MEA

3.1

WSM6300
Wireless Serial Modem
Users Guide

Documentation Revision 3.1.5

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Wireless Serial Modem

Introduction

Thank you for purchasing the MEA Wireless Serial Modem (WSM6300). MEA is a wireless communication system capable of supporting reliable, high data rate communications in noisy RF environments.

The WSM6300 is a wireless modem that has been designed specifically for use in wireless sensor systems. It provides a serial interface – 2-wire (RXD/TXD) RS-232 or RS-485 (half duplex) serial interface. The type of serial interface is factory configurable. The WSM6300 requires a 5 – 14.0 VDC power supply and is designed for indoor/outdoor use. The WSM6300 provides similar functionality as the MWR6300. An antenna and the power/serial interface connector are included.

The WSM6300 efficiently combines the functionality of a MEA infrastructure device and sensor interface into a single cost-effective wireless network component. This makes it easy to attach a remote sensor device to a Mesh Enabled Architecture (MEA) mobile broadband network. Sensors, controllers, signs, signals, etc. can all be Mesh-Enabled to send and receive data via the MEA network. Each WSM6300 can be individually configured to support a wide variety of remote sensor devices. A Mesh Sensor API is also available to facilitate direct connectivity between sensor hardware and Supervisory Control and Data Acquisition (SCADA) systems.

This document provides detailed installation and configuration instructions for use when installing the WSM6300.

What's in the Box

Each WSM6300 is a full-featured wireless networking device. The following is a list of the items provided with each WSM6300:

- Power / Serial Connector
- Antenna

Installation Requirements

The Mesh Serial Modem will require the following in a typical installation:

- 5 – 14.0 VDC Power.
- A suitable mounting location
- Antenna and RF cabling appropriate for use in the 2.4 GHz band.

WSM6300 Assembly

The external connection points on a WSM6300 unit are shown below.

- The power / serial connector interface is shown on the upper left corner below.
- The antenna port (N-type male) is shown on the upper right corner below.
- The transceiver MAC address is recorded on the label located on front side of the WSM unit. Record the MAC Address in the table in the WSM6300 MAC Addresses section of this document.

Figure 1. WSM6300 Assembly

WSM6300 Installation Procedure

1. Mount the WSM6300 in a suitable location. The device is environmentally sealed. Refer to the Deployment section of this document and the *MEA Guidelines for Network Deployment* manual for deployment location recommendations.

WARNING

The WSM6300 chassis must be grounded to prevent the possibility of damage induced by Electro Static Discharge (ESD).

2. Connect the antenna or antenna cable to the to the N-type antenna port.
3. Insert the Power Plug / Serial connector into 6-pin connector port.

Figure 2. WSM Serial Cable

Pin Number	Signal	Power/Serial Cable Color
1	PWR GND	Black
2	5 – 14.0 VDC	Red
3	GPIO5 (0 to 3.3 V)	Blue
4	TX(RS-232) or A+(RS-485) – from ASIC	Brown
5	RX(RS-232) or B-(RS-485) – to ASIC	Orange
6	Signal GND	Black

Deployment

When deploying the WSM6300, the antenna should be a minimum of 30 inches from any nearby metal poles to avoid distortion of the RF pattern. The antenna must have a separation distance of at least 2 meters from the body of all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. Users and installers must be provided with antenna installation and transmitter operating conditions to satisfy RF exposure compliance.

Deployment Tips

1. Locate the antenna to minimize multipath
2. Minimize interference from nearby transmitters
3. Maximize chance of a direct line of sight connection to other devices.
4. Ensure that the antenna supplied is vertically polarized.

Testing

Verify the operation of the WSM6300 using the following procedure:

1. Apply power to the WSM6300.
2. Obtain the MAC address that was recorded earlier in the WSM6300 MAC Addresses Table section of this document. The address will be in the format 00-05-12-0A-xx-yy for the Transceiver MAC address.
3. From MeshManager, display devices using the MAC address.
4. Select the appropriate WSM in the device tree, and then ping the device (right click and select ping).

A successful response to the ping command verifies that the WSM is communicating to the infrastructure devices.

A WSM6300 is compatible with any of Motorola MEA wireless network devices and may be used in a similar fashion as other infrastructure devices. MeshManager software is used to manage a WSM6300 in the MEA network.

The following list defines the standard MEA hardware components required to install a WSM:

- WSM6300 Box with N-type Antenna Connector and Antenna (user must specify antenna type from the approved antenna list below).
- WSM6300 External Power Cable and serial interface connector must be terminated by the customer for the intended application. Refer to the following table for proper connections.

The Network Operator must supply the following:

- Mounting Location
- Power Source (5-14.0V DC)
- Hand tools for installation

Optional Equipment:

- Antenna Cable (as required)
- Antenna cable adapter (as required).

Device Addressing

WSM6300s will be supplied with statically provisioned IP addressed as issued by the DHCP server at the MiSC or the CyberGuard network appliance. This method will map the MAC Address of each device to an IP Address. This will ensure that each WSM6300 will always be accessible by a unique IP Address. Refer to the *Mesh Sensor Network Configuration Guide* and the *MeshManager Users Guide* for more detailed information on the MiSC DHCP server, configuring and using the CyberGuard network appliance and network configuration and monitoring using MeshManager.

WSM6300 MAC Addresses Table

This table has been included for recording the Transceiver MAC Address for a set of WSM6300 devices as a quick reference. These addresses will be required for configuration and management of these devices.

WSM Transceiver MAC Address 00-05-12-0A-xx-yy

Configurable Parameters

The operational parameters for the WSM6300 are configured using the Device Manager Serial Port tab on the Wireless Router Configuration panel (Figure 1) in MeshManager. Refer to the *MeshManager Users Guide* for more information on provisioning and configuration of MEA network devices.

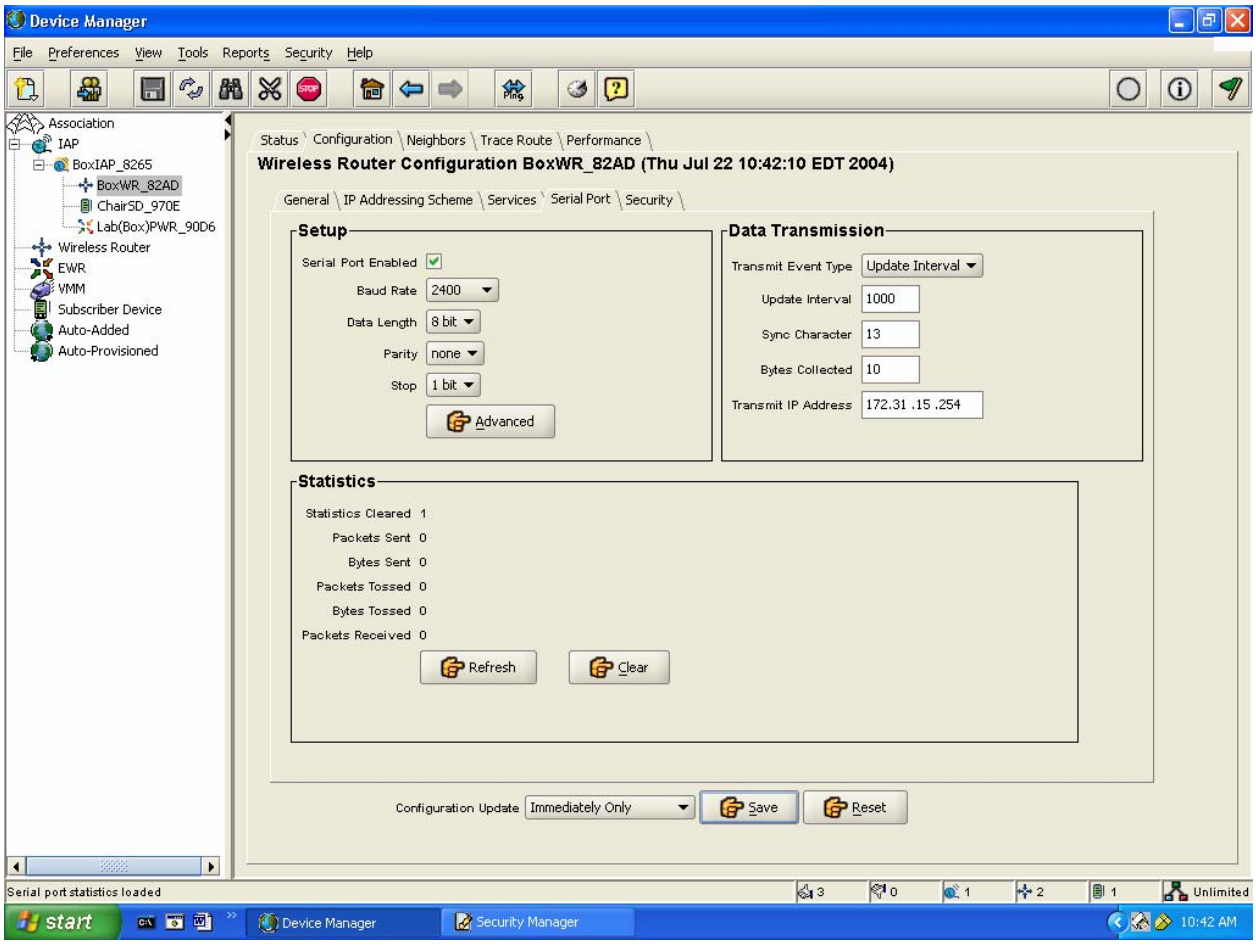

Figure 3. Device Manager Wireless Router Configuration Panel

Parameter	Description
Baud Rate	The transmission speed (in bits per second) at which data is sent and received, asynchronously, at the serial port. The baud rate is generally determined by the requirements of the attached sensor. Supported baud rates are 300, 600, 1200, 2400, 4800, 9600, 14,400, 19,200, 38,400, 57,600, 115,200.
Data Length	The number of data bits per character. Valid values are 5, 6, 7, 8.

Parameter	Description
Parity	Refers to the bit that is used for error checking.
Stop	Refers to the number of bits used as stop bits.
GPIO	General Purpose Input / Output. Can be set to output to control external logic controllable devices. Can be set to an input to monitor an external logic level. **Voltage on this pin should must remain within 0.0 to 4.0 volts!!** The GPIO must be set to RS 485 transmit enable when the WSM6300 is configured for use with a RS 485 interface**.**
RS-485 Transmit Enable	Used when the device is manually configured to support RS-485.
Transmission Event Type	Parameter used to define how often or when derail data is packetized and sent to a destination via the wireless network. Three choices exist as follows: *Update Interval* – Data is packetized for transmission at this periodic interval. *Sync Character* - Data is packetized for transmission when this ASCII character is received from the serial interface. *Bytes Collected* - Data is packetized for transmission when this number of bytes is collected in the serial interface receive buffer.
Transmit IP Address	IP Address that a sensor to will send its data to. This address can be on the same host that executes MeshManager or a standalone host. Each sensor node can be configured to send data to a different host, i.e., – all temperature sensors would report data to one host address and all fluid level sensors would report data to another host address. This address must be on the same segment of the network as the MeshManager. This is achieved by attaching a host to one of the available LAN ports on the CyberGuard SG300. The destination host will typically use the Sensor API to transfer data to a sensor management application. This field must be populated to enable the serial port.

Customer Service Information

If you have read this document and made every effort to resolve installation or operation issues rself and still require help, please contact your regional Motorola support representatives

USA

Motorola System Support Center (SSC) using the following contact information:

Phone: 800-221-7144

Hours of Operation: 7 days a week, 24 hours

Europe

Phone: +44 (0)1793 564680

Email: essc@motorola.com

Hours: of Operation: Mon-Fri 09:00 - 17:00 GMT

Calls are logged 24 x 7, cases will be worked Mon-Fri 09:00 - 17:00 GMT

Asia and Pacific Region

Remote Technical Help Desk (Channel Partners)

Phone: +63 28 92 79 93

Email: wi4Tech@motorola.com

Hours of Operation: Mon - Fri 8 am - 6 pm

Sat 8 am - 12 noon

Obtaining Support

Motorola provides technical support services for your system and recommends that you coordinate warranty and repair activities through the Motorola System Support Center (SSC). When you consult the Motorola SSC, you increase the likelihood that problems are rectified in a timely fashion and that warranty requirements are satisfied. Check your contract for specific warranty and service information.

System Information

To be provided with the best possible opportunity for support, collect the following system information and have it available when obtaining support.

Location of the system

Date the system was put into service

Software or firmware version information for components of your system

Serial number(s) of the device(s) or component(s) requiring support

A written description of the symptom or observation of the problem:

- When did it first appear?
- Can it be reproduced?
- What is the step-by-step procedure to cause it?

Do other circumstances contribute to the problem? For example, changes in weather or other conditions?

Maintenance action preceding problem:

- Upgrade of software or equipment
- Change in the hardware or software configuration
- Software reload - from backup or from CD-ROM (note the version and date)

Return Material Request

After collecting system information, contact the Motorola System Support Center for assistance or to obtain a Return Material Authorization (RMA) number for faulty Field Replaceable Entities (FREs):

North America: 800-221-7144

Radio Products and Services Division

The Radio Products and Services Division is your source for manuals and replacement parts.

Radio Products and Services Division Telephone Numbers

The telephone numbers for ordering are: (800)-422-4210 (US and Canada orders)

The Fax numbers are: (800)-622–6210 (US and Canada orders)

The number for help identifying an item or part number is (800)-422-4210; select choice “3” from the menu

Returning System Components to Motorola

Motorola's service philosophy is based on field replaceable entities (FREs). FREs are system components identified by Motorola to be returned to Motorola for repair.

Returning FREs

Return faulty FREs to Motorola for repair. When you return an assembly for service, follow these best practices:

Place any assembly containing CMOS devices in a static-proof bag or container for shipment.

Obtain a return authorization (RA) number from the Motorola System Support Center.

Include the warranty, model, kit numbers, and serial numbers on the job ticket, as necessary.

If the warranty is out of date, you must have a purchase order.

Print the return address clearly, in block letters.

Provide a phone number where your repair technician can be reached.

Include the contact person's name for return.

Pack the assembly tightly and securely, preferably in its original shipping container.

Product Warranty Information

This warranty applies within the fifty (50) United States, the District of Columbia and Canada.

LIMITED WARRANTY
MOTOROLA COMMUNICATION PRODUCTS

If the affected product is being purchased pursuant to a written Communications System Agreement signed by Motorola, the warranty contained in that written agreement will apply. Otherwise, the following warranty applies.

I. WHAT THIS WARRANTY COVERS AND FOR HOW LONG:

Motorola Inc. or, if applicable, Motorola Canada Limited ("Motorola") warrants the Motorola manufactured Broadband Data communications product, against material defects in material and workmanship under normal use and service for a period of One (1) Year from the date of shipment.

Motorola, at its option, will at no charge either repair the Product (with new or reconditioned parts), replace it with the same or equivalent Product (using new or reconditioned Product), or refund the purchase price of the Product during the warranty period provided purchaser notifies Motorola according to the terms of this warranty. Repaired or replaced Product is warranted for the balance of the original applicable warranty period. All replaced parts of the Product shall become the property of Motorola.

This express limited warranty is extended by Motorola to the original end user purchaser purchasing the Product for purposes of leasing or for commercial, industrial, or governmental use only, and is not assignable or transferable to any other party. This is the complete warranty for the Product manufactured by Motorola. Motorola assumes no obligations or liability for additions or modifications to this warranty unless made in writing and signed by an officer of Motorola. Unless made in a separate written agreement between Motorola and the original end user purchaser, Motorola does not warrant the installation, maintenance or service of the Product.

Motorola cannot be responsible in any way for any ancillary equipment not furnished by Motorola which is attached to or used in connection with the Product, or for operation of the Product with any ancillary equipment, and all such equipment is expressly excluded from this warranty. Because each system which may use the Product is unique, Motorola disclaims liability for range, coverage, or operation of the system as a whole under this warranty.

II. GENERAL PROVISIONS:

This warranty sets forth the full extent of Motorola's responsibilities regarding the Product. Repair, replacement or refund of the purchase price, at Motorola's option, is the exclusive remedy. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER EXPRESS WARRANTIES. MOTOROLA DISCLAIMS ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL MOTOROLA BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVINGS OR OTHER INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE SUCH PRODUCT, TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW.

III. HOW TO GET WARRANTY SERVICE:

Purchaser must notify Motorola's representative or call Motorola's Customer Response Center at 1-800-247-2346 within the applicable warranty period for information regarding warranty service.

IV. WHAT THIS WARRANTY DOES NOT COVER:

A) Defects or damage resulting from use of the Product in other than its normal and customary manner.
B) Defects or damage from misuse, accident, water, or neglect.
C) Defects or damage from improper testing, operation, maintenance, installation, alteration, modification, or adjustment.
D) Breakage or damage to antennas unless caused directly by defects in material workmanship.
E) A Product subjected to unauthorized Product modifications, disassemblies or repairs (including, without limitation, the addition to the Product of non-Motorola supplied equipment) which adversely affect performance of the Product or interfere with Motorola's normal warranty inspection and testing of the Product to verify any warranty claim.
F) Product which has had the serial number removed or made illegible.
G) Batteries (they carry their own separate limited warranty).
H) Freight costs to the repair depot.
I) A Product which, due to illegal or unauthorized alteration of the software/firmware in the Product, does not function in accordance with Motorola's published specifications or with the FCC type acceptance labeling in effect for the Product at the time the Product was initially distributed from Motorola.
J) Scratches or other cosmetic damage to Product surfaces that does not affect the operation of the Product.
K) That the software in the Product will meet the purchaser's requirements or that the operation of the software will be uninterrupted or error-free.
L) Normal and customary wear and tear.
M) Non-Motorola manufactured equipment unless bearing a Motorola Part Number in the form of an alpha numeric number (i.e., TDE6030B).

N) Lift trucks for installation, removal, replacement or repair of the Motorola supplied products from light, power, telephone poles etc.

O) Dispatch to remote site locations

P) Loading of software upgrades or fixes into the devices.

V. GOVERNING LAW

In the case of a Product sold in the United States and Canada, this Warranty is governed by the laws of the State of Illinois and the Province of Ontario, respectively.

VI. PATENT AND SOFTWARE PROVISIONS:

Motorola will defend, at its own expense, any suit brought against the end user purchaser to the extent that it is based on a claim that the Product or its parts infringe a United States patent, and Motorola will pay those costs and damages finally awarded against the end user purchaser in any such suit which are attributable to any such claim, but such defense and payments are conditioned on the following:

A) that Motorola will be notified promptly in writing by such purchaser of any notice of such claim;
B) that Motorola will have sole control of the defense of such suit and all negotiations for its settlement or compromise; and
C) should the Product or its parts become, or in Motorola's opinion be likely to become, the subject of a claim of infringement of a United States patent, that such purchaser will permit Motorola, at its option and expense, either to procure for such purchaser the right to continue using the Product or its parts or to replace or modify the same so that it becomes non-infringing or to grant such purchaser a credit for the Product or its parts as depreciated and accept its

return. The depreciation will be an equal amount per year over the lifetime of the Product or its parts as established by Motorola.

Motorola will have no liability with respect to any claim of patent infringement which is based upon the combination of the Product or its parts furnished hereunder with software, apparatus or devices not furnished by Motorola, nor will Motorola have any liability for the use of ancillary equipment or software not furnished by Motorola which is attached to or used in connection with the Product. The foregoing states the entire liability of Motorola with respect to infringement of patents by the Product or any its parts thereof.

Laws in the United States and other countries preserve for Motorola certain exclusive rights for copyrighted Motorola software such as the exclusive rights to reproduce in copies and distribute copies of such Motorola software. Motorola software may be used in only the Product in which the software was originally embodied and such software in such Product may not be replaced, copied, distributed, modified in any way, or used to produce any derivative thereof. No other use including, without limitation, alteration, modification, reproduction, distribution, or reverse engineering of such Motorola software or exercise of rights in such Motorola software is permitted. No license is granted by implication, estoppel or otherwise under Motorola patent rights or copyrights.

FCC Regulatory Information

FCC Information

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received; including interference that may cause undesired operation.

Federal Communications Commission (FCC) Statement:

This Equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in an installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the WMC6300 and radio or television receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the supplier of the WMC6300 or an experienced radio/TV technician for help.

FCC RF Energy Exposure Statement

5. **T**his equipment complies with FCC RF Energy exposure limits set forth for an uncontrolled environment.
6. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Although this device complies with the FCC RF Exposure limits in multiple configurations of the antenna, we suggest that the antenna be positioned away from the body when transmitting in order to minimize the level of RF Exposure.

Regulatory and RF Safety Exposure

Your Motorola WMC6300 PCMCIA card is designed and tested to comply with a number of national and international standards and guidelines (listed below) regarding human exposure to RF electromagnetic energy.

This product complies with the following RF energy exposure standards and guidelines:

United States Federal Communications Commission, Code of Federal Regulations; 47CFR part 2 sub-part J

American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-2005

Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition

International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998

Ministry of Health (Canada) Safety Code 6. Limits of Human Exposure to

Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, 1999

Australian Communications Authority Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard, 2003

ANATEL ANNEX to Resolution No. 303 of July 2, 2002 "Regulation of limitation of exposure to electrical, magnetic and electromagnetic fields in the radio frequency range between 9 KHz and 300 GHz" and "Attachment to resolution # 303 from July 2, 2002"

RF Exposure Compliance and Guidelines Operating Instructions

To ensure compliance with the general population uncontrolled environment RF exposure limits in these standards, the antenna should be kept at a minimum separation distance of 20cm from all persons when used in a personal or laptop computer.

ATTENTION

To ensure compliance with FCC requirements, use only Motorola approved, supplied antennas. Use of non-Motorola approved antennas may result in non-compliance with FCC regulations.

NOTE: The manufacturer is not responsible for any unauthorized modifications to this equipment. Unauthorized modifications could void user's authority to operate device.