rates are included.
	SINGLE – Only the desired rate is included.
	MULTIPLE – All rates up to the desired rate are included.
Example	To configure the OPERRATESET to SINGLE the command would be
	`MEASCFG 1,OPERRATESET,SINGLE`
Query command format	`MEASCFG?<ws>1, OPERRATESET`
Response	The response is returned in the form of the command to set the value.
Example	If the OPERRATESET is set to MULTIPLE the response would be
	`MEASCFG 1,OPERRATESET,MULIPLE`
*RST sets	ALL

PATHADD (Add an Element to the Path Loss Table)

Set command format `MEASCFG<ws>1,PATHADD,<channel>,<offset>, [direction]`

<channel> Channel number

<offset> Offset to be applied at this channel in dB

[direction] TX: path loss in the DUT Tx path.

RX: path loss in the DUT Rx path.

If this parameter is not included in the command line, both the Tx and Rx path loss tables will be updated for the specified channel.

Min	0
Max	100
Resolution	0.1 dB

Remarks

This command adds an entry to the path loss table. When the path state is on, the path loss table is applied to both the measurements and the MT8860B transmitted power level. Path loss entries can only be specified for those channels supported by the selected WLAN standard. For example, with 802.11b selected, path loss entries for channels 1 to 14 can be specified.

Note: The MT8860B does not interpolate between loss values specified for non adjacent channels. Each entry within the path loss table applies to the selected channel only.

Example

To set channel 6 offset to 1.3dB the command would be: -

```
MEASCFG 1,PATHADD,6,1.3
```

PATHDEL (Delete an Element from the Path Loss Table)

Set command format `MEASCFG<ws>1,PATHDEL,<channel>,[direction]`

<channel>Channel number

[direction]TX: path loss for DUT transmit

RX: path loss for DUT receive

If this parameter is not included in the command line, both the Tx and Rx path loss tables will be updated for the specified channel.

Remarks

This command deletes an entry from the path loss table. If there are no entries to delete from the table an execution error is given. Path loss entries can only be deleted for those channels supported by the selected WLAN standard. For example, path loss entries for channels 1 to 14 can be removed when 802.11b is selected.

Example

To delete the entry for channel 6 the command would be: -

```
MEASCFG 1,PATHDEL,6
```

FRST sets

All path loss entries are deleted from the table.

PATHSTATE (Path Loss Table Status)

Set command format	`MEASCFG<ws>1,PATHSTATE,<state>`
	<state> ON - Enable path loss table
	OFF - Disable path loss table
Remarks	This command is used to enable or disable use of the path loss table.
Example	To set path table to ON the command would be: -
	`MEASCFG 1,PATHSTATE,ON`
Query command format	`MEASCFG?<ws>1,PATHSTATE`
Remarks	This command returns the state of the path table.
Example	If the path table is OFF the reply would be:
	`MEASCFG 1,PATHSTATE,OFF`
*RST sets	ON

PATHTBL (Read all the Points from the Path Loss Table)

Query command format	`MEASCFG?<ws>1,PATHTBL,[direction]`
	[direction] TX: path loss in the DUT Tx path
	RX: path loss in the DUT Rx path
	If this parameter is not included and the TX and RX path loss tables differ, an error will be returned.
Remarks	This command returns all path loss values (greater than 0 dB) for those channels supported by the selected WLAN standard. Enter a path loss as a positive value between 0 and 100.
Response	`MEASCFG<ws>1,PATHTBL,<entries>[,<channel>,<offset>]`
	<entries> The number of sets of channel and offset to follow
	<channel> The channel for which the offset has been set.
	<offset> The specified offset for the channel in question.
Example	If there were five entries in the table, the response would be in the following format.
	`MEASCFG 1,PATHTBL,5,2,23.3,4,40.1,7,12.7,10,5.3,14,22.9`

PAYLOAD (Payload)

Set command format	`MEASCFG<ws>1,PAYLOAD,<type>`
	<type> ZEROS - data pattern of all 0's 0101 - continuous 0101 data pattern 1010 - continuous 1010 data pattern PN7 - pseudo random PN7 data pattern RANDOM - random data pattern COUNT - data pattern consists of 255 bytes with incrementing value 1 to 255
Remarks	Set the payload type to be used for any data transmission from the reference radio.
Example	To configure the payload to be A's the command would be `MEASCFG 1,PAYLOAD,1010`
Query command format	`MEASCFG?<ws>1,PAYLOAD`
Response	The response is returned in the form of the command to set the value.
Example	If the payload is 0101 the reply would be `MEASCFG 1,PAYLOAD,0101`
*RST sets	0101

PDPCT (Power Distribution Percentage)

Set command format	`MEASCFG<ws>1,PDPCT,<percentage>`
	< percentage > Min 0.0 Max 100.0 Resolution 0.1
Remarks	This command sets the percentage of time of the received signal to be included in the Power Distribution measurement.
Example	To set the Power Distribution percentage to 99.9% the command would be: - `MEASCFG 1,PDPCT,99.9`
Query command format	`MEASCFG?<ws>1,PDPCT`
Response	The response is returned in the form of the command to set that state.
Example	If the Power Distribution percentage is 99.9 the response would be: `MEASCFG 1,PDPCT,99.9`
*RST sets	99.0

PERDELAY (PER Measurement Delay)

Set command format	MEASCFG<ws>1,PERDELAY,<delay>		
	<delay>	in seconds	
		Min	0
		Max	5
Remarks	This command enables a delay to be imposed between the leveling operation and the transmission of the test packets when a PER measurement is performed.		
Example	To set the delay to 0.5 seconds the command would be: -		
	MEASCFG 1,PERDELAY,0.5		
Query command format	MEASCFG?<ws>1,PERDELAY		
Response	The response is returned in the form of the command to set that value.		
Example	If the delay is set to 0.5 seconds, the response would be:		
	MEASCFG 1,PERDELAY,0.500		
*RST sets	0		

PERPKTS (PER Test Number of Packets)

Set command format	MEASCFG<ws>1,PERPKTS,<number of packets>		
	< number of packets >	Min	1
		Max	10,000
Remarks	This command is to set the number of packets that are transmitted by the reference radio when the PER test is performed.		
Example	To configure the PER packets to 1000 the command would be:		
	MEASCFG 1,PERPKTS,1000		
Query command format	MEASCFG?<ws>1,PERPKTS		
Response	The response is returned in the form of the command to set the value.		
Example	If the number of PER packets is 123 the reply would be		
	MEASCFG 1,PERPKTS,123		
*RST sets	500		

PKTLEN (Packet Length)

Set command format

MEASCFG<ws>1,PKTLEN,<len>

<len>

Rx mode: Min 60, Max 1500 bytes

Tx mode: As defined in table depending on data rate.

Data Rate (Mbps)	Network mode		Direct mode	
	Min data length (bytes)	Max data length (bytes)	Min data length (bytes)	Max data length (bytes)
1	60	600	60	600
2	60	1,250	60	1,250
5.5	80	1,500	80	3,440
11	155	1,500	155	6,875
6	50	1,500	50	3,750
9	75	1,500	75	5,625
12	100	1,500	100	7,500
18	145	1,500	145	11,250
24	195	1,500	195	15,000
36	280	1,500	280	22,500
48	385	1,500	385	30,000
54	435	1,500	435	33,750

Remarks

Set the amount of data in packet transmissions from the reference radio.

Example

To configure the packet length to be 1204 the command would be

```
MEASCFG 1,PKTLEN,1204
```

Query command format

MEASCFG?<ws>1,PKTLEN

Response

The response is returned in the form of the command to set the value.

Example

If the packet length is 500 the reply would be

```
MEASCFG 1,PKTLEN,500
```

*RST sets

1024

PKTTYPE (Packet Type)

Set command format	`MEASCFG<ws>1,PKTTYPE,<type>`
	<type>: UNICAST
	BROADCAST
Remarks	This command is used to define the type of packet that the MT8860B will transmit.
	If the packet type is set to broadcast, the destination address is set to the broadcast address (0xFFFFFFFFFFFF).
	If the packet type is set to unicast, the destination address set by the MACADDR command is used.
Example	To set the packet type to unicast the command would be: -
	`MEASCFG 1,PKTTYPE,UNICAST`
Query command format	`MEASCFG?<ws>1,PKTTYPE`
Response	The response is returned in the form of the command to set the parameters.
Example	`MEASCFG 1,PKTTYPE,UNICAST`
*RST sets	UNICAST

PLINTERVAL (Packet Loopback Interval)

Set command format	`MEASCFG<ws>1,PLINTERVAL,<interval>`
	<interval> Min 5 ms
	Max 50 ms
Remarks	This command is used to set the interval between frame transmissions for Tx tests when Network mode is selected.
Example	To set the packet loopback interval to 10 milliseconds the command would be:-
	`MEASCFG 1,PLINTERVAL,10`
Query command format	`MEASCFG?<ws>1,PLINTERVAL`
Response	The response is returned in the form of the command to set the parameter.
Example	`MEASCFG 1,PLINTERVAL,10`
*RST sets	5 ms

PREAMBLE (Preamble Type)

Set command format	`MEASCFG<ws>1,PREAMBLE,<type>`
	<type> LONG - long preamble
	SHORT - short preamble
Remarks	This command sets the length of the preamble for the reference radio transmission. The Preamble setting is only applicable to the 2, 5.5 and 11 Mbps DSSS modulated data rates. The 1 Mbps DSSS modulated data rate always uses a long preamble. This parameter is not applicable for the OFDM data rates.
Example	To configure the preamble to be SHORT the command would be:
	`MEASCFG 1,PREAMBLE,SHORT`
Query command format	`MEASCFG?<ws>1,PREAMBLE`
Response	The response is returned in the form of the command to set the value.
Example	If the preamble is LONG the reply would be
	`MEASCFG 1,PREAMBLE,LONG`
*RST sets	LONG

PRETRG (Pre Trigger)

Set command format	`MEASCFG<ws>1,PRETRG,<value>`		
	<value>	Min	-5.95 ms
		Max	0 ms
		Resolution	1 µs
Remarks	This command sets the pre-trigger time. All gate and profile capture settings are relative to this point. Refer to the diagram under profile capture. Refer to the figure within the description of the PROFCAP command.		
Example	To configure the pre trigger to -1.5 ms, the command would be:		
	`MEASCFG 1,PRETRG, -1.5 ms`		
	Or		
	`MEASCFG 1,PRETRG, -1.5 E -3`		
Query command format	`MEASCFG? 1,PRETRG`		
Example	`MEASCFG? 1,PRETRG`		
	`MEASCFG 1,PRETRG, -1.50E -003`		
*RST sets	0 ms		

PROFAVG (Profile Average State)

Set command format	`MEASCFG<ws>1,PROFAVG,<profile>,<state>`	
	<profile>	POWER
		CARRIER (only available for DSSS)
		SPECTRUM1
		SPECTRUM2
		CCDF1 (only available for OFDM)
		CCDF2 (only available for OFDM)
	<state>	ON
		OFF
Remarks	When the profile average state is OFF the MEAN, HIGH and LOW profiles are not available. When ON all the profiles are available. All the average profiles that are on may impact on the measurement speed on the MT8860B. The other profiles within each type are always available when the measurements are complete.	
Example	To set the POWER average profile ON the command would be: -	
	`MEASCFG 1,PROFAVG,POWER,ON`	
Query command format	`MEASCFG?<ws>1,PROFAVG,<profile>`	
	<profile>	POWER
		CARRIER (only available for DSSS)
		SPECTRUM1
		SPECTRUM2
		CCDF1 (only available for OFDM)
		CCDF2 (only available for OFDM)
	The command returns the states of this profile.	
Example	If the SPECTRUM1 average profile was OFF and requested, the command and response would be	
	`MEASCFG? 1,PROFAVG,SPECTRUM1`	
	`MEASCFG 1,PROFAVG,SPECTRUM1,OFF`	
*RST sets	ON	

PROFCAP (Profile Capture Configuration)

Set command format

```
MEASCFG<ws>1,PROFCAP,<profile>,<capture start>,<capture stop>
```

<profile> POWER

CARRIER

<capture start/stop> The time relative to the pre-trigger point to set the start and stop of the profile capture.

Min 0

Max 5.95 ms

Resolution 1 µs

The minimum difference between the start and stop is 10 µs. The stop time must be the start time plus the capture window such that the stop time is always greater than the start time, i.e.,
Start time = 0 µs
Duration = 10 µs
Stop time = 10 µs

Remarks

The profile capture start and stop settings define the area of the profile that will be made available when the measurements have completed. This function enables an area of the profile to be provided at a higher resolution. The profile capture start and stop times are shown in the figure below.

Example

To set the POWER capture start to 100 us and the stop to 200 us the command would be: -

```
MEASCFG 1,PROFCAP,POWER,100E-6,200E-6
```

Query command format

```
MEASCFG?<ws>1,PROFCAP,<profile>
```

<profile> POWER

CARRIER

Response

The command returns the capture start and stop time.

Example

If the CARRIER capture start time was 100uS and the stop is 900uS and requested the command and response would be

```
MEASCFG? 1,PROFCAP,CARRIER
```

```
MEASCFG 1,PROFCAP,CARRIER, 1.00E-004, 9.0E-004
```

*RST sets

<capture start> 0, <capture stop> 1 ms

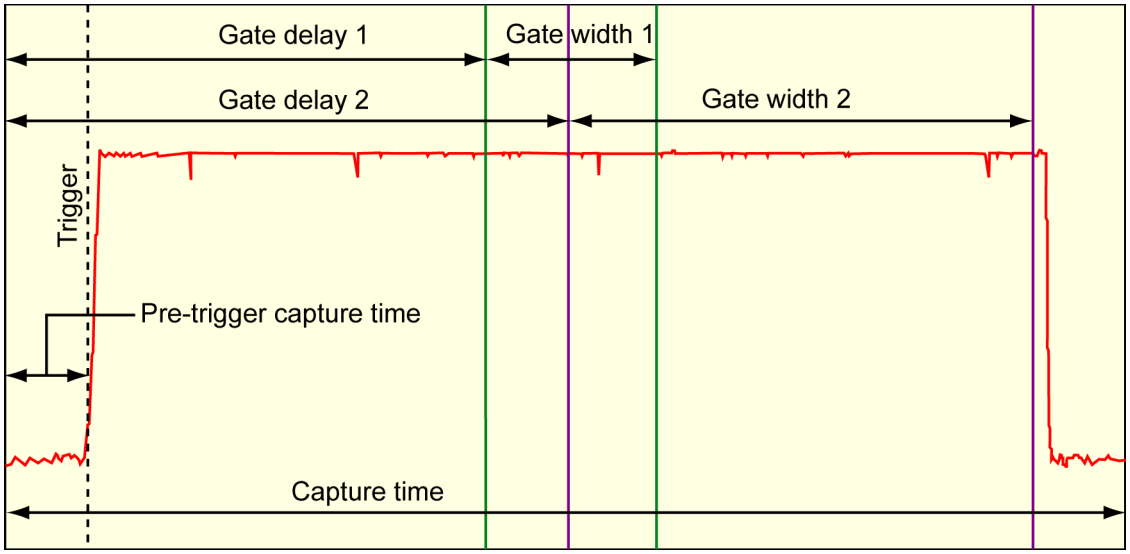


Figure 7-10. Profile Capture Times

RADIOERR (Radio Error Report)

Query command format	`MEASCFG?<ws>1,RADIOERR`
Remarks	Commands for the Reference radio that cannot be executed will produce an execution error. This event will set the EXE bit in the Event Status Register (ESR). Executing the RADIOERR command will give the reason for the execution error. The execution error is returned as a descriptive text string.
Response	The response format is `MEASCFG 1,RADIOERR,<length of error string>,<error string>,<error code>`

Example	Following the MEASCFG 1,PREAMBLE,LONG command and the EXE bit being set, send the following command,
	`MEASCFG? 1 RADIOERR`
	To get the response below
	`MEASCFG 1,RADIOERR, 27,Failed to set device config`

RADIOSEL (Radio Selection)

Set command format	`MEASCFG<ws>1,RADIOSEL,<selection>`		
	<selection>	INT	Internal reference radio
		EXT	External gold card
		NONE	No reference radio
Remarks	The MT8860B has an internal reference radio that is used when performing the 802.11b receiver tests. An external gold card can be used if required. This command enables the internal reference radio or external gold card to be used for the tests to be selected. If an external gold card is selected one of the BNC inputs must be configured to GOLDTX.		
	Note: When an external gold card is used, the measurement mode (MODE) should be set to RXMODE.		
Example	To configure the internal reference radio to be used the command would be		
	`MEASCFG 1,RADIOSEL,INT`		
Query command format	`MEASCFG?<ws>1,RADIOSEL`		
Response	The response is returned in the form of the command to set the value.		
Example	If the external gold card was set to be used the response would be		
	`MEASCFG 1,RADIOSEL,EXT`		
*RST sets	INT		

RANGE (Range Hold)

Set command format	`MEASCFG<ws>1,RANGE,<range>`
	<range>
	AUTO — The MT8860B auto ranges
	1, 2, 3 — The power ranges are calculated for each unit individually based on calibration data. Refer to the RDRANGES command on the following page.
Remarks	Input power levels in excess of range 1 could cause damage to the MT8860B.
Example	To configure the input range to be range 3 the command would be
	`MEASCFG 1,RANGE,3`
Note	For operation in ranges 3 the damage level is reduced to +18 dBm peak power.
Query command format	`MEASCFG?<ws>1,RANGE`
Response	The response is returned in the form of the command to set the value.
Example	If the MT8860B is auto ranging the response would be
	`MEASCFG 1,RANGE,AUTO`
*RST sets	AUTO

RDRANGES (Read Ranges)

Query command format	`MEASCFG?<ws>1,RDRANGES,<channel>`
	The channel numbers that can be set depend on the WLAN standard selected:
	If WLANSTD is set to B or G (DSSS):
	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
	If WLANSTD is set to G (OFDM):
	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
Remarks	This command is used to retrieve the top and bottom of ranges 1, 2, and 3 for a given channel number in dBm.
Response	The response format is:-
	RFRANGES,1,<channel>,<val1>,<val2>,<val3>,<val4>, <val5>,<val6>
	<channel> channel number 1 to 14
	<val1> Range 1 top (dBm)
	<val2> Range 1 bottom (dBm)
	<val3> Range 2 top (dBm)
	<val4> Range 2 bottom (dBm)
	<val5> Range 3 top (dBm)
	<val6> Range 3 bottom (dBm)
Example	To read the ranges for channel 1, the command would be:-
	`MEASCFG? 1,RDRANGES,1`
	The response would be:-
	`RFRANGES,1,1,26,0,3,-22,-19,-40`

REFRESH (Refresh WLAN Connection)

Query command format	MEASCFG<ws>1,REFRESH
Remarks	This command is used to refresh the WLAN connection.
Response	No response

SCAN (Scan for Networks)

Set command format	MEASCFG<ws>1,SCAN
Remarks	The command requests that the internal reference radio scans for available networks. When the scan is complete the SCAN bit (NWS) in the instrument status register (INS) is set. The bit is cleared at power on of the instrument and or when a scan starts. It is recommended that the instrument is put into Rx mode before making a connection.
Example	To request the reference radio to perform a scan the command would be MEASCFG 1,SCAN

SFMASK (Spectrum Flatness Mask)

Set command format	MEASCFG<ws>1,SFMASK,<upper limit>, <lower side limit>,<lower middle limit> <upper limit> Value in dB between 5 and -10. <lower side limit> Value in dB between 5 and -10. <lower middle limit> Value in dB between 5 and -10.
Remarks	This command is used to set the 3 limits for the spectral flatness mask. The value defines the power level at which the sub channel power should pass between. Spectral Flatness measurement is only measured in WLAN STD G.
Example	MEASCFG 1,SFMASK,2,-4,-2
Query command format	MEASCFG?<ws>1,SFMASK
Response	The response is returned in the form of the command to set the parameter.
Example	MEASCFG 1,SFMASK,1,-2,-1

STATUS (Status Command)

Query command format	`MEASCFG?<ws>1,STATUS`
Remarks	This command requests the instrument status. Reading the status will clear the SCW bit of the INS register.
Response	STATUS,1,ABCDEFGHIJKLMN

A 0 – Calibrated

1 – Not calibrated

B 0 – No network

1 – Network

C 0 – OK

1 – Overrange

D 0 – OK

1 – Underrange

E 0 – OK

1 – Spectral gate too small

F 0 – OK

1 – Spectral data error

G 0 – OK

1 – CCDF gate too small

H 0 – OK

1 – No burst

I 0 – OK

1 – No training sync

J 0 – Reserved

K 0 – OK

1 – Not enough samples

L 0 – OK

1 – Not enough chips to process chip clock measurement

M 0 – OK

1 – Bad Header CRC (DSSS packets only)

N 0 – OK

1 – Not enough symbols to process symbol clock measurement

STERR (Startup Errors)

Query command format	MEASCFG?<ws>1,STERR	
	MEASCFG,1,STERR,A,B,C,D	
Response	AB	
	A	0 – Calibrated
		1 – Not calibrated
	B	0 – Measurement data is OK.
		1 – Measurement data error.
	C	0 – Measurement system started.
		1 – Measurement system not started.
	D	0 – Card initialisation OK.
		1 – Card initialisation failed.
Remarks	If the instrument has started up, this command can be used to check for start-up errors.	

TESTMODE (Test Mode)

Set command format	MEASCFG<ws>1,TESTMODE,<mode>	
	<mode>	NETWORK
		DIRECT
Remarks	In “Network” mode, WLAN devices are tested using standard WLAN protocols once a network connection is established between the MT8860B and the DUT.	
	In “Direct” mode, WLAN devices are tested with the support of control software from the silicon supplier.	
Example	To set the test mode to direct the command would be: -	
	MEASCFG 1,TESTMODE,DIRECT	
Query command format	MEASCFG?<ws>1,TESTMODE	
Response	The response is returned in the form of the command to set the parameter.	
Example	MEASCFG 1,TESTMODE,NETWORK	
*RST sets	NETWORK	

TRGSRC (Trigger Source)

Set command format	`MEASCFG<ws>1,TRGSRC,<srce>,<params>`		
	<srce>	RF	Received power level
		EXT	External BNC
		FR	Free run
		VIDEO	Digital power comparator
	<params>	The parameter type(s) depends on the trigger source (<srce>) type specified:-	
		RF	Power, Edge
		EXT	Edge
		VIDEO	Edge
		FR	No parameters
		The permissible settings for each parameter are as follows:-	
		POWER	Min: -60 dBm, Max: +20 dBm
		EDGE	Rise, Fall
Remarks	There are a number of trigger sources available to trigger the MT8860B to measure the signal. The measurement is primed by a request for a measurement (MEAS) and once the measurement is primed the signal is captured on the next trigger event that occurs.		
Example	To set the trigger source to free run, the command would be:-		
	`MEASCFG 1,TRGSRC,FR`		
	To set the trigger source to RF when rising above -30dBm, the command would be: -		
	`MEASCFG 1,TRGSRC,RF,-30,RISE`		
Query command format	`MEASCFG?<ws>1,TRGSRC`		
Response	The response is returned in the form of the command to set that state.		
Example	If the trigger source is EXT on the RISING edge the response would be:		
	`MEASCFG 1,TRGSRC,EXT,RISE`		
*RST sets	<src> FR		

TXINTERVAL (Transmission Frame Interval)

Set command format	`MEASCFG<ws>1,TXINTERVAL,<interval>`
	<interval>: 0 to 65535 ms
Remarks	This command is used to set the interval between frame transmissions for Rx tests when Network mode is selected.
Example	To set the Tx frame interval to 233 ms the command would be:
	`MEASCFG 1,TXINTERVAL,233`
Query command format	`MEASCFG?<ws>1,TXINTERVAL`
Response	The response is returned in the form of the command to set that state.
Example	If the frame interval was 10 ms the response would be:
	`MEASCFG 1,TXINTERVAL,10`
*RST sets	0

TXPWR (Tx Power Level)

Set command format	`MEASCFG<ws>1,TXPWR,<pwr>`		
	<pwr>	Min	-100 dBm
		Max	0
Remarks	This command defines the power level to be transmitted by the MT8860B at the Test Port connector. If the path loss table is enabled and path loss values are specified, then the power level specified reflects the power level detected at the receiver of the DUT.		
Example	To set Tx power to –30dBm the command would be		
	`MEASCFG 1,TXPWR,-30`		
Query command format	`MEASCFG?<ws>1,TXPWR`		
Response	The response is returned in the form of the command to set the value.		
Example	If the Tx power was set to –35dBm the reply would be:		
	`MEASCFG 1,TXPWR,-35.0`		
*RST sets	-50.0 dBm		

TXRATE (Tx Rate)

Set command format	`MEASCFG<ws>1,TXRATE,<rate>`	
	<rate>	1 1 Mbps 2 2 Mbps 5.5 5.5 Mbps 6 6 Mbps 9 9 Mbps 11 11 Mbps 12 12 Mbps 18 18 Mbps 24 24 Mbps 36 36 Mbps 48 48 Mbps 54 54 Mbps
Note	Only 1, 2, 5.5 and 11 Mbps data rates are valid when the WLANSTD is set to B. All data rates are valid when the WLANSTD is set to G. Refer to the table on p5-4 of the Operation Manual for a full listing of IEEE channels, frequencies, and associated data rates.	
Remarks	This command sets the transmission rate of the data from the reference radio.	
Example	To set TXRATE to 5.5 Mbps the command would be `MEASCFG 1,TXRATE,5.5`	
Query command format	`MEASCFG?<ws>1,TXRATE`	
Response	The response is returned in the form of the command to set the value.	
*RST sets	11 (11 Mbps)	

UNITMACADDR (Unit MAC Address)

Query command format	`MEASCFG?<ws>1,UNITMACADDR`
Remark	This is the MAC address of the MT8860B.
Response	The response is returned in the following format: `MEASCFG 1,UNITMACADDR,<MAC Address>`
Example	`MEASCFG 1,UNITMACADDR,112233445566`

WLANSTD (WLAN Standard)

Set command format	`MEASCFG<ws>1,WLANSTD,<standard>`
	<standard> B 802.11b
	G 802.11g
Remarks	This command is used to switch between the different WLAN standards supported by the MT8860B, or to read the present standard.
Notes	When the WLAN standard is set to 802.11b, the data rate is automatically set to 11 Mbps. When the WLAN standard is set to 802.11g, the data rate is automatically set to 54 Mbps.
Example	To set the WLAN standard to 802.11g, the command would be: -
	`MEASCFG 1,WLANSTD,G`
Query command format	`MEASCFG?<ws>1,WLANSTD`
Response	The response is returned in the form of the command to set that state.
Example	If the WLAN standard is 802.11g the response would be:
	`MEASCFG 1,WLANSTD,G`
*RST sets	B (802.11b)

7-1 Advanced EVM Configuration

The MT8860B provides independent analysis length settings for EVM, chip clock, and symbol clock measurements. Additional parameters can also be configured that compensate for impairments in the signal transmitted by the DUT.

The following commands are used to define the analysis criteria that is applied by the MT8860B when performing EVM, chip clock and symbol clock measurements.

ALPHA (Set ALPHA Level for Root Nyquist Filtering)

Set command format	`MEASCFG<ws>1,EVMCFG,ALPHA,<setting>`
	<setting> 0.3 to 1.0 (in steps of 0.01)
Remarks	This command is used to set the ALPHA level used during root nyquist filtering.
Example	To set the ALPHA level to 0.3 the command would be:
	`MEASCFG 1,EVMCFG,ALPHA,0.3`
Query command format	`MEASCFG? 1,EVMCFG,ALPHA`
Response	The response is in the form of the command to set the value.
Example	If the ALPHA level was set to 0.3 the response would be:-
	`MEASCFG 1,EVMCFG,ALPHA,0.3`
*RST sets	0.35

BT (Set BT level for Gaussian Filtering)

Set command format	`MEASCFG<ws>1,EVMCFG,BT,<setting>`
	<setting> 0.3 to 1.0 (in steps of 0.1)
Remarks	This command is used to set the BT level used during gaussian filtering.
Example	To set the BT level to 0.3 the command would be:
	`MEASCFG 1,EVMCFG,BT,0.3`
Query command format	`MEASCFG? 1,EVMCFG,BT`
Response	The response is in the form of the command to set the value.
Example	If the BT level was set to 0.3 the response would be:-
	`MEASCFG 1,EVMCFG,BT,0.3`
*RST sets	0.5

CHANEST (EVM Channel Estimation)

Set command format	MEASCFG<ws>1,EVMCFG,CHANEST,<param> <param> TRAINSEQ - Long training sequence FULLPKT - Full packet
Remarks	This command selects the channel estimation method used when performing an EVM measurement.
Example	To select full packet channel estimation, the command would be: MEASCFG 1,EVMCFG,CHANEST,FULLPKT
Query command format	MEASCFG? 1,EVMCFG,CHANEST
Response	The response is in the form of the command to set the value.
Example	If channel estimation is set to long training sequence, the response would be:- MEASCFG 1,EVMCFG,CHANEST,TRAINSEQ
*RST sets	TRAINSEQ

CHIPCLK (DSSS Chip Clock Analysis Length)

Set command Format	`MEASCFG<ws>1,EVMCFG,CHIPCLK,<length>` <length> 3300 to 30250
Remarks	This command is used to set the number of chips used in the processing of the chip clock measurement when a DSSS data rate is selected.
Example	To set 16500 chips for chip clock measurement the command would be: `MEASCFG 1,EVMCFG,CHIPCLK,16500`
Query command format	`MEASCFG? 1,EVMCFG,CHIPCLK`
Response	The response is in the form of the command to set the value.
Example	If the chip clock analysis length is set to 16500, the response would be:- `MEASCFG 1,EVMCFG,CHIPCLK,16500`
*RST sets	5500

EVMCHIP (DSSS EVM Analysis Length)

Set command Format	`MEASCFG<ws>1,EVMCFG,EVMCHIP,<length>`
	`<length>` 220 to 11000
Remarks	This command is used to set the number of chips used in the processing of the EVM measurement when a DSSS data rate is selected.
Example	To set the DSSS EVM analysis length to 1000 chips, the command would be:
	`MEASCFG 1,EVMCFG,EVMCHIP,1000`
Query command format	`MEASCFG? 1,EVMCFG,EVMCHIP`
Response	The response is in the form of the command to set the value.
Example	If the DSSS EVM analysis length is set to 1000, the response would be:-
	`MEASCFG 1,EVMCFG,EVMCHIP,1000`
*RST sets	1000

EVMSYM (OFDM EVM Analysis Length)

Set command Format	`MEASCFG<ws>1,EVMCFG,EVMSYM,<length>`
	`<length>` 16 to 500
Remarks	This command is used to set the number of OFDM symbols used in the processing of the EVM measurements when an OFDM data rate is selected.
Example	To set the OFDM analysis length to 40 symbols, the command would be:
	`MEASCFG 1,EVMCFG,EVMSYM, 40`
Query command format	`MEASCFG? 1,EVMCFG,EVMSYM`
Response	The response is in the form of the command to set the value.
Example	If the OFDM analysis length is set to 40, the response would be:-
	`MEASCFG 1,EVMCFG,EVMSYM, 40`
*RST sets	40

FILTER (Set Filter State)

Set command format	`MEASCFG<ws>1,EVMCFG,FILTER,<mode>`
	<mode> NONE - No filter GAUSSIAN - Gaussian filter RNYQUIST - Root Nyquist filter
Remarks	This command is used to select the DSSS filter type.
Example	To enable GAUSSIAN filtering the command would be: `MEASCFG 1,EVMCFG,FILTER,GAUSSIAN`
Query command format	`MEASCFG? 1,EVMCFG,FILTER`
Response	The response is in the form of the command to set the value.
Example	If filtering was set to GAUSSIAN the response would be:- `MEASCFG 1,EVMCFG,FILTER,GAUSSIAN`
*RST sets	NONE

MODE (EVM Analysis Length Setting Method)

Set command format	`MEASCFG<ws>1,EVMCFG,MODE,<mode>`
	<mode> AUTO MANUAL
Remarks	This command is used to select whether the EVM analysis length is defined manually or configured automatically. If MANUAL mode is selected, the user defined settings for EVMCHIP, CHIPCLK, EVMSYM and SYMCLK are used. If AUTO mode is selected then the TXRATE, PKTLEN and MODE settings are used to calculate the EVMCHIP and CHIPCLK values for DSSS or the EVMSYM and SYMCLK values for OFDM. If the analysis length values calculated are less than the default values, the calculated values with be used, otherwise the default values will be used. The AUTOCFG command will also auto-configure the analysis length values if the EVMCFG mode is set to AUTO.
Example	To select automatic configuration of the EVM analysis lengths: `MEASCFG 1,EVMCFG,MODE,AUTO`
Query command format	`MEASCFG?<ws>1,EVMCFG,MODE`
Response	The response is returned in the form of the command to set the value.
Example	If the mode is MANUAL. `MEASCFG 1,EVMCFG,MODE,MANUAL`
*RST sets	AUTO

SYMCLK (OFDM Symbol Clock Analysis Length)

Set command format	`MEASCFG<ws>1,EVMCFG,SYMCLK,<length>`
	<length> 16 to 500
Remarks	This command defines how long the analysis length is for the symbol clock measurement.
Example	To set 100 symbols for the symbol clock measurement the command would be;
	`MEASCFG 1,EVMCFG,SYMCLK,100`
Query command format	`MEASCFG?<ws>1,EVMCFG,SYMCLK`
Response	The response is returned in the form of the command to set the value.
Example	If the SYMLK is set to 25 the response would be
	`MEASCFG 1,EVMCFG,SYMCLK,25`
*RST sets	55

TRACKING (EVM Pilot Tracking Type)

Set command format	`MEASCFG<ws>1,EVMCFG,TRACKING,<mode>`
	<mode> PHASE - Phase only
	PHASEMAG - Phase and magnitude
Remarks	PHASE will track the common pilot phase of all 4 pilots. PHASEMAG will also take into account any common pilot magnitude error.
Query command format	`MEASCFG?<ws>1,EVMCFG,TRACKING`
Response	The response is returned in the form of the command to set the parameters.
Example	`MEASCFG 1,EVMCFG,TRACKING,<mode>`
*RST sets	PHASE

7-2 DSSS Spectral Mask Configuration

The spectral mask is the PASS/FAIL criteria as defined in the IEEE specification for the spectral transmission of a 802.11b / 802.11g DSSS signal. The MT8860B supports five spectral masks. Mask 1 is fixed to the default IEEE 802.11b standard mask. The remaining four masks (2 to 5) can be defined by the operator, and the default values are the IEEE802.11b standard mask.

The following MEASCFG commands are used to select and modify the spectral masks.

Note	The spectral mask for 802.11g OFDM data rates is fixed and cannot be modified. The default mask (as defined in the 802.11 specification) is automatically selected by the MT8860B when an OFDM data rate is specified.

SMDEF (Set Spectral Mask to Defaults)

Set command format: `MEASCFG<ws>1,SMDEF,<mask number>`

<mask number>: 2 to 5

Remarks: This command is to set a spectral mask to the default values.

Default values are: -

Entry	Frequency offset	Power
1	-35 MHz	-50 dBr
2	-22 MHz	-30 dBr
3	-11 MHz	0 dBr
4	+11 MHz	-30 dBr
5	+22 MHz	-50 dBr

Example: To set mask 4 to the defaults the command would be

```
MEASCFG 1,SMDEF,4
```

SMSEL (Select Spectral Mask)

Set command format: `MEASCFG<ws>1,SMSEL,<mask number>`

<mask number> 1 to 5

Remarks: This command is to select the spectral mask used for the spectral mask test.

Example: To select mask 4 the command would be

```
MEASCFG 1,SMSEL,4
```

Query command format: `MEASCFG?<ws>1,SMSEL`

Example: If the mask selected is mask 2 the result would be

```
MEASCFG 1,SMSEL,2
```

*RST sets: 1

SMLIM (Spectral Mask Limits)

Set command format	`MEASCFG 1,SMLIM,<mask>,<limit2>,<limit1>`
	<mask> Mask number (2-5)
	<limit2> Value in dB for 35 to 22 MHz section of mask
	<limit1> Value in dB for 22 to 11 MHz section of mask
Remarks	This command is used to set and query DSSS spectral mask limits.
Example	To set mask 2 to the default values:
	`MEASCFG 1,SMLIM,2,-50,-30`
	If mask 2 is set to the default values;
	`MEASCFG 1,SMLIM,2,-50,-30`
Query command format	`MEASCFG? 1,SMLIM,<mask>`

7-3 Signal Generator Configuration

The MT8860B provides a signal generator mode of operation whereby a continuous transmit signal is generated at the test port connector. Signal generator mode may be of particular use in calculating the path loss of a test system prior to measurement operation or when testing the receiver of a DUT for RSSI (Received Signal Strength Indicator).

The following commands are used to configure the signal generator mode. Examples on how to use these commands are provided in Chapter 9.

Note

The following configuration is required to enable the use of signal generator mode.

- The test mode must be set to “DIRECT” (MEASCFG<ws>1,TESTMODE,DIRECT).
- The measurement mode must be set to “RX” (MEASCFG<ws>1,MODE,RXMODE).
- The reference radio must be set to “INTERNAL” (MEASCFG<ws>1,RADIOSEL,INT).

STATE (Signal Generator State)

Set command format	MEASCFG<ws>1,SIGGEN,STATE,<state>
	<state> ENABLE - Enable signal generator operation
	DISABLE - Disable signal generator operation
Remarks	This command enables and disables the signal generation functionality to start and stop the transmission of the selected data.
Example	To start transmission:
	`MEASCFG 1,SIGGEN,STATE,ENABLE`
Query command format	`MEASCFG?<ws>1,SIGGEN,STATE`
Response	The response is returned in the form of the command to set the value.
Example	If the state is disabled.
	`MEASCFG 1,SIGGEN,STATE,DISABLE`
*RST sets	DISABLE

MODE (Signal Generator Output Mode)

Set command format	MEASCFG<ws>1,SIGGEN,MODE,<mode>
	<mode> CF - continuous framed data
	CS - carrier suppression (unframed 0101 unscrambled)
	CM - continuous modulated (unframed)
	CW - continuous non-modulated (unframed)
Remarks	This command is used to select the type of signal to be generated.
Example	To select continuous framed data:
	`MEASCFG 1,SIGGEN,MODE,CF`
Query command format	`MEASCFG?<ws>1,SIGGEN,MODE`
Response	The response is returned in the form of the command to set the value.
Example	If the mode is CW.
	MEASCFG 1,SIGGEN,MODE,CW
*RST sets	CF

Chapter 8 — Measurement Requests and Output Results Format

The MT8860B is primed to make a measurement when a measurement request is made. Once a measurement request is made, the next packet number occurrences of the trigger source selected will cause a packet to be captured and the measurements requested obtained. When the measurements requested are complete for the NUMMEAS packets (or triggers), the results are available in the GPIB output queue to be read.

The output for each set of test results has a fixed format so that when a number of measurements are requested at the same time, the data can be extracted easily in whatever order they may be available.

The MT8860B is able to perform both transmitter and receiver measurements.

In Tx measurement mode all the Tx measurements are available concurrently.

In Rx measurement mode the MT8860B can be requested to provide PER measurements if a connection to the MT8860B reference radio has been established. When the PER measurements are requested the reference radio transmits the specified packets and returns a PER. If a connection to the MT8860B reference radio has not been made, the reference radio can be configured to continuously transmit, or to transmit the configured number of the specified packet, on the set channel number. In this mode of operation, the system controlling the DUT must make the PER calculations.

MEAS (Measurement Request)

Query command format `MEASCFG?<ws><reserved>,MEAS,<params…..>`

<reserved>Must be set to '1'

<params>The parameters are a list of measurements that are to be carried out on the captured packet.

Mnemonic	Measurement	Tx/ Rx	Date Rate	
			DSSS	OFDM
AP	Average power	Tx	⊙	⊙
CC	Chip Clock	Tx	⊙	○
CF	Average Carrier frequency	Tx	⊙	⊙
CL	Carrier Leakage	Tx	○	⊙
CO	Average Carrier offset	Tx	⊙	⊙
CP	Crest factor power	Tx	⊙	⊙
CS	Carrier suppression	Tx	⊙	○
EV	EVM analysis	Tx	⊙	⊙
FE	Spectral flatness errors	Tx	○	⊙
FT	Frequency Tolerance	Tx	⊙	⊙
MS	Spectral mask segment	Tx	⊙	⊙
OB	Occupied bandwidth	Tx	⊙	⊙
PD	Power distribution	Tx	○	⊙
PP	Peak power	Tx	⊙	⊙
SC	Symbol Clock	Tx	○	⊙
SD	Power spectral density	Tx	⊙	⊙
SF	Spectral flatness	Tx	○	⊙
SM	Spectral mask	Tx	⊙	⊙
TT	Transition times	Tx	⊙	⊙
PER	Packet Error Rate	Rx	⊙	⊙

The response for each test is described below. The responses are comma separated within the same reply message, with the message terminator at the end of the measurements requested. If the results for a gate are invalid, the valid flag will be set to FALSE and the related parameters for that gate will be set to 0 or FAIL.

Average Power

Response

Header	AP
Reserved1	
Results	Gate 1 Measurement Valid (TRUE or FALSE)
	Gate 1 Mean average in dBm
	Gate 1 Highest average in dBm
	Gate 1 Lowest average in dBm
	Gate 2 Measurement Valid (TRUE or FALSE)
	Gate 2 Mean average in dBm
	Gate 2 Highest average in dBm
	Gate 2 Lowest average in dBm

Example

```
AP,1,TRUE,9.47,9.48,9.46,TRUE,9.48,9.50,9.46
```

Chip Cock

Response

Header	CC
Reserved	1
Result	Measurement Valid (true or false)
	Chip clock in Hz
	Chip clock in ppm

Example

```
CC,1,TRUE,-117.70,-10.70
```

Average Carrier frequency

Header	CF
Reserved	1
Result	Gate 1 Measurement Valid (TRUE or FALSE)
	Gate 1 Centre frequency in MHz
	Gate 2 Measurement Valid (TRUE or FALSE)
	Gate 2 Centre frequency in MHz

Example

```
CF,1,TRUE,2436.97,TRUE,2437.97
```

Carrier Leakage

Response

Header	CL
Reserved	1
Result	Measurement Valid (true or false)
	Carrier Leakage measurement in dB

Example

```
CL,1,TRUE,-29.98
```

Average Carrier Offset

Response

Header	CO
Reserved	1
Result	Gate 1 Measurement Valid (TRUE or FALSE)
	Gate 1 Mean carrier offset in kHz
	Gate 1 Highest carrier offset in kHz
	Gate 1 Lowest carrier offset in kHz
	Gate 2 measurement Valid (TRUE or FALSE)
	Gate 2 Mean carrier offset in kHz
	Gate 2 Highest carrier offset in kHz
	Gate 2 Lowest carrier offset in kHz

Example

```
CO,1,TRUE,-26.35,-26.00,-26.70,TRUE,-26.75,-
26.72,-26.78
```

Crest Factor Power

Response

Header	CP
Reserved	1
Result	Gate 1 measurement Valid (TRUE or FALSE)
	Gate 1 Crest Factor Power in dB
	Gate 2 measurement Valid (TRUE or FALSE)
	Gate 2 Crest Factor Power in dB

Example

```
CP,1,TRUE,9.35,TRUE,9.34
```

Carrier Suppression

Response

Header	CS
Reserved	1
Result	Gate 1 Measurement Valid (TRUE or FALSE)
	Gate 1 Carrier suppression in dBc
	Gate 2 Measurement Valid (TRUE or FALSE)
	Gate 2 Carrier suppression in dBc

Example

```
CS,1,TRUE,20.3,TRUE,20.3
```

EVM Response

Header	EV
Reserved	1
Result	DSSS data rate response:-
	Measurement Valid
	EVM rms %
	EVM peak %
	EVM minimum %
	EVM rms dB
	EVM peak dB
	EVM minimum dB
	IQ offset in dB (11b / 11g DSSS)
	Phase error in degrees (11b / 11g DSSS)
	Magnitude error (11b / 11g DSSS)
	OFDM data rate response:-
	Measurement Valid
	EVM rms %
	EVM peak %
	EVM minimum %
	EVM rms dB
	EVM peak dB
	EVM minimum dB

Remarks

When a measurement request is made, the parameters define which measurements the MT8860B is to make.

If EV is included in the list of measurements to make then the EVM analysis is performed over the first burst in the capture. Conditions:

It must contain a valid long training word.

Example

```
11b: EV,1,TRUE,2.67,5.47,0.05,-31.46,-25.23,-
66.00,-36.00,0.98,2.06
```

```
11g: EV,1,TRUE,4.67,16.67,0.05,-26.61,-15.56,-
66.89
```

Spectral Flatness Error

Response

Header	FE
Reserved	1
Result	Measurement Valid (true or false)
	Number of Channels failing mask
	<Channel>, <Number of failures>

Example

```
FE,1,TRUE,3,-26,-24,5,19,2
```

If running the measurement over a number of averages, the number of times a channel fails the mask is recorded.

Frequency Tolerance

Response

Header	FT
Reserved	1
Result	Measurement Valid (true or false)
	Centre frequency error in Hz
	Centre frequency error in ppm

Example

```
FT,1,TRUE,-26058.17,-10.69
```

Mask Segment

Response
(Results for DSSS data rates)

Header MS

Reserved 1

Result Gate 1 measurement valid (true or false)
Gate1 peak power in segment
-35 to -22 MHz
-22 to -11 MHz
-11 to 22 MHz
22 to 35 MHz

Gate 2 measurement valid (true or false)
Gate 2 peak power in segment
-35 to -22 MHz
-22 to -11 MHz
-11 to 22 MHz
22 to 35 MHz

Example

```
MS,1,TRUE,-55.5,-39.4,-42.5,-58.1,TRUE,-55.9,-
39.5,-42.4,-58.5
```

Mask Segment (extended)

Response
(Results for OFDM data rates)

Header MSX

Reserved 1

Result Number of segments

Gate 1 measurement Valid (TRUE or FALSE)

Gate 1 for each segment:

Frequency in MHz

Power relative to mask in dB

Gate 2 measurement Valid (TRUE or FALSE)

Gate 2 for each segment:

Frequency in MHz

Power relative to mask in dB

Example

```
MSX,1,8,TRUE,-30.2,-11.7,-28.6,-12.6,-11.9,-
10.8,-10.9,-12.1,10.8,-15.9,11.8,-12.7,29.9,-
14.1,32.1,-14.1,TRUE,-30.2,-11.7,-28.6,-12.6,-
11.9,-10.8,-10.9,-12.1,10.8,-15.9,11.8,-
12.7,29.9,-14.1,32.1,-14.1
```

Occupied Bandwidth

Response

Header	OB
Reserved	1
Result	Gate 1 Measurement Valid (TRUE or FALSE)
	Gate 1 Occupied Bandwidth (MHz)
	Gate 1 Lower Occupied Bandwidth Offset (MHz)
	Gate 1 Upper Occupied Bandwidth Offset (MHz)
	Gate 2 Measurement Valid (TRUE or FALSE)
	Gate 2 Occupied Bandwidth (MHz)
	Gate 2 Lower Occupied Bandwidth Offset (MHz)
	Gate 2 Upper Occupied Bandwidth Offset (MHz)

Example

```
OB,1,TRUE,16.6,-8.3,8.3,TRUE,16.6,-8.3,8.3
```

Power Distribution

Response

Header	PD
Reserved	1
Result	Gate 1 measurement Valid (TRUE or FALSE)
	Gate 1 Power Distribution in dB
	Gate 2 measurement Valid (TRUE or FALSE)
	Gate 2 Power Distribution in dB

Example

```
PD,1,TRUE,9.2,TRUE,9.1
```

Peak Power

Response

Header	PP
Reserved	1
Result	Gate 1 Measurement Valid (TRUE or FALSE)
	Gate 1 Peak power in dBm
	Gate 2 Measurement Valid (TRUE or FALSE)
	Gate 2 Peak power in dBm

Example

```
PP,1,TRUE,18.82,TRUE,18.82
```

Symbol Clock

Response

Header	SC
Reserved	1
Result	Measurement Valid (true or false)
	Symbol clock in Hz
	Symbol clock in ppm

Example

```
SC,1,TRUE,-2.32,-9.27
```

Power Spectral Density

Response

Header SD

Reserved 1

ResultGate 1 Measurement Valid (true or false)

Gate 1 Power Spectral Density in dBm/MHz

Gate 2 Measurement Valid (true or false)

Gate 2 Power Spectral Density in dBm/MHz

Example

```
SD,1,TRUE,1.72,TRUE,1.56
```

Spectral Flatness

Response

Header	SF
Reserved	1
Result	Measurement Valid (true or false)
	Pass/Fail Spectral Flatness Mask

Example

```
SF,1,TRUE,PASS
```

Spectral Mask

Response

Header	SM
Reserved	1
Result	Gate 1Measurement Valid (TRUE or FALSE)
	Gate 1 PASS or FAIL against selected mask
	Gate 2 Measurement Valid (TRUE or FALSE)
	Gate 2 PASS or FAIL against selected mask

Example

```
SM,1,TRUE,PASS,TRUE,PASS
```

Transition Times

Response

Header	TT
Reserved	1
Result	Gate 1 Measurement Valid
	Gate 1 Rise Time
	Gate 1 Fall Time
	Gate 2 Measurement Valid
	Gate 2 Rise Time
	Gate 2 Fall Time

Example

```
TT,1,TRUE,9.1E-008,2.0E-007,TRUE,9.1E-008,2.0E-007
```

Sensitivity PER

Response

Header	PER
Reserved	1
Result	Valid (TRUE or FALSE)
	Packet error rate as a percentage
	ACKs received
	Packets sent

Example

```
PER,1,TRUE,2.000,490,500
```

Example

To request for the peak power, average power, and carrier suppression measurements to be made on the next packet(s) captured, the command would be:

```
MEASCFG? 1,MEAS,PP,AP,CS
```

The response would be in the form: -

```
PP,1,TRUE,-32.4,TRUE,-33.7,AP,1,TRUE,-36.7,-
37.8,-35.2,TRUE,-37.7,-38.8,-
36.2,CS,1,TRUE,5.6,TRUE,4.7
```

RDPROF (Read Profile)

Query command format `MEASCFG?<ws>1,RDPROF,<profile >,<profile type>,<format>`

<profiles>The profile being requested.

Profile	Date Rate	
	DSSS	OFDM
POWER	⊙	⊙
CARRIER	⊙	○
SPECTRUM1	⊙	⊙
SPECTRUM2	⊙	⊙
CCDF1	○	⊙
CCDF2	○	⊙
EVMCHAN	○	⊙
EVMTIME	○	⊙
CONSTELLATION	⊙	⊙
FLATNESS	○	⊙

<profile type> RAW
MEAN
HIGH
LOW
LAST

<format> ASCII
BINARY

Remarks

This command requests the type of profile data to be returned based on the raw data captured.

The power and carrier profiles contain data representing the period between the capture start time and the capture stop time. This data is decimated to provide output with a resolution of 440 points (output samples).

The EVMCHAN and EVMTIME profiles are only applicable to the MEAN, HIGH, and LOW profile types.

First, the raw data is split into a number of sections (S) all containing 1/440 of the samples from the profile width. Each of these sections is then decimated to produce three values (D):

Highest	Highest S value from any packet being analysed that has appeared in this section.
Lowest	Lowest S value from any packet being analysed that has appeared in this section.
Mean	The mean for all packets analysed, of the average of all the S values in this section.

Note: The mean, high, and low profiles are only available if the relevant PROFAVG is on.

Example

To request the MEAN of the POWER profile in ASCII format the command would be:

```
MEASCFG? 1,RDPROF,POWER,MEAN,ASCII
```

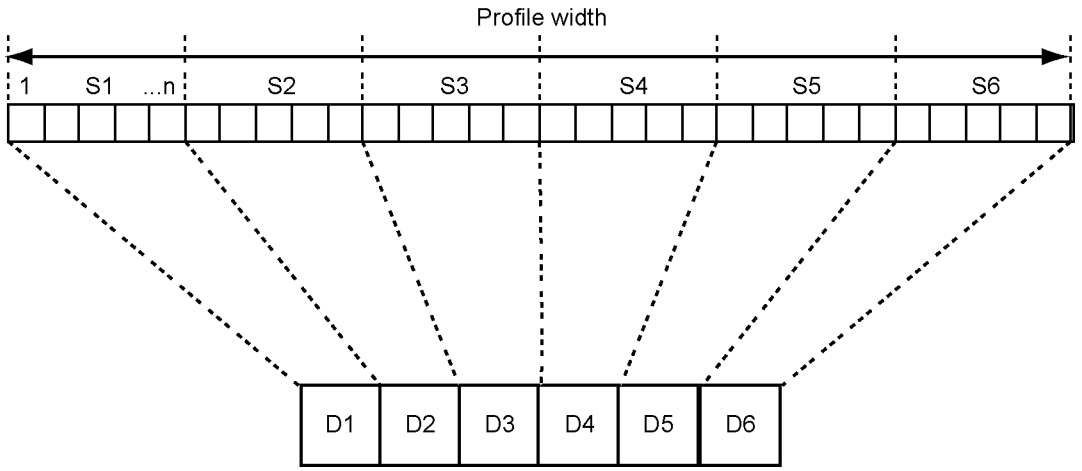


Figure 8-1. Profile Width

Responses

The power and carrier data for the LAST, and the mean, high, and low profiles is decimated to 440 points. The 440 points represent the captured data between the capture start and capture stop times set.

The spectral data for the LAST, MEAN, HIGH, and LOW profiles is 815 points. The 815 points represent the average of the spectrums captured between the capture start and capture stop and represent 815 points between –35 MHz and +35 MHz from the carrier frequency.

The output format for the data is:

`PROFILE,1,<profile>,<profile type>,<zoomed>,<format>,<number of elements>,<data elements>`

<profile>	The profile that was requested. POWER CARRIER SPECTRUM1 SPECTRUM2 CCDF1 (MEAN only) CCDF2 (MEAN only) EVMCHAN (OFDM only) EVMTIME (OFDM only) CONSTELLATION (BINARY only) FLATNESS
<profile type>	RAW (BINARY only) MEAN HIGH LOW LAST
<zoomed>	TRUE or FALSE. Zoomed is true if the period “capture start” to “capture stop” does not include both gate 1 and gate 2.
<format>	ASCII BINARY – Note: For the constellation profile or any RAW profile type the format must be binary.
<number of elements>	The number of data elements that follow. In ASCII format these elements are comma separated. For Binary format there is no separator between elements.
<data elements>	For output in an ASCII format the power and carrier data is 440 comma separated values. The values for the profile types are described below: -

Power profiles

Each value is a power value in dBm to 0.1 dB resolution.

Carrier profiles

Each value is a frequency in kHz to one decimal place i.e. 0.1 kHz resolution.

Spectral profiles

Each of the 815 power values returned in this data representing 85.9375 kHz steps from –35 MHz to +35 MHz.

For output in binary or ASCII format the power and carrier data is 440 single precision values. The spectrum binary output is 815 single precision values.

CCDF profiles

Each entry is for a dB value (in 0.1 dB steps) above the mean power for the gate. The comma separated values represent a percentage of time that the signal has exceeded the dB value for this entry.

EVM profiles

Two EVM profiles are supported: EVMCHAN representing EVM vs. sub carrier, and EVMTIME representing EVM vs. symbol. The number of data elements is not constrained to 401 points. For EVMCHAN there are 64 data elements, for EVMTIME the number of data elements is equal to the number of OFDM symbols in gate 1 markers.

Constellation – OFDM data rates

Normal BINARY type response.

DATA After binary header:

[OFDMSYMBOL1][OFDMSYMBOL2][...][OFDMSYMBOLn]
where n = Binary Data Length size / 512
4bytes per I/Q value
2 IQ values per constellation point
64 IQ values per OFDM symbol

[OFDMSYMBOLx] = [I Value1][Q Value1][I Value2][Q Value2]... [I Value64][Q Value64]
[I Value x]= [4 bytes]
[Q Value x]= [4 bytes]

4 bytes = 32 bit IEEE floating point format.

Constellation – DSSS data rates

Normal BINARY type response.

Data After binary header;

[QPSK Symbol 1][QPSK Symbol 2][...][QPSK Symbol n]
where n = Binary Data Length size / 8
4 bytes per I/Q value
2 IQ values per constellation symbol point

[QPSK Symbol x] = [[I Value x][Q Value x]]

[I Value x] = 4 bytes
[Q Value x] = 4 bytes

4 bytes = 32 bit IEEE floating point format

Flatness

Flatness profile output supports Last, Mean, High, Low and Binary outputs. The flatness profile contains all sub channels, including the guard channels, i.e. 64 channel values. Elements from 7 to 59 correspond to sub channels -26 to +26 including the centre channel 0. The values are in dB and are relative to the average of the centre +/- 16 sub channels power.

Chapter 9 — MT8860B Remote Command Sequences

This chapter provides examples on how the GPIB command set and the status reporting can be combined by a user to develop an automated test program.

The examples assume that the event registers have been configured so that a service request is generated when;

- Operation Complete is reported.
- Data is available in the output queue in response to a query command.
- A network scan has completed in response to measCfg 1,scan
- A DUT IP address has been assigned using DHCP.
- External gold card leveling has completed in response to measCfg 1,extLevel
- An error condition occurs which results in either the QYE, CMD, EXE or DDE bits in the *ESR register being set.
- A measurement status change has occurred.
- A parameter has been changed due to a configuration constraint.
- The instrument is unable to achieve the specified output power level.

The following command line can be used to configure the event registers to detect all of the above conditions;

```
*CLS;*SRE 49;*ESE 61;*INE 191
```

In order for the status reporting to work correctly, the automated test program must;

- Wait for a service request to be generated.
- Establish which device/instrument is requesting service.
- Determine the cause of the service request and act accordingly.

As a consequence, additional commands and operations will be required in conjunction with those commands listed in the examples.

Cause of service request	Action to be taken
Operation Complete is reported	ACTION 1: Read the Status Byte using serial poll method (bit 5 <esb> should be set). Issue a *ESR? Query command. Wait for a service request to be generated. Read the Status Byte using serial poll method (bit4 <mav> should be set). Read the output queue. The response should indicate that bit 0 <opc> is set indicating that the command has been executed successfully and the operation is complete.
Data is available in the output queue in response to a query command.	ACTION 2: Read the Status Byte using serial poll method (bit4 <mav> should be set) Read the output queue.
A network scan has completed in response to meascfg 1,scan	ACTION 3: Read the Status Byte using serial poll method (bit0 < isb> should be set) Issue a *INS? Query command. Wait for a service request to be generated. Read the Status Byte using serial poll method (bit4 <mav> should be set). Read the output queue. The response should indicate that bit 0 <nws> is set indicating that the scan operation has completed.
A DUT IP address has been assigned using DHCP	ACTION 4: Read the Status Byte using serial poll method (bit0 < isb> should be set). Issue a *INS? Query command. Wait for a service request to be generated. Read the Status Byte using serial poll method (bit4 <mav> should be set). Read the output queue. The response should indicate that bit 5 <ipa> is set.

External gold card leveling has completed in response to measfg 1,extlevel	ACTION 5: Read the Status Byte using serial poll method (bit0 < isb> should be set). Issue a *INS? Query command. Wait for a service request to be generated. Read the Status Byte using serial poll method (bit4 <mav> should be set). Read the output queue. The response should indicate that bit 2 <lvl> is set.
An error condition occurs which results in either the QYE, CMD, EXE or DDE bits in the *ESR register being set.	ACTION 6: Read the Status Byte using serial poll method (bit 5 <esb> should be set) Issue a *ESR? Query command. Wait for a service request to be generated. Read the Status Byte using serial poll method (bit4 <mav> should be set). Read the output queue. The response will indicate the type of error generated. The following query commands can then be used to identify the cause of the problem; syscfg? errlst measfg? 1,errlst measfg? 1,radioerr measfg? 1,errmess,<x> where <x> is error number These commands return a list of error codes that can be interpreted by referring to Appendix A.

A measurement status change has occurred.	ACTION 7: Read the Status Byte using serial poll method (bit0 < isb> should be set). Issue a *INS? Query command. Wait for a service request to be generated. Read the Status Byte using serial poll method (bit4 <mav> should be set). Read the output queue. The response should indicate that bit 1 <scw> is set. The following query command can then be used to determine the actual cause of the status change; meascfg? 1,status
A parameter has been changed due to a configuration constraint.	ACTION 8: Read the Status Byte using serial poll method (bit0 < isb> should be set). Issue a *INS? Query command. Wait for a service request to be generated. Read the Status Byte using serial poll method (bit4 <mav> should be set). Read the output queue. The response should indicate that bit 4 <cfg> is set.
The instrument is unable to achieve the specified output power level.	ACTION 9: Read the Status Byte using serial poll method (bit0 < isb> should be set). Issue a *INS? Query command. Wait for a service request to be generated. Read the Status Byte using serial poll method (bit4 <mav> should be set). Read the output queue. The response should indicate that bit 3 <unlvl> is set.

Example 1: Infrastructure connection with a device (STA)

The following sequence of commands will establish an infrastructure connection between the MT8860B and one or more Client devices (STA). The MT8860B creates the network for the STA to join. Configuration of the DUT must take place before these commands are issued.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`meascfg 1,radiosel,int;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Ensures that the MT8860B reference radio is selected (default setting)
2	`meascfg 1,testmode,network;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Select Network Mode (default setting)
3	`meascfg 1,txpwr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	<x> specifies the nominal power level of the management frames transmitted by the MT8860B during the connection process
4	`meascfg 1,nwtype,ap;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Sets the network type to infrastructure and configures the MT8860B to simulate an Access Point (AP)
5	`meascfg 1,mode,rxmode;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Set the MT8860B to receiver testing mode
6	`meascfg 1,wlanstd,<x>;*opc` where `<x> = B or G`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the WLAN standard. This will depend upon the DUT.
7	`meascfg 1,operrateset,all;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Configures the management frames transmitted by the MT8860B to contain all data rates supported by MT8860B (default setting)

At this point, the assignment of the DUT IP Address needs to be defined. If the IP address is to be obtained automatically, then perform Stage 8a. If the IP address is to be manually configured, then the perform Stage 8b.

8a	`meascfg 1,ipprop,auto;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Default setting

8b	`meascfg 1,ipprop,manual;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	
	`meascfg 1,ipparms,<x>,<y>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the MT8860B IP address and subnet mask. <x> is the IP address and <y> the subnet mask
	`meascfg 1,dutip,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the DUT IP address <x>

The following commands can be specified at this time but they are not essential;

meascfg 1,beaconint,<x>;*opc where <x> is the beacon interval

meascfg 1,preamble,long;*opc OR meascfg 1,preamble,short;*opc

meascfg 1,txrate,<x>;*opc where <x> is the data rate

9	`meascfg 1,channelnum,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the channel number of the network to be created by MT8860B
10	`meascfg 1,nwssid,<x>,<y>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	This command specifies the network name (SSID) created by MT8860B. <x> is the SSID length and <y> the SSID. The SSID is limited to 32 characters.
11	`meascfg? 1,nwmacaddr,<x>,<y>`	SRQ generated by mav. Perform Action 2 (page 9-2) The MAC addresses of all detected devices is returned (up to a value of <x>	<x> specifies the number of different MAC addresses to be found during the detection period. <y> specifies the detection period
12	`meascfg 1,macaddr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Specify the MAC address of the DUT to be tested. This information is contained in the *nwmacaddr* response at stage 11

Stage 13 is only required if the IP address is automatically obtained (Stage 8a)

13		SRQ generated by ipa. Perform Action 4 (page 9-2)	

At this point an infrastructure connection has been made between the MT8860B and the STA. Both receiver and transmitter measurements should now be possible.

Example 2: Infrastructure connection with an Access Point (AP)

The following sequence of commands will establish an infrastructure connection between the MT8860B and one or more access points (AP). The MT8860B joins the network created by the AP. Configuration of the DUT must take place before these commands are issued.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`meascfg 1,radiosel,int;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Ensures that the MT8860B reference radio is selected (default setting)
2	`meascfg 1,testmode,network;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Select Network Mode (default setting)
3	`meascfg 1,txpwr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	<x> specifies the nominal power level of the management frames transmitted by the MT8860B during the connection process
4	`meascfg 1,nwtype,sta;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Sets the network type to infrastructure and configures the MT8860B to simulate a client (STA)
5	`meascfg 1,mode,rxmode;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Set the MT8860B to receiver testing mode
6	`meascfg 1,wlanstd,<x>;*opc` where `<x> = B or G`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the WLAN standard. This will depend upon the DUT
7	`meascfg 1,operrateset,all;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Configures the management frames transmitted by the MT8860B to contain all data rates supported by MT8860B (default setting)

For AP testing, please disable the DHCP server on the AP and configure the MT8860B IP settings manually.

8	`meascfg 1,ipprop,manual;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	
	`meascfg 1,ipparms,<x>,<y>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the MT8860B IP address and subnet mask. <x> is the IP address and <y> the subnet mask
	`meascfg 1,dutip,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the DUT IP address <x>
9	`meascfg 1,scan`	SRQ generated by nws. Perform Action 3 (page 9-2)	Instructs the MT8860B to perform a scan for available networks. When the scan operation has completed, the <nws> bit in the *INS register is set
10	`meascfg? 1,nwavail`	SRQ generated by mav. Perform Action 2 (page 9-2) The number of networks found by the scan device is returned.	A maximum of 15 networks can be reported
11	`meascfg? 1,nwinfo,<x>`	SRQ generated by mav. Perform Action 2 (page 9-2) The information for network <x> is returned.	The value of <x> must be between 1 and the number of networks found in stage 10
12	`meascfg 1,nwselect,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Instructs the MT8860B to attempt to join network <x>. The value of <x> must be between 1 and the number of networks found in stage 10.
			NOTE: This command causes the MT8860B channel number to be automatically set to the specified network

13	`meascfg? 1,nwmacaddr,<x>,<y>`	SRQ generated by mav. Perform Action 2 (page 9-2) The MAC addresses of all detected devices is returned (up to a value of <x>	<x> specifies the number of different MAC addresses to be found during the detection period. <y> specifies the detection period
14	`meascfg 1,macaddr,<x>;*opc`	SRQ generated by opc. Perform Action 4 (page 9-2)	Specify the MAC address of the DUT to be tested. This information is contained in the *nwmacaddr* response at stage 13

At this point an infrastructure connection has been made between the MT8860B and the AP. Both receiver and transmitter measurements can should now be possible.

Example 3: Ad-Hoc connection (MT8860B creates a Network)

The following sequence of commands will establish an Ad-Hoc connection between the MT8860B and one or more WLAN devices. The MT8860B creates the network for the DUT to join. Configuration of the DUT must take place before these commands are issued.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`meascfg 1,radiosel,int;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Ensures that the MT8860B reference radio is selected (default setting)
2	`meascfg 1,testmode,network;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Select Network Mode (default setting)
3	`meascfg 1,txpwr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	<x> specifies the nominal power level of the management frames transmitted by the MT8860B during the connection process
4	`meascfg 1,nwtype,adhoc;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Sets the network type to Ad-Hoc (default setting)
5	`meascfg 1,mode,rxmode;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Set the MT8860B to receiver testing mode
6	`meascfg 1,wlanstd,<x>;*opc where <x> = B or G`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the WLAN standard. This will depend upon the DUT
7	`meascfg 1,operrateset,all;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Configures the management frames transmitted by the MT8860B to contain all data rates supported by MT8860B (default setting)

At this point, the assignment of the DUT IP Address needs to be defined. If the IP address is to be obtained automatically, then perform Stage 8a. If the IP address is to be manually configured, then the perform Stage 8b.

8a	`meascfg 1,ipprop,auto;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	

8b	`meascfg 1,ipprop,manual;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	
	`meascfg 1,ipparms,<x>,<y>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the MT8860B IP address and subnet mask. <x> is the IP address and <y> the subnet mask
	`meascfg 1,dutip,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the DUT IP address <x>

The following commands can be specified at this time but they are not essential;

Meascfg 1,beaconint,<x>;*opc where <x> is the beacon interval

Meascfg 1,preamble,<x>;*opc where <x> is the preamble format (DSSS data rate only)

Meascfg 1,txrate,<x>;*opc where <x> is the data rate

9	`meascfg 1,channelnum,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the channel number of the network to be created by MT8860B
10	`meascfg 1,nwssid,<x>,<y>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	This command specifies the network name (SSID) created by MT8860B. <x> is the SSID length and <y> the SSID. The SSID is limited to 32 characters
11	`meascfg? 1,nwmacaddr,<x>,<y>`	SRQ generated by mav. Perform Action 2 (page 9-2) The MAC addresses of all detected devices is returned (up to a value of <x>	<x> specifies the number of different MAC addresses to be found during the detection period. <y> specifies the detection period
12	`meascfg 1,macaddr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Specify the MAC address of the DUT to be tested. This information is contained in the *nwmacaddr* response at stage 11

Stage 13 is only required if the IP address is automatically obtained (Stage 8a).

13		SRQ generated by ipa. Perform Action 4 (page 9-2)	

At this point an Ad-Hoc connection has been made between the MT8860B and the DUT. Both receiver and transmitter measurements should now be possible.

Example 4: Ad-Hoc connection (MT8860B joins a Network)

The following sequence of commands will establish an Ad-Hoc connection between the MT8860B and one or more WLAN devices The MT8860B joins the network created by the WLAN device. Configuration of the DUT must take place before these commands are issued.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`meascfg 1,radiosel,int;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Ensures that the MT8860B reference radio is selected (default setting)
2	`meascfg 1,testmode,network;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Select Network Mode (default setting)
3	`meascfg 1,txpwr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	<x> specifies the nominal power level of the management frames transmitted by the MT8860B during the connection process
4	`meascfg 1,nwtype,adhoc;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Sets the network type to Ad-Hoc (default setting)
5	`meascfg 1,mode,rxmode;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Set the MT8860B to receiver testing mode
6	`meascfg 1,wlanstd,<x>;*opc` where `<x> = B or G`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the WLAN standard. This will depend upon the DUT
7	`meascfg 1,operrateset,all;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Configures the management frames transmitted by the MT8860B to contain all data rates supported by MT8860B (default setting)

At this point, the assignment of the DUT IP Address needs to be defined. If the IP address is to be obtained automatically, then perform Stage 8a. If the IP address is to be manually configured, then the perform Stage 8b.

8a	`meascfg 1,ipprop,auto;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	

8b	`meascfg 1,ipprop,manual;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	
	`meascfg 1,ipparms,<x>,<y>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the MT8860B IP address and subnet mask. <x> is the IP address and <y> the subnet mask
	`meascfg 1,dutip,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the DUT IP address <x>
9	`meascfg 1,scan`	SRQ generated by nws. Perform Action 3 (page 9-2)	Instructs the MT8860B to perform a scan for available networks. When the scan operation has completed, the <nws> bit in the *INS register is set
10	`meascfg? 1,nwavail`	SRQ generated by mav. Perform Action 2 (page 9-2) The number of networks found by the scan device is returned.	A maximum of 15 networks can be reported
11	`meascfg? 1,nwinfo,<x>`	SRQ generated by mav. Perform Action 2 (page 9-2) The information for network <x> is returned.	The value of <x> must be between 1 and the number of networks found in stage 10
12	`meascfg 1,nwselect,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Instructs the MT8860B to attempt to join network <x>. The value of <x> must be between 1 and the number of networks found in stage 10.
			NOTE: This command causes the MT8860B channel number to be automatically set to the specified network

13	`meascfg? 1,nwmacaddr,<x>,<y>`	SRQ generated by mav. Perform Action 2 (page 9-2) The MAC addresses of all detected devices is returned (up to a value of <x>	<x> specifies the number of different MAC addresses to be found during the detection period. <y> specifies the detection period
14	`meascfg 1,macaddr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Specify the MAC address of the DUT to be tested. This information is contained in the *nwmacaddr* response at stage 13
13	`meascfg? 1,nwmacaddr,<x>,<y>`	SRQ generated by mav. Perform Action 2 (page 9-2) The MAC addresses of all detected devices is returned (up to a value of <x>	<x> specifies the number of different MAC addresses to be found during the detection period. <y> specifies the detection period
14	`meascfg 1,macaddr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Specify the MAC address of the DUT to be tested. This information is contained in the *nwmacaddr* response at stage 13

Stage 15 is only required if the IP address is automatically obtained (Stage 8a).

15		SRQ generated by ipa. Perform Action 4 (page 9-2)	

At this point an Ad-Hoc connection has been made between the MT8860B and the DUT. Both receiver and transmitter measurements should now be possible.

Example 5: Receiver sensitivity (PER) test in Network Mode

The following sequence of commands will perform a PER test when Network mode is selected. A network connection must be established between the MT8860B and the DUT before performing the PER test.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`meascfg 1,testmode,network;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Select Network Mode (default setting)
2	`meascfg 1,mode,rxmode;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Set the MT8860B to receiver testing mode
3	`meascfg 1,pkttype,unicast;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Sets the packet type to unicast (default setting)
4	`meascfg 1,wlanstd,<x>;*opc` where `<x> = B or G`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the WLAN standard. This will depend upon the DUT
5	`meascfg 1,operrateset,all;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Configures management frames transmitted by the MT8860B to contain all data rates supported by MT8860B (default setting)
6	`meascfg 1,dutpwr,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the nominal transmit power of the DUT.
7	`meascfg 1,perpkts,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Specify the number of packets transmitted during each measurement operation

The following commands can be specified at this time but they are not essential;

meascfg 1,pktlen,<x>;*opc where <x> is the payload length
meascfg 1,payload,<x>;*opc where <x> is the payload data type
meascfg 1,preamble,<x>;*opc where <x> is the preamble format (for DSSS rates only)
meascfg 1,txinterval,<x>;*opc where <x> is the frame interval

8	`meascfg 1,channelnum,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the channel number
9	`meascfg 1,txrate,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the data rate
10	`meascfg 1,txpwr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	<x> specifies the power level transmitted by the MT8860B during the receiver sensitivity test
11	`meascfg? 1,meas,per`	SRQ generated by mav. Perform Action 2 (page 9-2) The response is in the format; PER,1,a,b,c,d	Result (a) indicates whether the measurement is valid of not (TRUE / FALSE). If FALSE is returned then the values for (b), (c) and (d) should be ignored and the setup checked. Result (b) is the PER in %. Result (c) is the number of acknowledgement (ACK) packets received. Result (d) is the number of packets transmitted by the MT8860B.

At this point, a PER measurement has been performed. Steps 8 – 11 can be repeated for different channels, data rates and power levels.

Example 6: Performing a receiver sensitivity (PER) test in Direct Mode

The following sequence of commands will perform a PER test when Direct mode is selected. Configuration of the DUT must take place using chipset vendor control software before these commands are issued.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`meascfg 1,testmode,direct;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Select Direct Mode
2	`meascfg 1,mode,rxmode;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Set the MT8860B to receiver testing mode

At this point, the packet type can be defined.

For unicast packets, perform Stage 3a.

For broadcast (multicast) packets, perform Stage 3b.

3a	`meascfg 1,pkttype,unicast;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Sets the packet type to unicast (default setting)
	`meascfg 1,macaddr,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the MAC address of the DUT to be tested
3b	`meascfg 1,pkttype,broadcast;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Sets the packet type to broadcast
4	`meascfg 1,wlanstd,<x>;*opc` where `<x> = B or G`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the WLAN standard. This will depend upon the DUT.
5	`meascfg 1,perpkts,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Specify the number of packets transmitted during each measurement operation

The following commands can be specified at this time but they are not essential;

meascfg 1,pktlen,<x>;*opc where <x> is the payload length

meascfg 1,payload,<x>;*opc where <x> is the payload data type

meascfg 1,preamble,<x>;*opc where <x> is the preamble format (for DSSS rates only)

meascfg 1,ifinterval,<x>;*opc where <x> is the frame interval

6	`meascfg 1,channelnum,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the channel number
7	`meascfg 1,txrate,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the data rate
8	`meascfg 1,txpwr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	<x> specifies the power level transmitted by the MT8860B during the receiver sensitivity test
9	`meascfg? 1,meas,per`	SRQ generated by mav. Perform Action 2 (page 9-2)	The command causes the MT8860B to transmit the required number of packets defined at stage 5. When the final packet has been transmitted, the MT8860B will return the response; PER,1,FALSE,0,0,0 No measurement is performed by the MT8860B. The chipset vendor control software must be used to calculate the Rx sensitivity.

At this point, a PER measurement has been performed. Steps 8 – 11 can be repeated for different channels, data rates and power levels.

Example 7: Performing transmitter measurements in Network Mode

The following sequence of commands will configure the MT8860B for analysis of the transmitter characteristics of a WLAN device when Network mode is selected. A network connection must be established between the MT8860B and the DUT before performing transmitter analysis.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`meascfg 1,testmode,network;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Select Network Mode (default setting)
2	`meascfg 1,mode,txmode;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Set the MT8860B to transmitter testing mode
3	`meascfg 1,wlanstd,<x>;*opc` where <x> = B or G	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the WLAN standard. This will depend upon the DUT.
4	`meascfg 1,operrateset,single;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	Configures the management frames transmitted by the MT8860B to contain only the selected data rate.
5	`meascfg 1,txpwr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	<x> specifies the nominal power level of the ICMP packets transmitted by the MT8860B
6	`meascfg 1,dutpwr,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the nominal transmit power of the DUT.

The following commands can be specified at this time but they are not essential;

meascfg 1,pktlen,<x>;*opc where <x> is the payload length

meascfg 1,payload,<x>;*opc where <x> is the payload data type

meascfg 1,preamble,<x>;*opc where <x> is the preamble format (for DSSS rates only)

meascfg 1,plinterval,<x>;*opc where <x> is the frame interval

7	`meascfg 1,channelnum,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the channel number

8	`meascfg 1,txrate,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the data rate
9	`meascfg 1,autocfg;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	This command automatically configures the Tx analyzer settings of the MT8860B based on Tx characteristics and data rate defined.

Alternatively, the MT8860B Tx analyzer settings can be manually configured using the following commands;

meascfg 1,range,<x>;*opc

meascfg 1,pretrg,<x>;*opc

meascfg 1,profcap,power,<x>,<y>;*opc

meascfg 1,profcap,carrier,<x>,<y>;*opc

meascfg 1,trgsrc,<x>,<y>,<z>;*opc

meascfg 1,gate,1,<x>,<y>;*opc

meascfg 1,gate,2,<x>,<y>;*opc

Please refer to the relevant command for details on the <x>, <y> and <z> parameters.

10	`meascfg 1,nummeas,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the amount of averaging to be applied to the measurement
11	`meascfg? 1,meas,<a>,<b>,…,<f>`	SRQ generated by mav. Perform Action 2 (page 9-2)	<a>, <b>,……,<f> represent the required transmit measurement mnemonic as described on page 8-1. Transmitter measurements can be performed individually or simultaneously on the same command line

At this point, transmitter measurements have been performed. The response format will depend upon the measurement requested. Steps 7 – 10 can be repeated for different channels and data rates.

Example 8: Performing transmitter measurements in Direct Mode

The following sequence of commands configure the MT8860B for analysis of the transmitter characteristics of a WLAN device in Direct mode. Configuration of the DUT must take place using chipset vendor control software before these commands are issued.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`meascfg 1,testmode,direct;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Select Direct Mode
2	`meascfg 1,mode,txmode;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Set the MT8860B to transmitter testing mode
3	`meascfg 1,wlanstd,<x>;*opc` where `<x> = B or G`	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the WLAN standard. This will depend upon the DUT

If the auto-configure function is used (stage 10), then stages 4 – 7 must be performed. The settings should reflect the values used on the chipset vendor control software.

4	`meascfg 1,dutpwr,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the nominal transmit power of the DUT
5	`meascfg 1,pktlen,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the payload length
6	`meascfg 1,payload,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the payload data type
7	`meascfg 1,preamble,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the preamble format (for DSSS rates only)
8	`meascfg 1,channelnum,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the channel number
9	`meascfg 1,txrate,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the data rate

10	`meascfg 1,autocfg;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	This command automatically configures the Tx analyzer settings of the MT8860B based on Tx characteristics and data rate defined.

Alternatively, the MT8860B Tx analyzer settings can be manually configured using the following commands;

meascfg 1,range,<x>;*opc
meascfg 1,autorngmode,<x>;*opc
meascfg 1,pretrg,<x>;*opc
meascfg 1,profcap,power,<x>,<y>;*opc
meascfg 1,profcap,carrier,<x>,<y>;*opc
meascfg 1,trgsrc,<x>,<y>,<z>;*opc
meascfg 1,gate,1,<x>,<y>;*opc
meascfg 1,gate,2,<x>,<y>;*opc

Please refer to the relevant command for details on the <x>, <y> and <z> parameters.

11	`meascfg 1,nummeas,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the amount of averaging to be applied to the measurement
12	`meascfg? 1,meas,<a>,<b>,…,<f>`	SRQ generated by mav. Perform Action 2 (page 9-2)	<a>, <b>,.....,<f> represent the required transmit measurement mnemonic as described on page 8-1 and 8-2. Transmitter measurements can be performed individually or simultaneously on the same command line.

At this point, transmitter measurements have been performed. The response format will depend upon the measurement requested. Steps 7 – 10 can be repeated for different channels and data rates.

Example 9: Using an external reference radio with MT8860B

The MT8860B is provided with a WLAN reference input connector. This allows DUT receiver measurements to be performed using an external WLAN device instead of the internal reference radio. In this mode of operation, only the leveling loop and attenuator hardware of the MT8860B is used to provide a calibrated signal level at the Test Port Connector. In order that the correct signal level is produced at the test port connector, the following test conditions must be used –

The average power at the WLAN reference input must be in the range +12 dBm to +18dBm.

The packets generated by the WLAN device must be > 110 us in length.

The "Tx ON" signal from the WLAN device must be connected to the rear panel BNC connector "Digital 2 In".

Note	No measurements are supported by MT8860B in this mode of operation.

The following sequence of commands can be used to configure the MT8860B allowing an external WLAN device to be used for DUT receiver testing.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`meascfg 1,testmode,direct;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Select Direct Mode
2	`meascfg 1,mode,rxmode;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Set the MT8860B to receiver testing mode
3	`meascfg 1,wlanstd,<x>;*opc` where `<x>` = B or G	SRQ generated by opc Perform Action 1 (page 9-2)	Specify the WLAN standard. This will depend upon the DUT.
4	`meascfg 1,radiosel,ext;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Set the reference radio to external selection
5	`syscfg bnc,in2,goldtx;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	Sets the rear panel BNC connector "Digital 2 In" to accept the Tx ON signal from the external reference radio (default setting)
6	`meascfg 1,dutpwr;*opc`	SRQ generated by opc. Perform Action 1 (page 9-2)	<x> is the nominal transmit power of the DUT

7	`meascfg 1,channelnum,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the channel number. This ensures that the correct calibration is applied
8	`meascfg 1,txrate,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-2)	<x> is the data rate
9	`meascfg 1,txpwr,<x>;*opc`	SRQ generated by opc. Perform Action 1 (page 9-29-2)	<x> specifies the power level required to be transmitted to the DUT receiver
10	`meascfg 1,extlevel`	SRQ generated by lvl or unlvl Perform Action 5 (page 9-2)	Instructs the MT8860B to perform a leveling operation. When the leveling operation has completed, the <lvl> bit in the *INS register is set. If the leveling operation is unsuccessful, the <unlvl> bit in the *INS register is set

At this point, the external reference radio can be configured to transmit packets to the DUT. The power level applied to the receiver will be the value specified at Stage 9.

Example 10: Using the signal generator mode

The following example configures the MT8860B to generate an 802.11b carrier suppression signal.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`measCfg 1,testMode,direct;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Select Direct Mode
2	`measCfg 1,mode,rxMode;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Select RX Mode
3	`measCfg 1,radioSel,int;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Select internal reference radio
4	`measCfg 1,wlanStd,b;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Select 802.11b
5	`measCfg 1,payload,0101;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Set the payload to repeating 0101 pattern
6	`measCfg 1,txRate,2;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Set the transmit rate to 2 Mbps
7	`measCfg 1,txPwr,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	<x> specifies the power level transmitted by the MT8860B
8	`measCfg 1,siggen,mode,cs;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Select the transmit state to Carrier Suppression Signal
9	`measCfg 1,siggen,state,enable;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Enable the Signal Generator

The following example configures the MT8860B to generate a continuous 802.11g framed signal.

Stage	Command to MT8860B	Response from MT8860B	Comments
1	`measCfg 1,testMode,direct;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Select Direct Mode
2	`measCfg 1,mode,rxMode;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Select RX Mode
3	`measCfg 1,radioSel,int;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Select internal reference radio
4	`measCfg 1,wlanStd,g;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Select 802.11g
5	`measCfg 1,txPwr,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	<x> specifies the power level transmitted by the MT8860B
6	`measCfg 1,pktLen,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	<x> specifies the packet length
7	`measCfg 1,payload,<x>;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	<x> specifies the payload
8	`measCfg 1,ifInterval,<x>,*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	<x> specifies the inter-frame spacing
9	`measCfg 1,siggen,mode,cf;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Set the transmit state to Continuous Framed Signal

10	`measCfg 1,siggen,state,enable;*opc`	SRQ generated by opc Perform Action 1 (page 9-1)	Enable the Signal Generator

Appendix A Error Codes

A-1 System Error Codes

Table A-1. System Error Codes

Error Code (HEX)	Comment
0002	Command parameter is out of range
0101	Operation not permitted
0102	Unable to write parameter to configuration file
0103	Unable to read parameter from configuration file
0104 - 0108	For service use only. If problem persists please contact your regional Anritsu service centre.
0109	Default configuration settings are in use. Please use the SHUTDOWN command and then power cycle the MT8860B.
010A - 010C	For service use only. If problem persists please contact your regional Anritsu service centre.
010D	Option code is incorrect or number of retries exceeded. If latter, then power cycle the MT8860B and try again. If the problem persists please contact your regional Anritsu service centre.
010E	Option not enabled for operation requested.
010F	Configuration command failed. If the 10 MHz reference oscillator has been set to external, check that a signal is being applied to the 10MHz input connector on the rear panel.
0110	Option not supported on this instrument.
0201 – 020A	For service use only. Power cycle the MT8860B and try again. If the problem persists please contact your regional Anritsu service centre.
020B	The IP address entered is invalid.
020C	The IP network mask entered is invalid.
020D	Error accessing the registry.

A-2 Measurement Error Codes

Table A-2. Measurement Error Codes

Error Code (HEX)	Comment
1001	A user supplied index is invalid.
1101	Measurement in progress. Stop the measurement and resend the command.
1102	Command invalid for current instrument mode. Use the MODE command to change instrument mode.
1103	For service use only. If problem persists please contact your regional Anritsu service centre.
1104	Radio state is incorrect. Use the RADIOSEL command to check that the radio state is correct for the current operation.
110B	Invalid WLAN standard for measurement or profile requested. Use WLANSTD command.
110C	This request can only be performed on the default mask. Use the SMSEL command to select spectral mask 1.
1201	Error from Reference radio card driver. Refer to the Reference Radio Card Driver Error Codes table for details of the associated error code.
1202	Error from RF card driver. Please refer to the RF Card Driver Error Codes table for more details.
1203	Error from Spectral card driver. Refer to the Spectral Card Driver Error Codes table for details of the associated error code.
1204	Error from Spectral card driver write. Refer to the Spectral Card Driver Error Codes table for details of the associated error code.
1205	Error from Spectral card driver read. Refer to the Spectral Card DSP Error Codes table for details of the associated error code.
1207	For service use only. If problem persists please contact your regional Anritsu service centre.
120A	For service use only. Power cycle the MT8860B, if problem persists please contact your regional Anritsu service centre.
120D	Error from reference radio. Use the RADIOERR command to obtain more details.
120E	Measurement aborted.
120F	Connection invalid. Increase the power level using the TXPWR command and try to connect again.
1210	EVM filter settings not permitted.
1211	The DUT IP address has not been set automatically.
1212	Unable to communicate with the DUT.
1213	Error accessing the registry.
1214	Conflict in the path table.

A-3 RF Card Driver Error Codes

Table A-3. Card Driver Error Codes

Error Code (HEX)	Comment
2000 - 2003	For service use only. If problem persists please contact your regional Anritsu service centre.
2004	Measurement timeout error. Please check that the trigger selection (TRGSRC) is applicable for the applied signal.
2010	Possible EEPROM data corruption. Power cycle the MT8860B, if the problem persists please contact your regional Anritsu service centre.
2011	Possible EEPROM read error. Power cycle the MT8860B, if the problem persists please contact your regional Anritsu service centre.
2020	Abnormal temperature reported by internal sensor. Power down the MT8860B for 15 minutes and then power on the instrument. Check that the fan is operating and that air is being drawn into the MT8860B. If the problem persists please contact your regional Anritsu service centre.
2021	Measurement timeout error. Please check that the trigger selection (TRGSRC) is applicable for the applied signal.
2022	PLL lock error. Retry CHANNEL command, if the problem persists please contact your regional Anritsu service centre.
2024	The applied signal is too HIGH for the selected power range. Please select a suitable power range setting using the RANGE command.
2025	The applied signal is too LOW for the selected power range. Please select a suitable power range setting using the RANGE command.
2027	For service use only. If problem persists please contact your regional Anritsu service centre.
2028	The applied signal is too LOW for the selected auto power range mode. Use the AUTORNGMODE to select HIGH sensitivity mode.
2029	Measurement aborted.
2030 - 2037	For service use only. If problem persists please contact your regional Anritsu service centre.
2040	Failed to calculate EEPROM checksum. If problem persists please contact your regional Anritsu service centre.
2041	Failed a read from EEPROM. If problem persists please contact your regional Anritsu service centre.
2042	Failed to write to EEPROM. If problem persists please contact your regional Anritsu service centre.
2044	Failed to update EEPROM checksum. If problem persists please contact your regional Anritsu service centre.
2050 -2070	For service use only. If problem persists please contact your regional Anritsu service centre.

A-4 Spectral Card Driver Error Codes

Table A-4. Spectral Card Driver Error Codes

Error Code (HEX)	Comment
3000 - 3010	For service use only. If problem persists please contact your regional Anritsu service centre.
3011	Failed to calculate EEPROM checksum. If problem persists please contact your regional Anritsu service centre.
3012	Failed a read from EEPROM. If problem persists please contact your regional Anritsu service centre.
3013	Failed to write to EEPROM. If problem persists please contact your regional Anritsu service centre.
3014	EEPROM checksum incorrect. If problem persists please contact your regional Anritsu service centre.
3200	For service use only. If problem persists please contact your regional Anritsu service centre.

A-5 Reference Radio Card Driver Error Codes

Table A-5. Reference Radio Card Driver Error Codes

Error Code (HEX)	Comment
4000 - 4004	For service use only. If problem persists please contact your regional Anritsu service centre.
4010	Possible EEPROM data corruption. Power cycle the MT8860B, if the problem persists please contact your regional Anritsu service centre.
4011	Possible EEPROM read error. Power cycle the MT8860B, if the problem persists please contact your regional Anritsu service centre.
4020	Abnormal temperature reported by internal sensor. Power down the MT8860B for 15 minutes and then power on the instrument. Check that the fan is operating and that air is being drawn into the MT8860B. If the problem persists please contact your regional Anritsu service centre.
4021	Measurement timeout error. Check that a trigger is available for use by the MT8860B. If problem persists please contact your regional Anritsu service centre.
4022 - 4027	For service use only. If problem persists please contact your regional Anritsu service centre.
4029	Measurement aborted.
4040	Failed to calculate EEPROM checksum. If problem persists please contact your regional Anritsu service centre.
4041	Failed a read from EEPROM. If problem persists please contact your regional Anritsu service centre.
4042	Failed to write to EEPROM. If problem persists please contact your regional Anritsu service centre.
4050 - 4070	For service use only. If problem persists please contact your regional Anritsu service centre.

A-6 Spectral Card DSP Error Codes

Table A-6. Spectral Card DSP Error Codes

Error Code (HEX)	Comment
5001 - 5050	For service use only. If problem persists please contact your regional Anritsu service centre.
5060	Abnormal temperature reported by internal sensor. Power down the MT8860B for 15 minutes and then power on the instrument. Check that the fan is operating and that air is being drawn into the MT8860B. If the problem persists please contact your regional Anritsu service centre.
5100	Measurement timeout error. Check that a trigger is available for use by the MT8860B. If problem persists please contact your regional Anritsu service centre.
5110	For service use only. If problem persists please contact your regional Anritsu service centre.
5120	Profile type requested is not available for the selected measurement.
5130	Profile or profile type requested is not applicable for selected measurement.
5140	For service use only. If problem persists please contact your regional Anritsu service centre.
5150	Gate width is too small for spectral and CCDF measurements.
5160	Profile type not supported for specified measurement.

Appendix B GPIB PC Card Set-up

The following GPIB interface properties are recommended for reliable GPIB communication with the MT8860B WLAN Test Set. The interface properties are expressed in the terms used by the National Instruments GPIB ISA and PCI cards and drivers for Windows and DOS.

For details of how to set up and configure the National Instruments GPIB card, refer to the installation information supplied with the card itself.

B-1 General Settings

GPIB Interface ID:	GPIB0
Secondary Address:	NONE
System Controller:	YES
I/O Timeout:	13 (10 seconds)
Autopolling:	YES

B-2 Termination Settings

Set EOI at End of Write:	YES
Terminate Read on EOS:	NO
EOS Byte:	0x0A (10 decimal)
8-bit EOS Compare:	YES
Set EOI with EOS on Write:	YES

B-3 Advanced Settings

HS488 Cable Length:	0 (Disabled)
Parallel Poll Duration:	0 (2 msec)
Assert REN when SC:	YES
Bus Timing:	2 (500 nsec)

Appendix C Terminology Glossary

Table C-1. Glossary of Terminology

Item	Explanation
CIC	The controller (usually a PC) in charge of controlling and co-ordinating communication with devices attached to the GPIB bus.
Command Unit	A complete command formatted with parameters and terminators.
Configuration Commands	Commands issued to instrument that change a specific instrument configuration.
GPIB	General Purpose Instrument Bus
GPIB Controller	A device in charge of controlling and co-ordinating communication with devices attached to the GPIB bus.
Message	A sequence of commands used together to configure the instrument in a specified manner.
Mnemonic	The remote command name, e.g., BEACONINT
Query Command	A command mnemonic used to request information from the instrument. A query command mnemonic is usually the same as the Set Command with a question mark appended.
Set Command	A command mnemonic that changes a specific configuration setting.
Terminator	A specific action used to indicate the termination of a remote message string.

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