MOTOROLA

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Exhibit 8 – Users Manual

DSMODEM/RTC

Wireless LAN

FCC ID: E9UDSMODEM-RTC

Model No. DSMODEM/RTC

8.0 DSMODEM/RTC Users Manual

902 ~ 928 MHz Wireless-LAN

WS200 / WM200 User Manual

Table of Content

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.

1. Introduction and Features

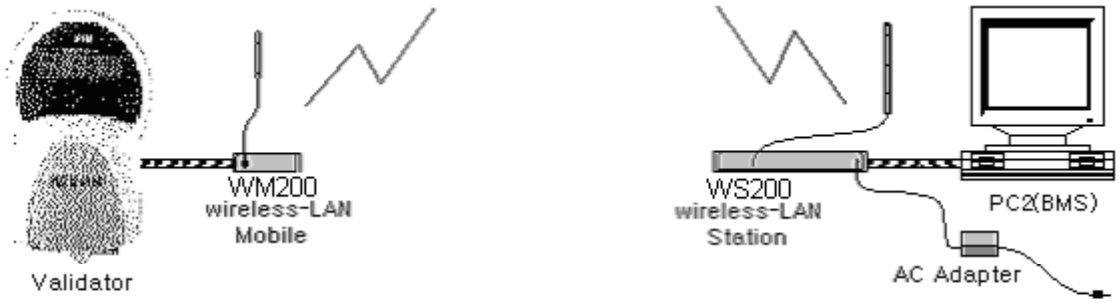
1.1. WS200 / WM200 (MSSK' s RF-LAN) receives and transmits data in the Industrial, Scientific and Medical (ISM) band of 902 to 928 MHz by half-duplex mode. WS200

/ WM200 wireless-LAN uses a standard RS-232C serial data external-interface that can be driven asynchronously. WS200 / WM200 wireless-LAN uses direct sequence spread spectrum technology implemented with Spread Spectrum Technology (SST). This can be applied for multiple-access networking or point-to-point, point-to-multiple, and multiple-to-multiple communication.

1.2. WS200 / WM200 is consisting with Station(WS200) and Mobile(WM200) Parts. Mobile(WM200) is connected by Validator, and Station(WS200) is connected by BMS (Data Gathering System). Mobile and Station can RF-communication with each other.

1.3. Major features of the WS200 / WM200 wireless-LAN include:

- Designed for 902-928 MHz ISM band
- Auto channel scan and channel indication
- Auto channel change when interfered
- Spurious emission meets FCC part 15 class B and 15.247
- High immunity to interference and jamming
- Long range
- High security
- Compact size
- Easy to operate
- Low cost



<Figure 1-1, OneValidator connection with one BMS, via Mobile and Station.>

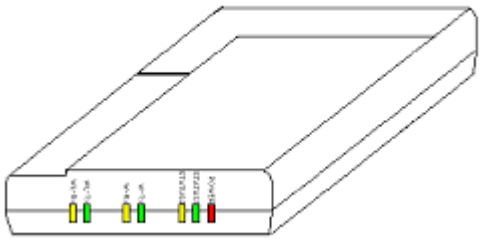
2. Outside & Configuration

2.1. Mobile has one connector, LED indicators.

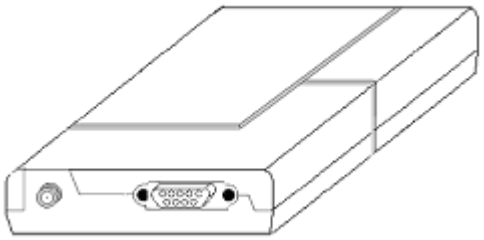
1.	RS-232 & Power Connector		A DB-9 connector for connecting to data terminal equipment (DTE) and +12~+24V DC power input.
	1,6	Power	+12~+24V DC power input.
	2	TX of RF-LAN	RS-232C communication TX-line of RF-LAN.
	3	RX of RF-LAN	RS-232C communication RX-line of RF-LAN.
	4,5,9	GND	GND
2.	Power LED		This LED turns on when DC-Power on.
3.	Status 1 LED		This LED display Wireless-LAN's Status.
4.	Status 2 LED		This LED display Wireless-LAN's Status.
5.	Wired TX LED		This LED turns on when Wired TX-signal is.
6.	Wired RX LED		This LED turns on when Wired RX-signal is.
7.	Wireless TX LED		This LED turns on when Wireless TX-signal is.
8.	Wireless RX LED		This LED turns on when Wireless RX-signal is.
9.	DIP Switch		(Not Defined.) Inside located. (Can't view on outside.)

2.2. Mobile Configuration

A. Mobile



<Figure 2-1, Mobile LEDs >



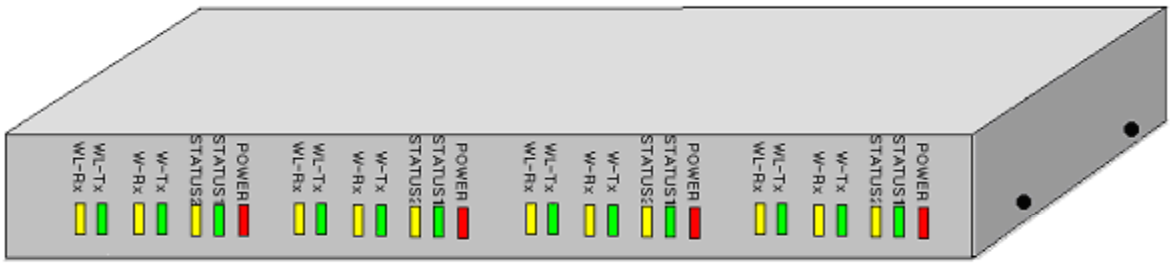
<Figure 2-2, Mobile connectors >

B. Mobile's Antenna & Antenna Cable

C. Mobile's Communication/Power Cable

2.3. Station Configuration

A. Station

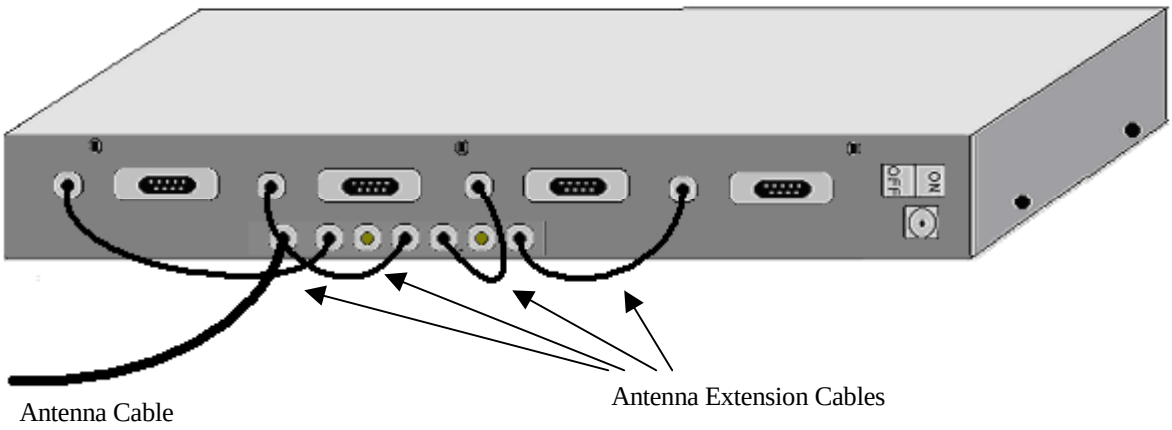


<Figure 2-3, Station LEDs >

<Figure 2-4, Station connectors >

B. Station's Antenna & Antenna Cable

C. Station's Antenna Extension Cables

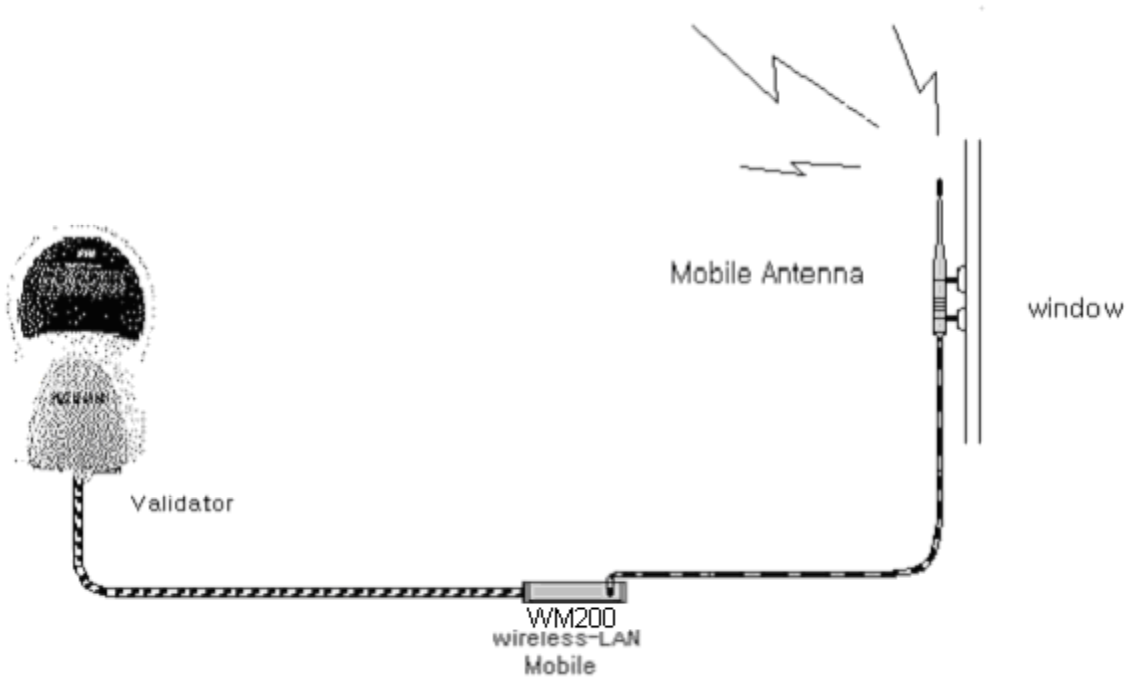


<Figure 2-5, Station's Antenna connection >

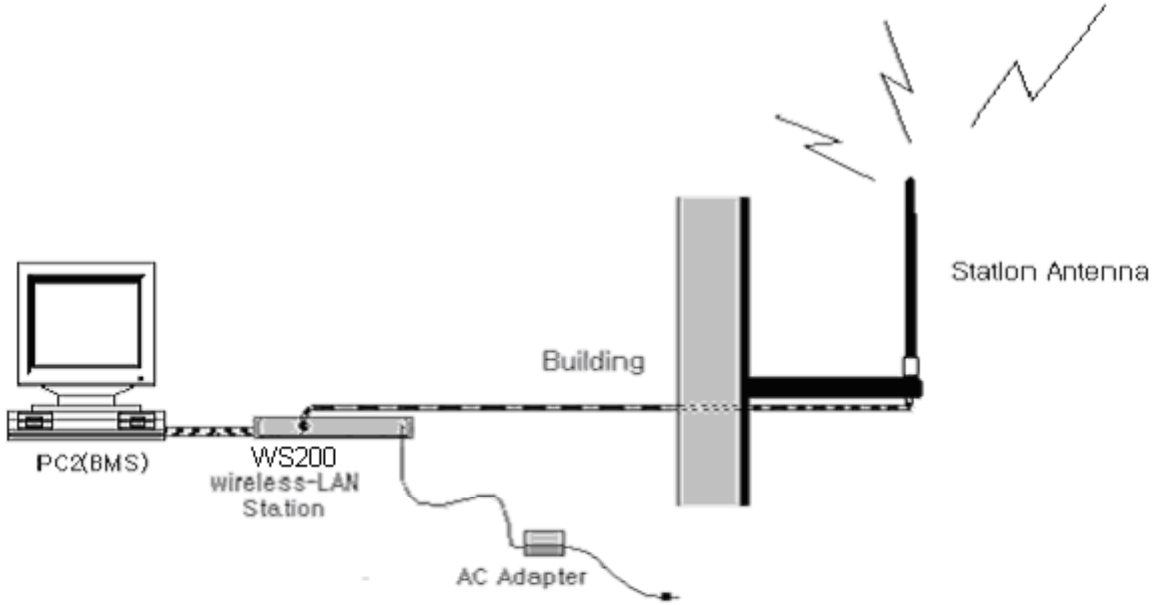
D. Station's Communication Cables

E. Station's Power Adapter & Power Cable

3. Setting and Using



<Figure 3-1, Mobile connection with Validator, Antenna >



<Figure 3-2, Mobile connection with Validator, Antenna and AC adapter>

3.1. Prepare the WS200 / WM200 wireless-LAN

The following sections describe how to connect the WS200 / WM200 wireless-LAN to External Device and how to set up and operate the WS200 / WM200 wireless-LAN.

3.1.1. Those following equipment will be used to set up the system, but the system operation should be verified by qualified personnel in MSSK and professionally installed.

3.1.2. One **Validator** and One **PC** for BMS.

3.1.3. One **WM200 Mobile**.

3.1.4. One RS-232 cable (with power-line) for Mobile.

3.1.5. One Mobile (WM200)'s Antenna & Antenna Cable (200mm Dipole Antenna : specified by MSSK).

3.1.6. One **WS200 Station**.

3.1.7. Four RS-232 cables (with no power-line) for Station. (Station use AC-Power adapter.)

3.1.8. Four Station (WS200)'s Antenna Extension Cables

3.1.9. One Station (WS200)'s Antenna & Antenna Cable (800mm Whip Antenna : specified by MSSK).

3.1.10. AC Power Adapter & Cable for Station.

3.2. Connecting WS200 / WM200 wireless-LAN

To connect both the wireless modems, please do the following procedures.

For Mobile,

A. One side of RS-232 cable connects the serial port of Validator , and the other side connects with the rear of Mobile.

B. Mobile's antenna & antenna cable connects with Mobile. (Please, do not use other device might cause the rf-power variation.)

C. Place the antenna on window of BUS.

D. Validator power on, then the power indicator-LED on Mobile will turn on. (+24V power deriving by Validator)

For Station,

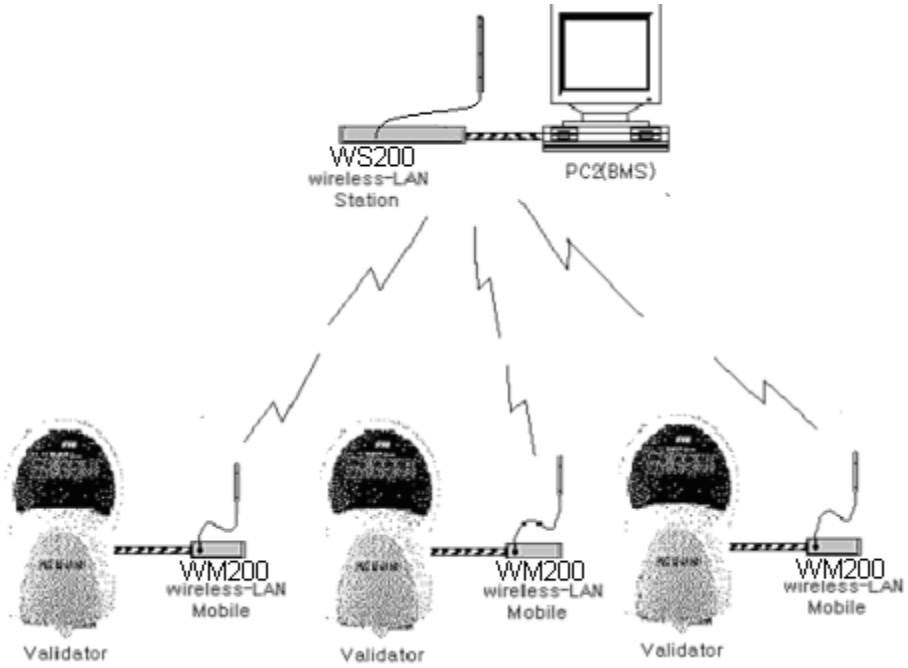
A. One side of the RS-232 cable connects connector on the rear panel of Station, and the other side connects with the serial port of PC (BMS).
B. Four-antenna extension cables connect on each point. (See *Figure 2-5*)
C. Station's antenna & antenna cable connects with Station. (Please, do not use other device might cause the rf-power variation.)
D. Place the antenna on higher position.
E. Plug the AC power adapter (AC to 24VDC) into power inlet of the Station and power on.
F. Then power indicator-LED on the Station will turn on.

<Figure 3-3, One Validator connection with one BMS, via Mobile and Station.>

4. Applications

Wireless Networking

With appropriate operating(wireless application program), data of the WS200 / WM200 within a workgroup may be shared without physically connect them together.



<Figure 4-1, Three Validators is connecting with one BMS, via Mobiles and Station.>

5. Technical Specifications

RF-Frequency Range	902-928MHz

RF-Channel Spacing	2.048 MHz
RF-Transmission Power	20 ± 2 dBm
RF-Modulation Scheme	GMSK
RF-Radio Technique	Direct Sequence Spread Spectrum
RF-Duplex Mode	Half-duplex
RF-Number of Channel	10
RF-Operation Mode	Point-to-point
RF-PN Code Chip Rate	1.365 M chips/sec
RF-Data Format	Async, 170 Kbps, 8-bit, Even-parity, 1-Stop-bit
Wired External Interface	RS-232-C, DB-9 Connector (with Power Pin)
Wired Data Format	Async, 115 Kbps, 8-bit, No-parity, 1-Stop-bit
DATA FORMAT	Transparent
Data Bit Error Rate	10^{-3} @ -100 dBm
Operating Temperature	0 °C to 60 °C
Storage Temperature	-30 °C to 70 °C
Supply Voltage	+12~24 VDC
Transmitter CurrentConsumption	< 200mA @ 24VDC
Receiver Current Consumption	< 150mA @ 24VDC
Power Consumption	< 4.8W (Mobile)/ < 20W (Station)
Spurious Emission	Compliance FCC part 15 class B and 15.247
Antenna	50 ohms (omni-directional)

6. Trouble Shooting

6.1. When Mobile/Station do not display power LED.

A. Check wired connection condition.

B. Reconnect wired connection.

C. Please. Call repair-department.

6.2. When Status LED didn't flicker by 10-second, periodically.

A. Check wired connection condition.

B. Reconnect wired connection. (And, Please. Call repair-department.)

6.3. When Validator display "RF1"-> "Fail" (Mobile can't wired-communicate with validator).

A. Check wired connection condition.

B. Reconnect wired connection. (And, Please! Call repair-department.)

6.4. When BMS display "Wired communication is failed"(Station can't wired-communicate with BMS).

A. Check wired connection condition.

B. Reconnect wired connection. (And, Please. Call repair-department.)

6.5. When Mobile can't communicate with Station (Wireless-communication can't more). Validator's display : "RF2 -> Fail", BMS's display : "Wireless communication is failed"

A. Check Mobile condition.

B. Check distance of Mobile and Station.

C. Check Mobile antenna right up and antenna's connectors.

(Antenna condition checking.)

D. Check Station antenna right up and antenna's connectors.

(Antenna condition checking.)

E. Please. Call repair-department