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WMC6300
Wireless Modem Card
Windows 2000 and XP
User's Guide

Version 3.0.78

Foreword

This document describes in detail the confidential and proprietary technology of MeshNetworks' MEA™ Architecture. MeshNetworks products and technology are protected by US and international patent and patent pending technology. This document represents the current MEA design; the contents are subject to change at any time at the discretion of MeshNetworks, Inc.

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Table of Contents

INTRODUCTION	1
General System Requirements.....	2
Windows XP Minimum Requirements.....	2
Windows 2000 Minimum Requirements.....	3
What's in the Box	3
FCC Approved Antennas for WMC6300	3
WMC6300 External Connections and Lights.....	4
Installing MEA Software with a Windows XP Operating System	5
Installing MEA Software with a Windows 2000 Operating System.....	11
INSTALLING THE WMC6300 WIRELESS MODEM CARD.....	16
Connect the Antenna Assembly (Laptop Computer).....	16
Connect the Magnetic Antenna Assembly (Optional).....	19
Insert the WMC6300 Wireless Modem Card	20
Configuring the DNS Address	26
Removing the WMC6300 Wireless Modem Card	28
Uninstalling Application Software.....	29
OVERVIEW OF MESHTRAY	30
MeshTray™	30
Starting MeshTray.....	32
MeshTray Status Tab	32
MeshTray Configuration Tab	33
Geo Position	33
Enhanced Geo Mode.....	33
Reporting Interval	33
Server IP Address.....	34

MeshNetworks

User Priority Settings and Quality of Service Overview	34
Classification of Data Packets.....	34
Differentiated Services Code Point	34
User Priority	34
Service Differentiation Mechanisms	35
IAP Support for Quality of Service.....	35
Priority Levels for Local Nodes.....	36
Setting the Priority Level for the WMC6300	37
Addressing Scheme for Unified Modes of Operation.....	37
Network DHCP Scheme	38
Statically Provisioned Scheme	39
User Supplied Scheme.....	39
Setting the User Supplied IP Address.....	39
MeshTray Geo-Position Tab (Optional)	43
MeshTray Routing Tab (Optional)	45
Routing Icons	46
Terminating MeshTray.....	47
TROUBLESHOOTING USING MESHAPI.....	48
CUSTOMER SERVICE INFORMATION	49
LICENSE AND WARRANTY INFORMATION.....	50
REGULATORY INFORMATION.....	54
FCC Information	54
FCC RF Radiation Exposure Statement	54
Safety Information for the MEA WMC6300	55
SAFETY CERTIFICATION.....	56
CE Mark Certification.....	56

List of Figures

Figure 1.	WMC6300 Wireless Modem Card	2
Figure 2.	WMC6300 Antenna Port and LED Indicators.....	4
Figure 3.	MEA Setup - Welcome Dialog Box.....	5
Figure 4.	MEA Setup - License Agreement Dialog Box	6
Figure 5.	MEA Setup – Startup Options Dialog Box.....	6
Figure 6.	MEA Setup - Ready to Install Dialog Box	7
Figure 7.	MEA Setup - Drivers Previously Installed Dialog Box.....	8
Figure 8.	Software Installation Dialog Box.....	8
Figure 9.	Software Installation Dialog Box.....	9
Figure 10.	Software Installation Dialog Box.....	10
Figure 11.	MEA Setup - mea Installed Successfully Dialog Box	10
Figure 12.	MEA Setup - Installer Setup Dialog Box.....	11
Figure 13.	MEA Setup - License Agreement Dialog Box	12
Figure 14.	MEA Setup – Startup Options Dialog Box.....	12
Figure 15.	MEA Setup - Ready to Install Dialog Box	13
Figure 16.	MEA Setup - Drivers Previously Installed Dialog Box.....	13
Figure 17.	Digital Signature Not Found Dialog Box.....	14
Figure 18.	MEA Setup - Select Options Dialog Box	14
Figure 19.	Finished Popup Dialog Box.....	15
Figure 20.	Attach Antenna to the WMC6300	16
Figure 21.	Antenna Clip	17
Figure 22.	Mounting the Antenna Clip	18
Figure 23.	Insert the Antenna into the Clip	18
Figure 24.	Attach Magnetic Mount Antenna to the WMC6300	19
Figure 25.	Installing the WMC6300 Wireless Modem Card.....	20
Figure 26.	Found New Hardware Popup Dialog box	20
Figure 27.	Found New Hardware Wizard – Serial PC Card.....	21
Figure 28.	Found New Hardware Wizard - Loading Files.....	21

MeshNetworks

Figure 29.	Hardware Installation Dialog Box.....	22
Figure 30.	Found New Hardware Wizard - Complete	22
Figure 31.	Found New Hardware Wizard – WMC6300 PC Card	23
Figure 32.	Found New Hardware Wizard Loading Files.....	23
Figure 33.	Hardware Installation Dialog Box - WMC6300 PC Card.....	24
Figure 34.	Found New Hardware Wizard Complete.....	24
Figure 35.	Found New Hardware - Wizard Complete	25
Figure 36	Local Area Connection Properties Dialog Box.....	26
Figure 37.	Unplug or Eject Hardware Icon	28
Figure 38.	Safe to Remove Hardware - WMC6300 Card.....	28
Figure 39.	Removing the WMC6300 from the PCMCIA slot.....	28
Figure 40.	Confirm Action - Uninstall.....	29
Figure 41.	Removing Programs from Your Computer Dialog Box.....	29
Figure 42.	Inactive MeshTray Icon.....	30
Figure 43.	MeshTray Link Quality Indicator	30
Figure 44.	MeshTray No IP Address Acquired Icon	31
Figure 45.	MeshTray Status Tab.....	32
Figure 46.	MeshTray Configuration Tab.....	33
Figure 47.	MeshTray Configuration Tab Priority Settings.....	37
Figure 48.	MeshTray Configuration Tab Addressing Scheme	38
Figure 49.	Control Panel – Network and Dial-up Connections Icon.....	40
Figure 50.	Network and Dial-up Connections Window.....	40
Figure 51.	Local Area Connection Properties Dialog Box.....	41
Figure 52.	Internet Protocol (TCP/IP) Properties Dialog Box.....	42
Figure 53.	MeshTray Geo Position Tab.....	43
Figure 54.	MeshTray Geo Position Spherical Coordinates.....	44
Figure 55.	MeshTray Routing Tab	45
Figure 56.	Exit MeshTray	47
Figure 57.	Using EventViewer To Troubleshoot MeshAPI	48

Introduction

Thank you for purchasing the Wireless Modem Card. If you wish to skip this introduction and begin the installation, go directly to the

Installing the **WMC6300 Wireless Modem Card** section of this document.

MEA is a wireless communication system capable of supporting high data rate mobile communication at vehicular speeds. The MEA system is designed to allow standard client hosts with a PCMCIA interface to have a mobile broadband Ethernet connection. The MEA system works transparently to the client host in a manner similar to an Ethernet connection. MEA provides Internet Protocol based data and location services. Its geo-location accuracy and availability is better than ± 10 meters within 1 second. It is capable of supporting subscribers traveling up to 100 miles per hour.



Figure 1. WMC6300 Wireless Modem Card

The MEA system provides a secure and reliable transport for the client host. The client host may still require configuration and authentication before it will be allowed to access services on the core network. Access to the core network is controlled by the network administrator according to current operating practices. This document provides detailed installation and configuration instructions for installing the MEA WMC6300 Wireless Modem Card and supporting software.

General System Requirements

For best results, ensure the computers meet the following minimum requirements.

Windows XP Minimum Requirements

- Laptop or Notebook PC running the Microsoft Windows XP (Service Pack 1) operating system
- 500 MHz Processor
- 10 MB of available hard disk storage
- Keyboard, Mouse, CD-ROM drive or DVD drive
- Available Type II PCMCIA card slot in the Host device

Windows 2000 Minimum Requirements

- Laptop or Notebook PC running the Microsoft Windows 2000 (Service Pack 3) operating system
- 500 MHz Processor
- 10 MB of available hard disk storage
- Keyboard, Mouse, CD-ROM drive or DVD drive
- Available Type II PCMCIA card slot in the Host device

What's in the Box

Each MEA WMC6300 Wireless Modem Card is a full-featured wireless networking interface. The following is a list of the items provided with each WMC6300 card:

- MEA WMC6300 Wireless Modem Card
- Antenna with a MMCX connector
- MEA WMC6300 Software and Documentation CD ROM

The MEA CD ROM contains an online version of the MEA WMC6300 User's Guide in Adobe PDF format. The CD also contains an installation executable to load Adobe Acrobat Reader software if it is not already resident on your computer.

FCC Approved Antennas for WMC6300

Manufacturer	Part Number	Gain	Usage
Centurion	MAF94058	2 dBi	Laptop
Maxrad	BMMG2400ML195MSMA	0 dBi	Mobile
Antenex	TRA24003	3 dBi	Mobile

WMC6300 External Connections and Lights

The WMC6300 Wireless Modem Card is designed for insertion into an industry-standard Type II PCMCIA card slot located in a Host device. The WMC6300 has an antenna port to connect the external antenna and two LED Indicators. As shown in [Figure 2](#) the red LED is the transmit indicator and the green LED is the receive indicator.

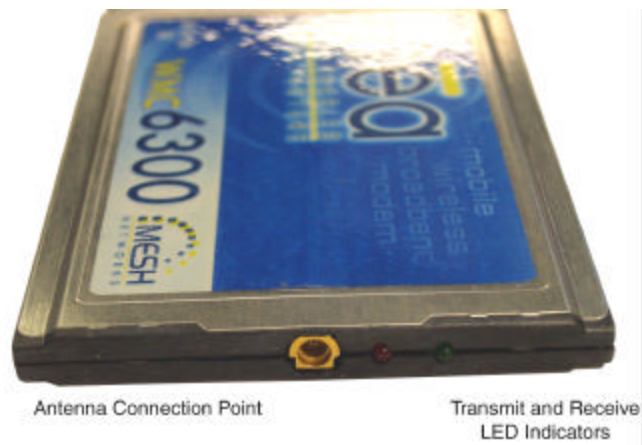


Figure 2. WMC6300 Antenna Port and LED Indicators

Installing MEA Software with a Windows XP Operating System

The following procedure outlines the installation of the MEA software on a typical Windows XP platform. Some of the steps may vary slightly based on the configuration of the individual computers.

NOTE: Windows XP clients should install the MEA Software before inserting the WMC6300 card.

Complete the following procedure to install the MEA software:

1. Insert the MEA Software and Documentation CD into the CD-ROM drive.
2. If the installation program does not start automatically, open the Windows **Start** menu. Click on **Run** then type the following into the dialog box:

d:\setupmeaclient.exe

where **d:** specifies the CD-ROM drive and click the “**OK**” button.

3. Click the “**Next**” button to continue the installation process.
4. The MEA Setup dialog box will be displayed as shown in [Figure 3](#).
5. Click the **Next** button to continue the installation process.

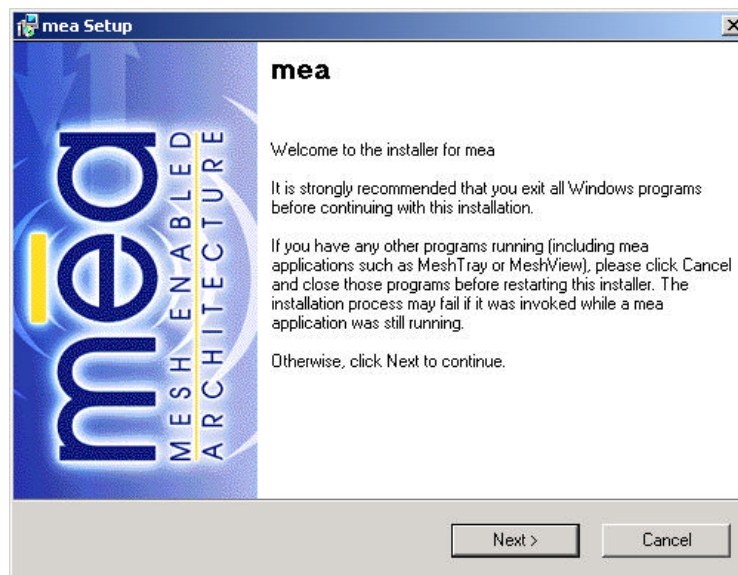


Figure 3. MEA Setup - Welcome Dialog Box

6. The *License Agreement* dialog box will be displayed as shown in [Figure 4](#). Please review the *End User License Agreement*. Use the scroll bar located at the right side of the dialog box to display the complete text message.

NOTE: If you do not agree with the terms of the license agreement, click on **Cancel** and the installation will be terminated.

To continue with the installation process, select the **YES** radio button as shown in [Figure 4](#) and then click on the **Next** button to continue the installation.

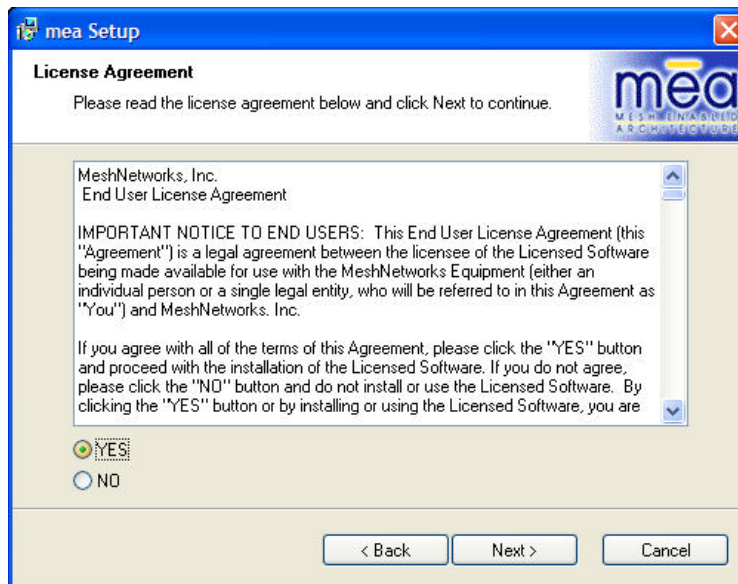


Figure 4. MEA Setup - License Agreement Dialog Box

7. The *Startup Options* dialog box will be displayed as shown in [Figure 5](#). The user can modify the default installation configuration by checking or un-checking the boxes on this installation dialog box. Click on the **Next** button to continue the installation process.

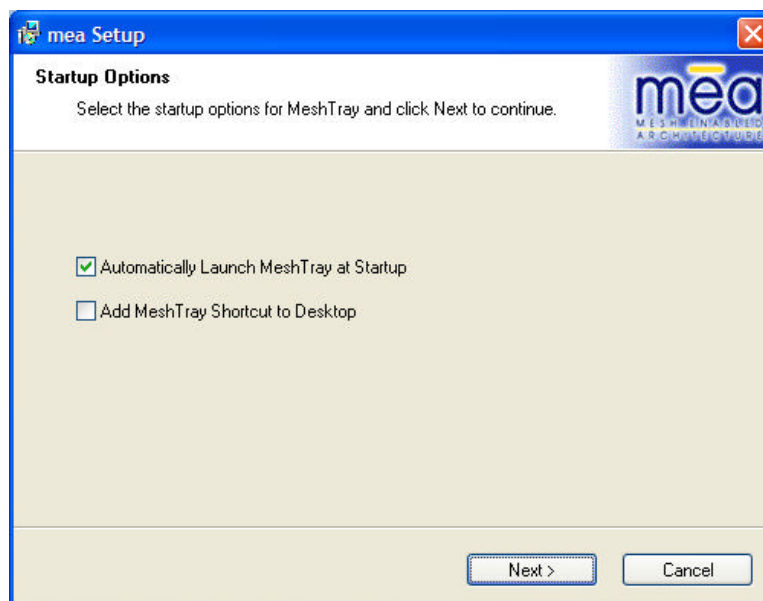


Figure 5. MEA Setup – Startup Options Dialog Box

8. The *Ready to Install* dialog box will be displayed as shown in [Figure 6](#). This dialog box displays the Install Folder location and the Shortcut Folder name that will be used to install the MEA software. Click on the **Next** button to proceed with the installation process.

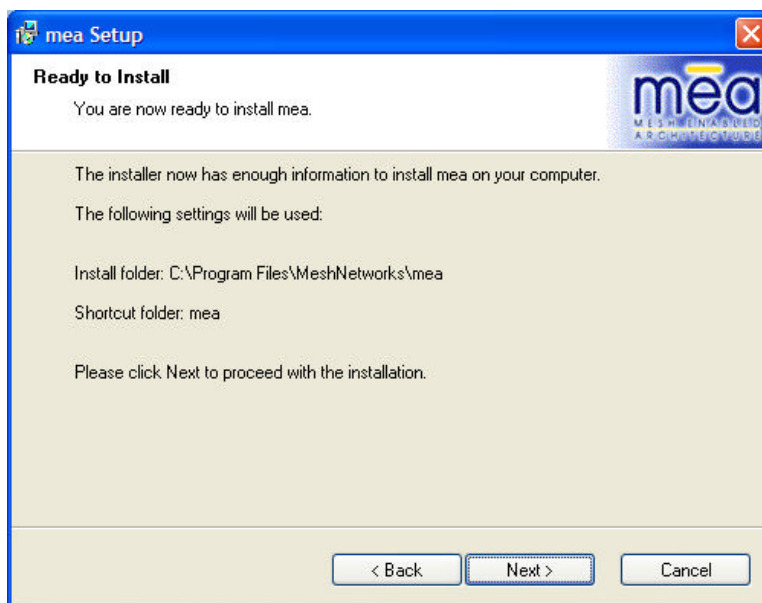


Figure 6. MEA Setup - Ready to Install Dialog Box

9. If MEA was previously installed on your computer, the *Information* dialog box will be displayed as shown in [Figure 7](#). Click on the **Next** button to uninstall the existing MEA drivers and continue the installation process. If you do not want to continue, press the **Cancel** button.

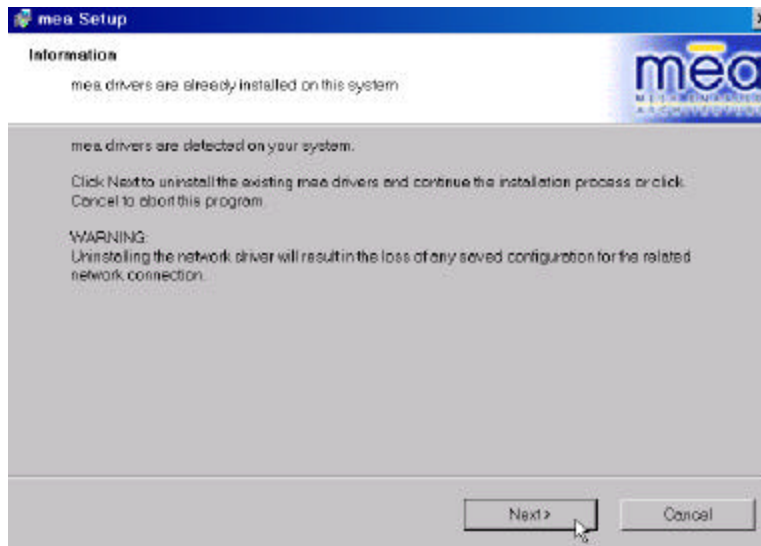


Figure 7 MEA Setup - Drivers Previously Installed Dialog Box

10. The *Performing Setup Actions* dialog box displays a status bar to indicate the progress of the installation.
11. If the *Software Installation* dialog box is displayed as shown in [Figure 8](#), it indicates that the software is not Windows Logo tested. Click on the **Continue Anyway** button to complete the installation process.



Figure 8. Software Installation Dialog Box

12. A second *Software Installation* dialog box is displayed as shown in [Figure 9](#). It indicates the software you are installing is not *Windows Logo tested*.

Click on the **Continue Anyway** button to complete the installation process.



Figure 9. Software Installation Dialog Box

13. The *Select Options* dialog box will be displayed as shown in [Figure 10](#). This dialog box allows the user to view the *ReadMe* file for the most current release information. It also allows the user to immediately run MeshTray. Click on the **Next** button to proceed with the installation process.

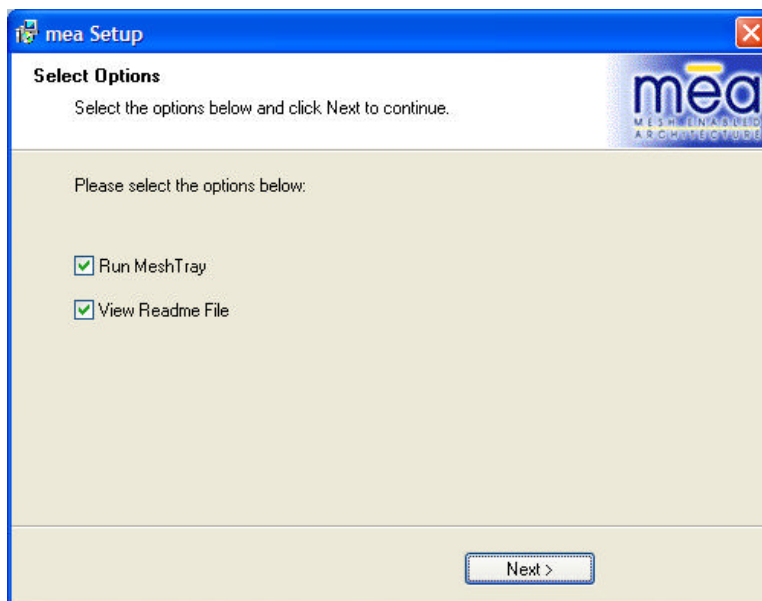


Figure 10. Software Installation Dialog Box

14. If selected, the *ReadMe* file will be displayed. Review the contents of the file and then dismiss the dialog box by clicking on the **X** located in the upper right corner of the dialog box.
15. The *mea Installed Successfully* dialog box will appear as shown in [Figure 11](#). Click on the **Finish** button to exit.

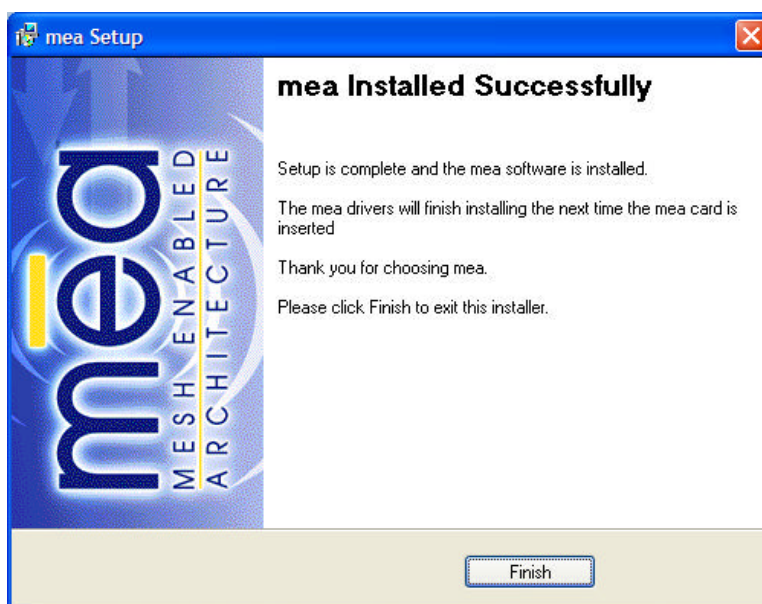


Figure 11. MEA Setup - mea Installed Successfully Dialog Box

WARNING

After installing the MEA software, MeshTray must be active when installing the WMC6300 card.

Installing MEA Software with a Windows 2000 Operating System

The following procedure outlines the installation of the MEA software on a typical Windows 2000 platform. Some of the steps may vary slightly based on the configuration of the individual computers.

NOTE: Windows 2000 clients should install the MEA Software before inserting the WMC6300 card.

Complete the following procedure to install the MEA software:

1. Insert the MEA Software and Documentation CD into the CD-ROM drive.
2. If the installation program does not start automatically, open the Windows **Start**. Click on **Run** then type the following into the dialog box:

d:\setupmeaclient.exe

where **d:** specifies the CD-ROM drive and click the "**OK**" button.

3. The MEA Setup program will be displayed as shown in [Figure 12](#).
4. Click the **Next** button to continue the installation process.

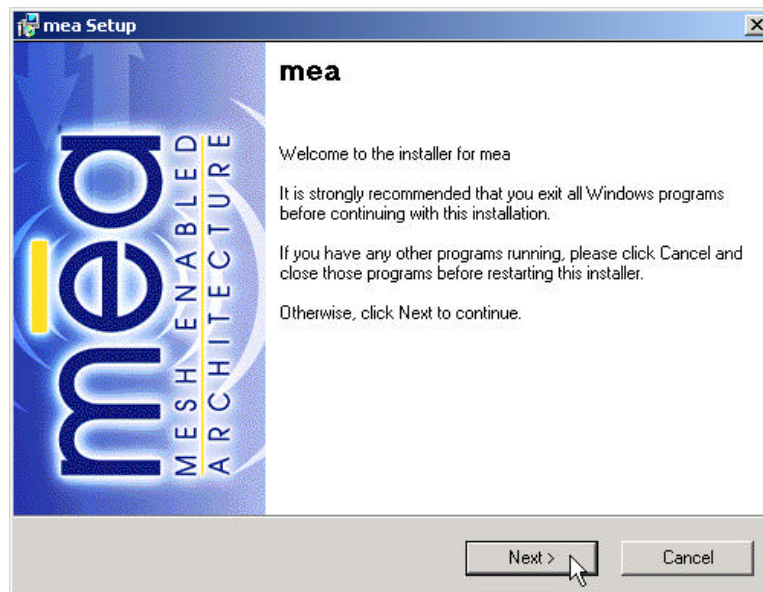


Figure 12. MEA Setup - Installer Setup Dialog Box

5. The *License Agreement* dialog box will be displayed. Please review the End User *License Agreement*. Use the scroll bar located at the right side of the dialog box to display the complete text message.

NOTE: If you do not agree with the terms of the license agreement, click on **Cancel** and the installation will be terminated.

- To continue with the installation process, click on the **YES** button as shown in [Figure 13](#) and then click on the **Next** button to continue the installation.

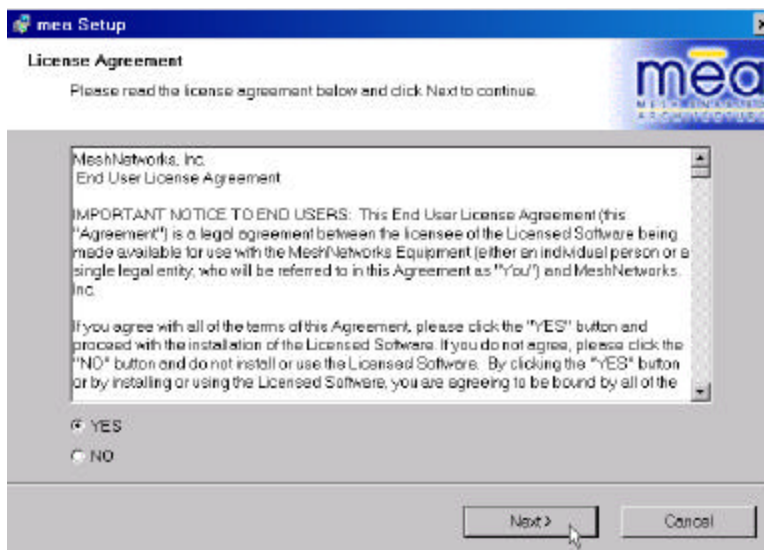


Figure 13. MEA Setup - License Agreement Dialog Box

- The *Startup Options* dialog box will be displayed as shown in [Figure 14](#). The user can modify the default installation configuration by checking or un-checking the boxes on this installation dialog box. Click on **Next** to continue the installation process.

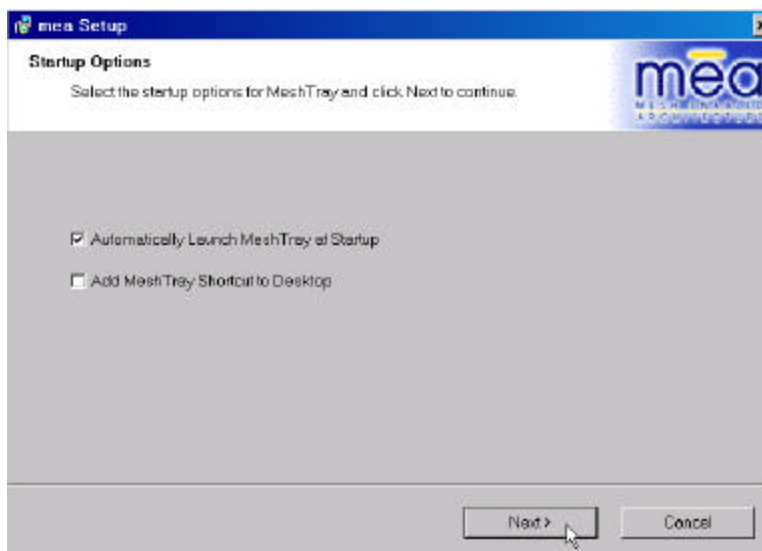


Figure 14. MEA Setup – Startup Options Dialog Box

8. The *Ready to Install* dialog box will be displayed as shown in [Figure 15](#). This dialog box displays the Install Folder location and the Shortcut Folder name that will be used to install the MEA software. Click on **Next** to proceed with the installation process.

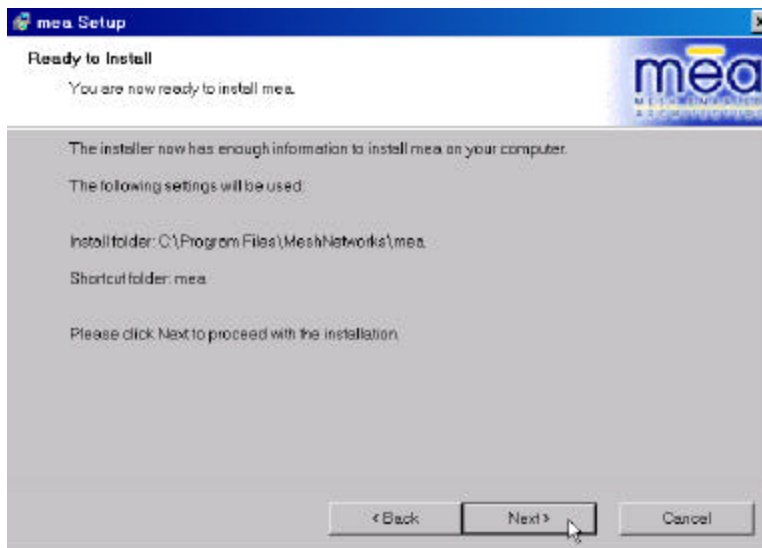


Figure 15. MEA Setup - Ready to Install Dialog Box

9. If MEA was previously installed on your computer, the *Information* dialog box will be displayed as shown in [Figure 16](#). Click on the **Next** button to uninstall the existing MEA drivers and continue the installation process. If you do not want to continue, press the **Cancel** button.

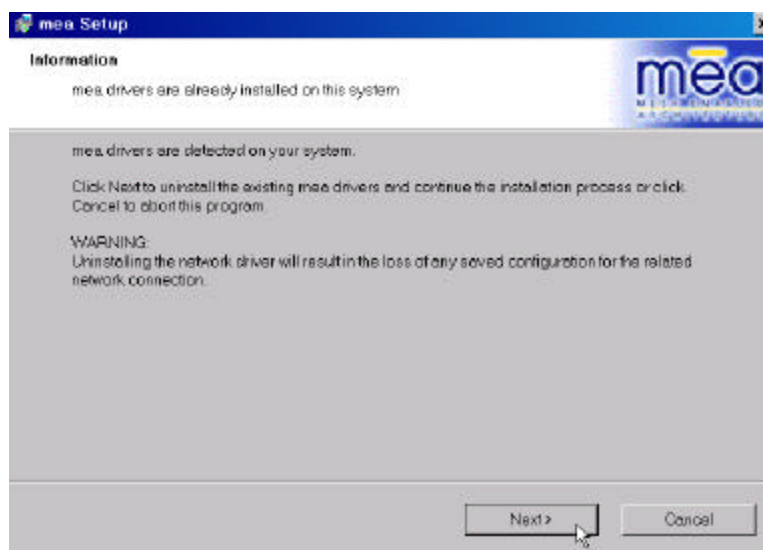


Figure 16 MEA Setup - Drivers Previously Installed Dialog Box

10. During the installation process, the *Performing Setup Actions* dialog box displays a status bar that indicates the progress of the installation.
11. If the computer has been configured to check digital signatures, a *Digital Signature Not Found* dialog box will be displayed as in [Figure 17](#). In response to the query “Do you want to continue the installation?” press the **Yes** button.

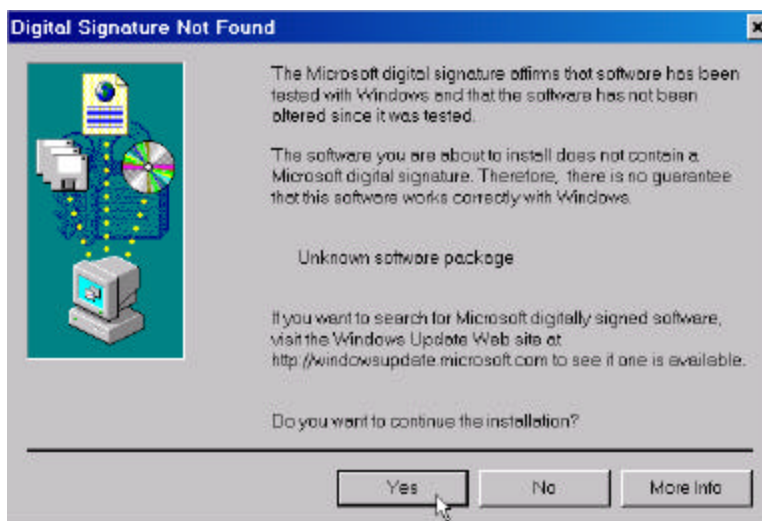


Figure 17. Digital Signature Not Found Dialog Box

12. When the file transfer is complete, a dialog box will be displayed as shown in [Figure 18](#) that allows the user to view the *ReadMe* file for the most current release information. It also allows the user to immediately run MeshTray. Click on **Next** to proceed with the installation process.

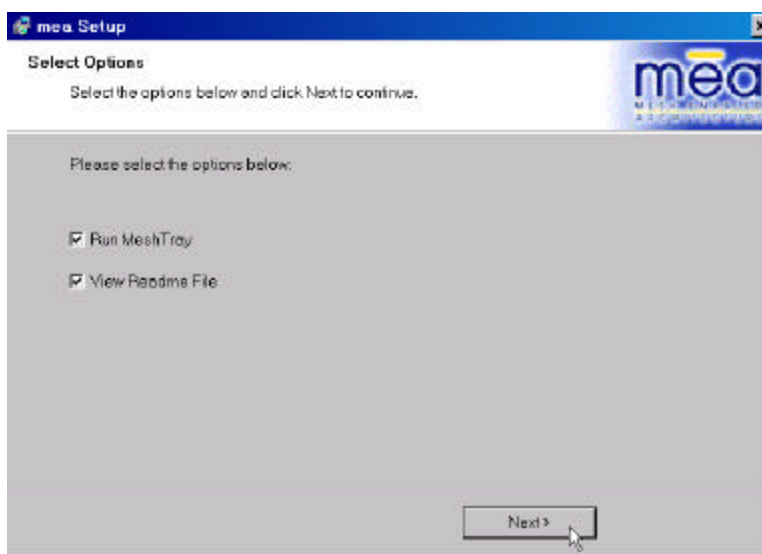


Figure 18. MEA Setup - Select Options Dialog Box

13. If selected, the *ReadMe* file will be displayed. Review the contents of the file and then dismiss the dialog box by clicking on the **X** located in the upper-right corner of the dialog box.
14. The *mea Installed Successfully* dialog box will appear as shown in [Figure 19](#). Click on the **Finish** button to exit.



Figure 19. Finished Popup Dialog Box

Installing the WMC6300 Wireless Modem Card

WARNING

After installing the MEA software, MeshTray must be active when installing the WMC6300 card.

Connect the Antenna Assembly (Laptop Computer)

Complete the following procedure to connect the Antenna Assembly to the WMC6300, for use in a standard laptop computer.

Warning

Always eject card when not in use.

1. Locate the Antenna and insert the connector into the WMC6300 antenna port as shown in [Figure 20](#).

Note: The connector will “snap” into place when fully inserted.

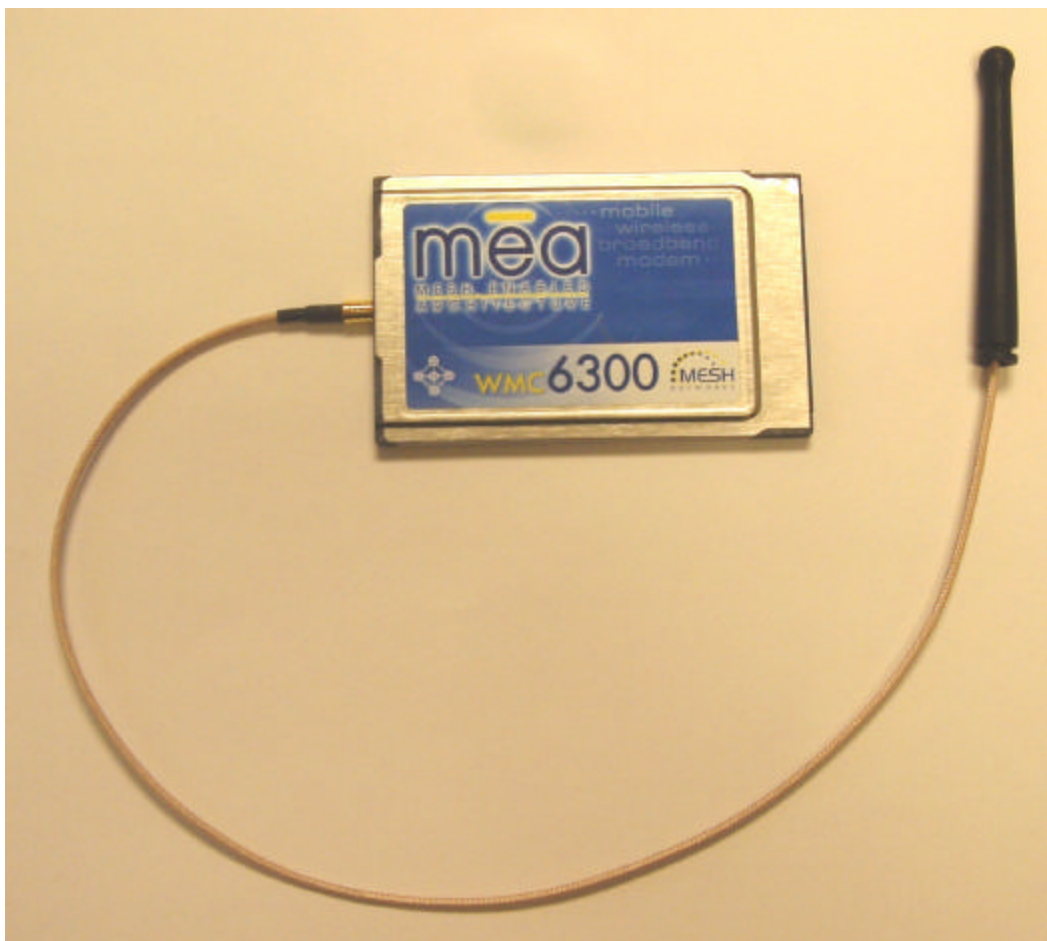


Figure 20. Attach Antenna to the WMC6300

2. Locate the Antenna Clip shown in Figure 21 and remove the paper that protects the adhesive backing.



Figure 21. Antenna Clip

3. Attach the Antenna Clip to the back of the laptop computer display approximately 1 inch from the top corner of the display as shown in [Figure 21](#). Ensure that the location selected for the Antenna Clip will reach the WMC6300 with the provided cable length.

Note: The antenna operational position must be greater than 8 inches or 20 cm from the bottom of the case and such that the Antenna is vertically orientated when the laptop is in use.

Warning

Use only the MeshNetworks supplied antenna.
Use of another antenna is prohibited and violates FCC regulations.



Figure 22. Mounting the Antenna Clip

4. Insert the Antenna into the Antenna Clip as shown in [Figure 22](#).

Warning

Never use the WMC6300 with the Antenna removed from the Clip.
Never use the WMC6300 with the Antenna disconnected from the Card.
Never use the WMC6300 with the display in the closed position.

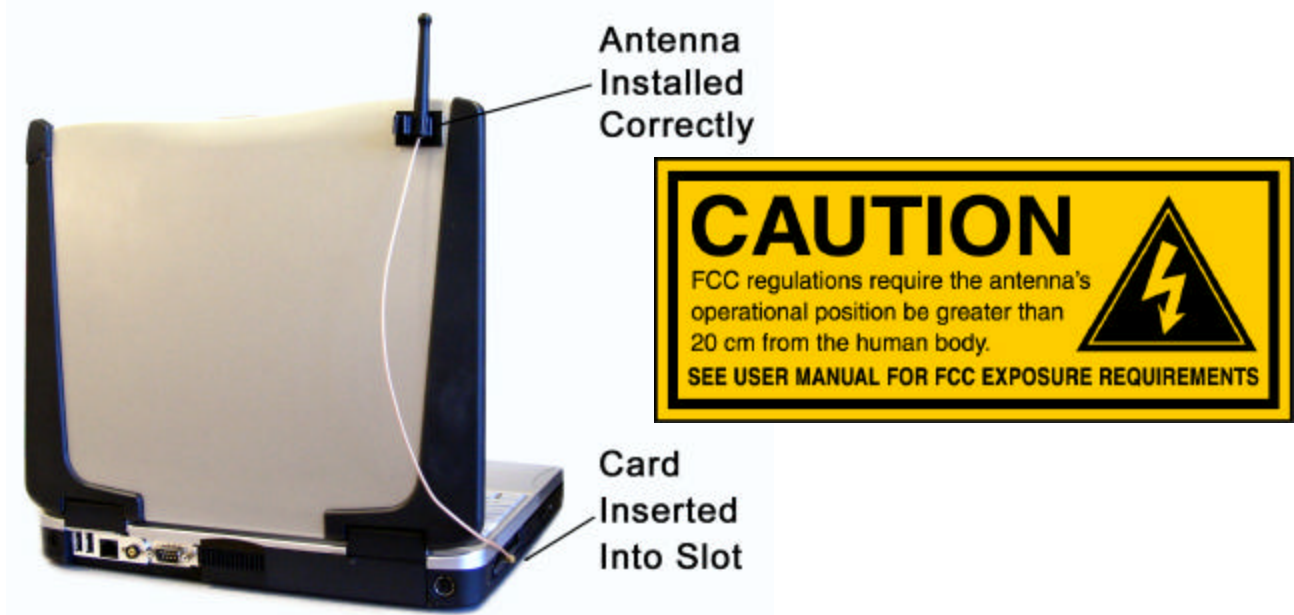


Figure 23. Insert the Antenna into the Clip

Connect the Magnetic Antenna Assembly (Optional)

Complete the following procedure to install the Magnetic Mount Antenna on the rooftop of a vehicle. (The cable length of the Antenna is approximately 12-feet.)

1. Attach the Magnetic Antenna to the metal rooftop of the vehicle so that the antenna is in a vertical orientation.

Caution: The base of the antenna contains a powerful magnet that secures the antenna to the rooftop. Use care when attaching the antenna

2. Route the remaining 12-foot cable as required to arrive at the Host Computer.

Warning

FCC regulations require that the antenna's operational position must be greater than 20 cm from the human body.

Never use the WMC6300 with the Antenna removed from the rooftop.

Never use the WMC6300 with the Antenna disconnected from the Card.

3. Insert the Antenna Cable Connector into the WMC6300 antenna port as shown in [Figure 24](#). **Note:** The connector will “snap” into place when fully inserted.

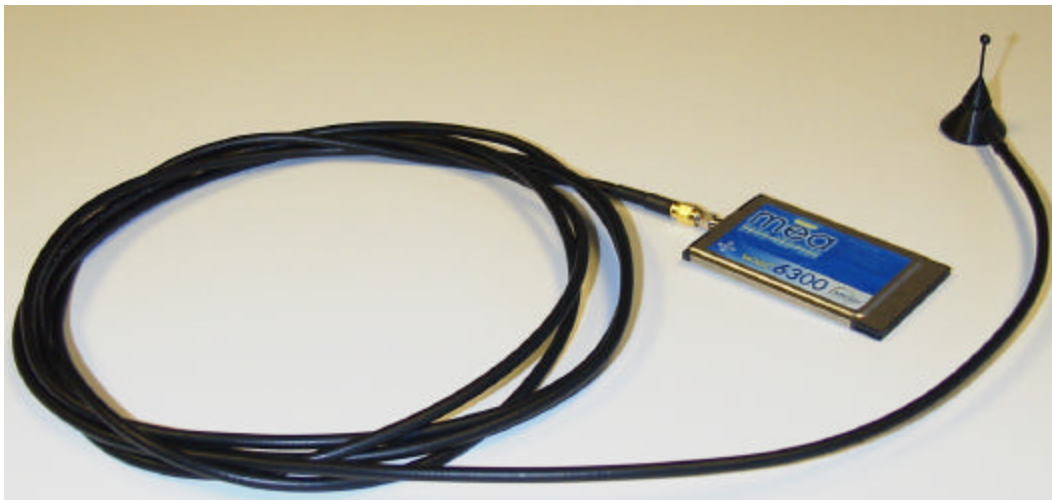


Figure 24. Attach Magnetic Mount Antenna to the WMC6300

Insert the WMC6300 Wireless Modem Card

Complete the following procedure to install the WMC6300 Wireless Modem Card in the computer.

1. Locate an available Type II PCMCIA card slot in the computer. If necessary, remove the slot dust cover from the slot.
2. To ensure the correct orientation of the card, insert the WMC6300 Wireless Modem Card into the computer's PCMCIA card slot with the label side up as shown in [Figure 25](#).

CAUTION - Never force the card into the slot.



Figure 25. Installing the WMC6300 Wireless Modem Card

3. The first time that the card is inserted, a message will be displayed indicating that the PC card has been found as shown in [Figure 26](#).

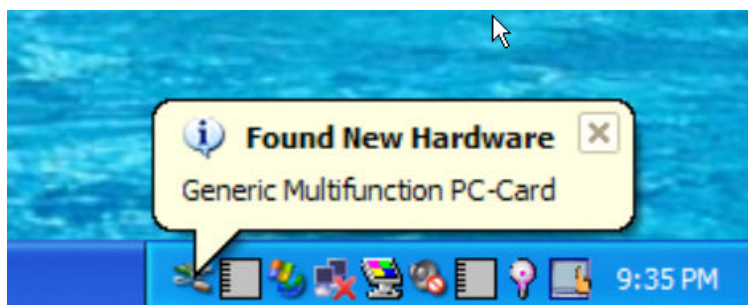


Figure 26. Found New Hardware Popup Dialog box

4. The Windows *Found New Hardware Wizard* for the Serial PC Card will start as shown in [Figure 25](#). Verify that the “Install the software automatically (Recommended)” radio button is selected, and then click on the **Next** button.



Figure 27. Found New Hardware Wizard – Serial PC Card

5. The *Found New Hardware* dialog will display the progress information for establishing the restore point and backing up old files as shown in [Figure 28](#). As soon as these steps are complete, the *Hardware Installation* dialog box shown in [Figure 29](#). will be displayed. Click on the **Continue Anyway** button in the *Hardware Installation* dialog box.

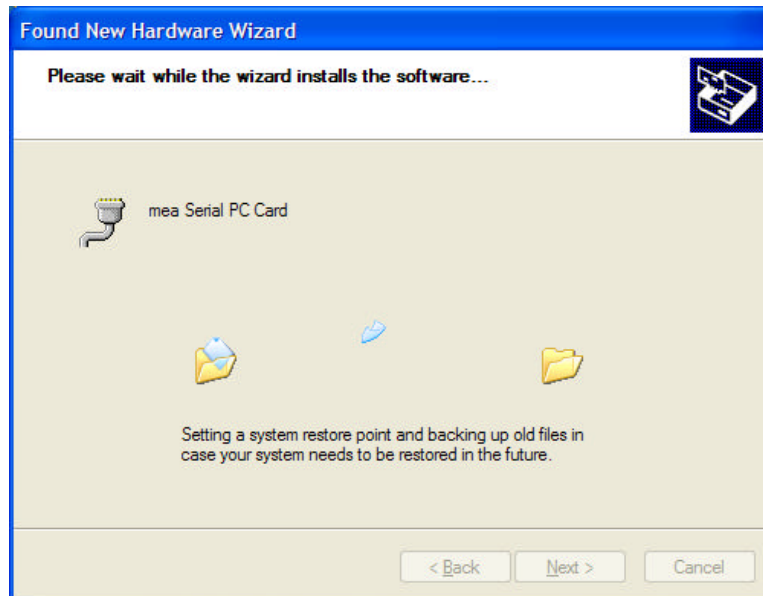


Figure 28. Found New Hardware Wizard - Loading Files



Figure 29. Hardware Installation Dialog Box

6. The *Found New Hardware Wizard Complete* dialog box will appear as shown in [Figure 30](#). Click on the **Finish** button.

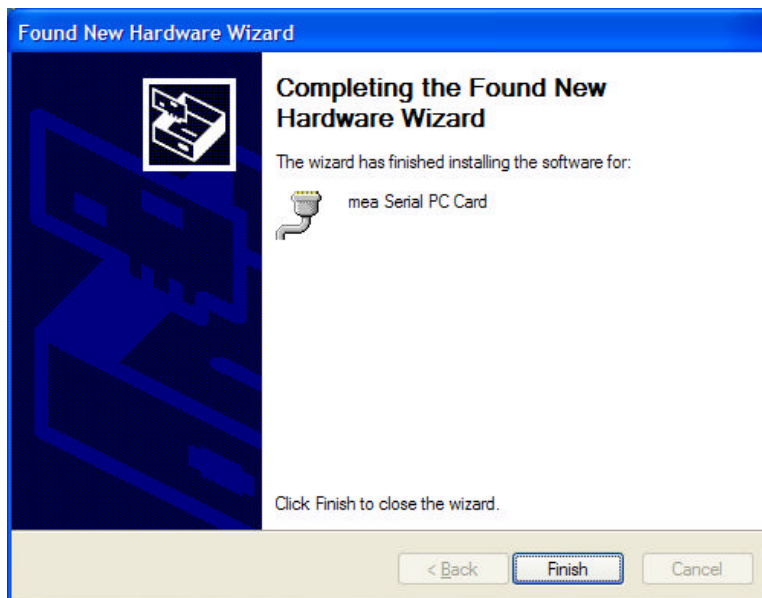


Figure 30. Found New Hardware Wizard - Complete

7. An additional *Found New Hardware Wizard* for the WMC6300 PC Card will be displayed as shown in [Figure 31](#). Verify that the *Install the software automatically (Recommended)* radio button is selected, and then click on the **Next** button.



Figure 31. Found New Hardware Wizard – WMC6300 PC Card

8. A *Loading Files* dialog box will appear as shown in [Figure 32](#), followed by a *Hardware Installation* dialog box as shown in [Figure 33](#). Click on the **Continue Anyway** button in the “Hardware Installation” dialog box.

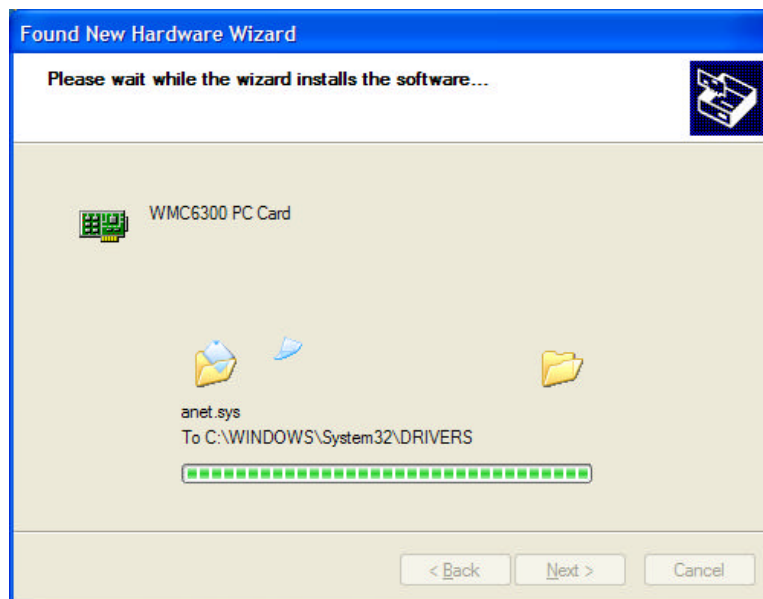


Figure 32. Found New Hardware Wizard Loading Files



Figure 33. Hardware Installation Dialog Box - WMC6300 PC Card

9. The Found New Hardware Wizard Complete dialog box will be displayed as shown in [Figure 34](#). Click on the **Finish** button.

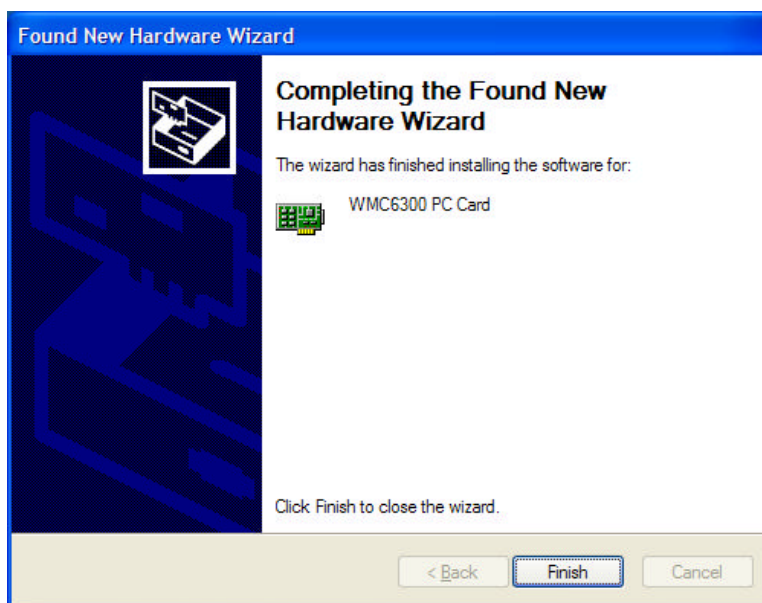


Figure 34. Found New Hardware Wizard Complete

10. The *Found New Hardware* pop-up window will appear confirming that the driver installation is complete and the hardware is ready to use.

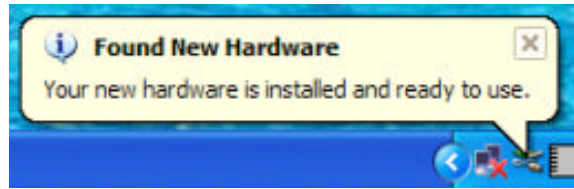


Figure 35. Found New Hardware - Wizard Complete

Configuring the DNS Address

Typically, the DNS address will be supplied as part of the WMC6300's communication with the network. Occasionally however, the Network Operator must supply the DNS IP address for an internet connection. This address must be manually configured in order for web URLs such as www.meshnetworks.com to be resolved. Complete the following procedure to configure the address:

1. From the windows **Start** menu, select **Settings → Control Panel**
2. On the Control Panel, double-click on the *Network and Dial-Up Connections* icon.
3. Right click on the Local Area Connection Corresponding to the Wireless Modem Card and select "Properties" from the pop up menu.

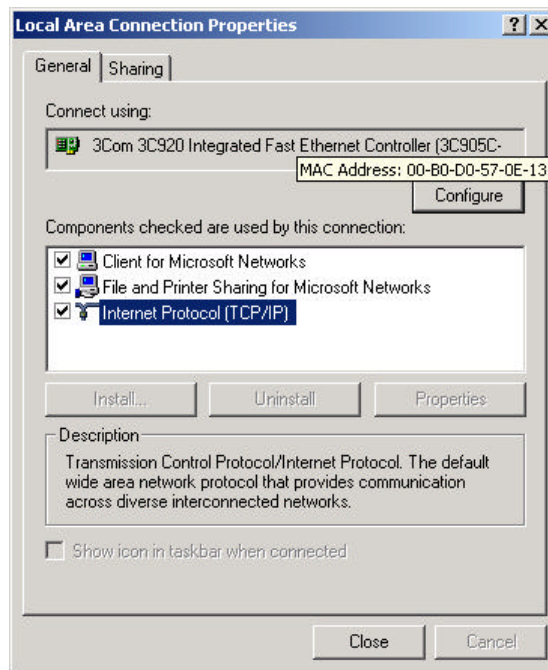


Figure 36 Local Area Connection Properties Dialog Box

4. Highlight "Internet Protocol (TCP/IP)" in the Components dialog box as shown in Figure 37.
5. Click on the **Properties** button.
6. Click on the **Advanced** button.
7. Click on the DNS tab
8. Click on the DNS **Add** button.
9. Enter the *DNS Server IP Address* provided by the network administrator and then click the **Add** button.
10. Click on the **OK** button to close the *Advanced TCP/IP Settings* dialog box.

11. Click on the **OK** button to close the Internet Protocol (TCP/IP) Properties dialog box.
12. Click on the **OK** button to close the Local Area Connection Properties dialog box.

This configuration should remain in the Windows XP host.

Removing the WMC6300 Wireless Modem Card

The WMC6300 should be ejected using the following procedure to ensure that power to the card is disabled prior to removal.

WARNING

Always eject card when not in use.

1. Click on the Unplug or Eject Hardware icon in the system task bar.
2. Select **"Safely remove Generic Multifunction PC-Card"** from the popup menu as shown in [Figure 37](#).

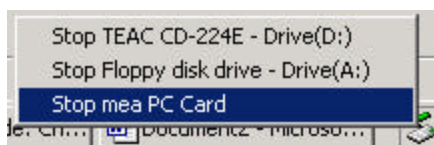


Figure 37. Unplug or Eject Hardware Icon

3. Wait for a message that indicates that the device may be safely removed from the system as shown in [Figure 38](#).



Figure 38. Safe to Remove Hardware - WMC6300 Card

4. Eject the WMC6300 from the PCMCIA slot as shown in [Figure 39](#).

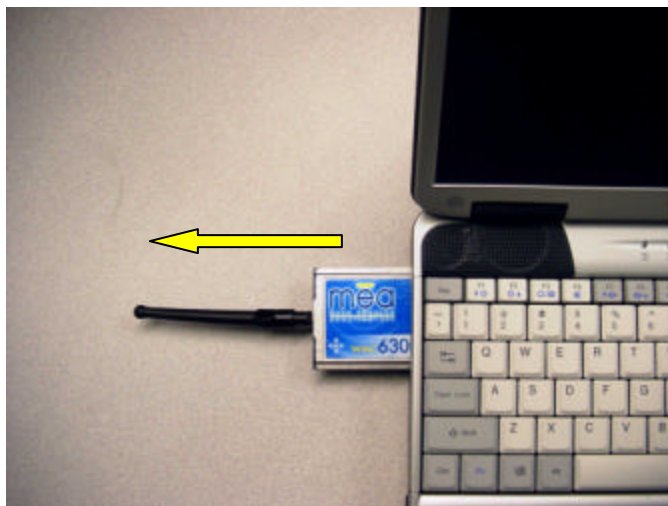


Figure 39. Removing the WMC6300 from the PCMCIA slot

Uninstalling Application Software

Complete the following procedure to “Uninstall” the MEA Software:

1. From the **Start** menu, select **Programs? mea? Uninstall mea**.

NOTE: The MEA software can also be uninstalled using “Add/Remove Programs” located in the Control Panel.

2. The *Confirm Action* dialog box in will display the query “Are you sure you want to remove ‘mea’ and all of its components ? as shown in [Figure 40](#). Click on **Yes** to continue.

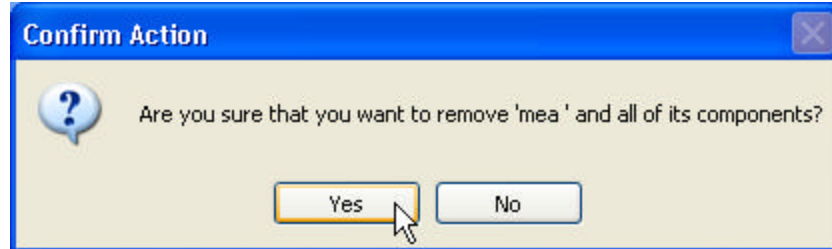


Figure 40. Confirm Action - Uninstall

3. The *Removing Programs From Your Computer* dialog box will be displayed while the MEA software is uninstalled as shown in [Figure 41](#). When the Uninstalling Software Process is complete, click on the **Close** button.

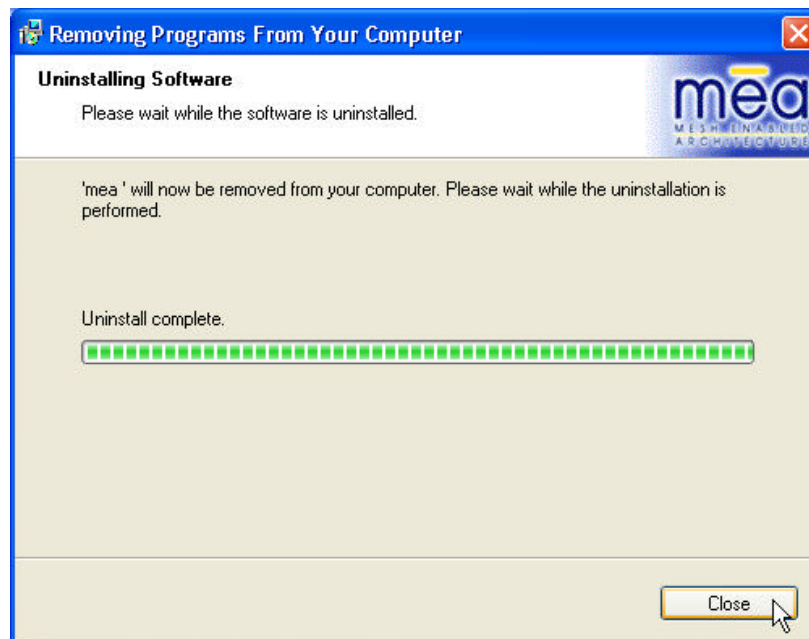


Figure 41. Removing Programs from Your Computer Dialog Box

Overview of MeshTray

MeshTray™

MeshTray is a status and configuration application that reports vital and statistical information about the MEA card. Because MeshTray is a “tray” application, it stays in the desktop system status tray when it is minimized as shown in the following figures.

CAUTION: Before starting MeshTray, you must have the MeshView application running to support many of the MeshTray features.

The MeshTray icon is dynamic and changes to indicate both the current mode of operation and the state of the wireless interface. As shown in [Figure 42](#) the MeshTray icon is depicting an inactive or disconnected state. The inactive state applies when a WMC6300 card is not inserted. The disconnected state applies if a card is inserted but is not yet associated with an IAP6300.



Inactive MeshTray Icon

Figure 42. Inactive MeshTray Icon

When the WMC6300 is associated with an IAP6300, the MeshTray icon displays the Link Quality to the associated IAP as color-coded bars as shown in [Figure 43](#). The greater the number of bars, the better the Link Quality.



Active MeshTray Icon

Figure 43. MeshTray Link Quality Indicator

The MeshTray icon shown in [Figure 44](#) indicates that the IP address has not yet been acquired from the DHCP server. When this happens, the IP field in the Status Tab displays a flashing or 0 IP (see [Figure 45](#)).



**MeshTray No IP
Address Acquired**

Figure 44. MeshTray No IP Address Acquired Icon

Starting MeshTray

During the software installation process, you can choose to place a MeshTray shortcut icon on the desktop.

To start the MeshTray application, double-click on the MeshTray icon or from the **Start** menu select **Programs** → **mea** → **MeshTray.exe**.

Clicking on the MeshTray icon in the system tray restores the application to a property sheet interface as shown in [Figure 44](#).

MeshTray Status Tab

When the utility is launched, MeshTray displays useful system information such as a description of the device, the MAC and IP address of the device, and the type of device (i.e., Subscriber Device). The Firmware version and build date are also displayed. The associated IAP MAC address and the link quality to that IAP are also displayed.

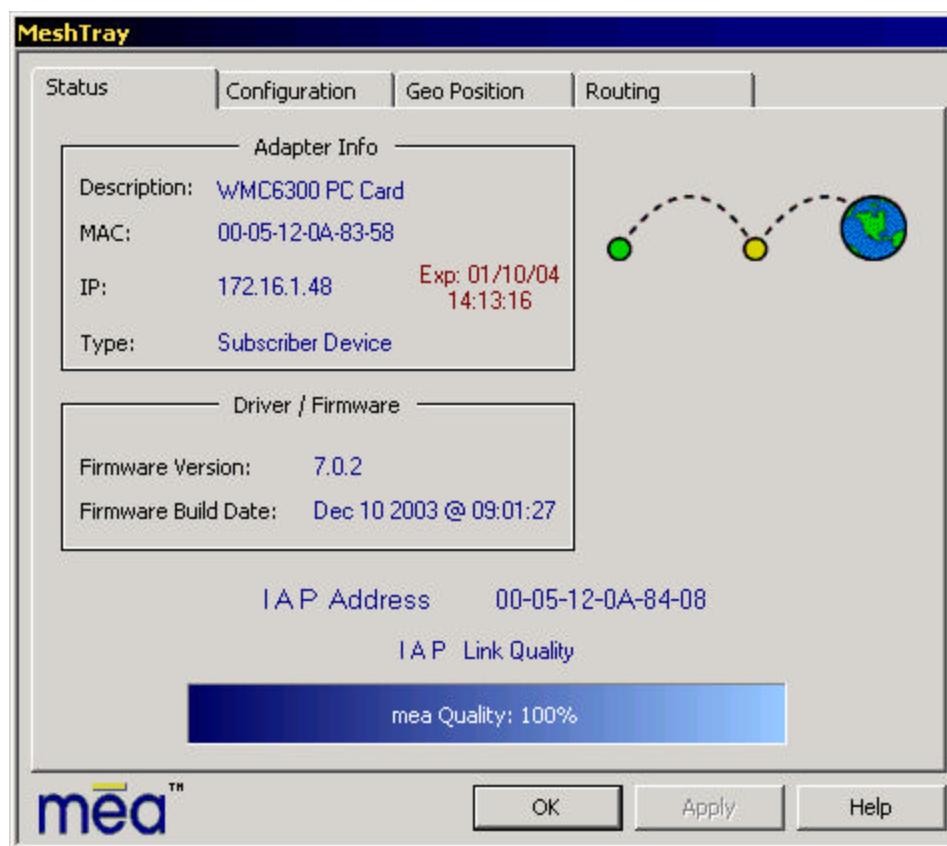


Figure 45. MeshTray Status Tab

MeshTray Configuration Tab

The Configuration Tab is used to set the parameters for Geo Mode and select the desired Priority Level and Addressing Scheme settings.

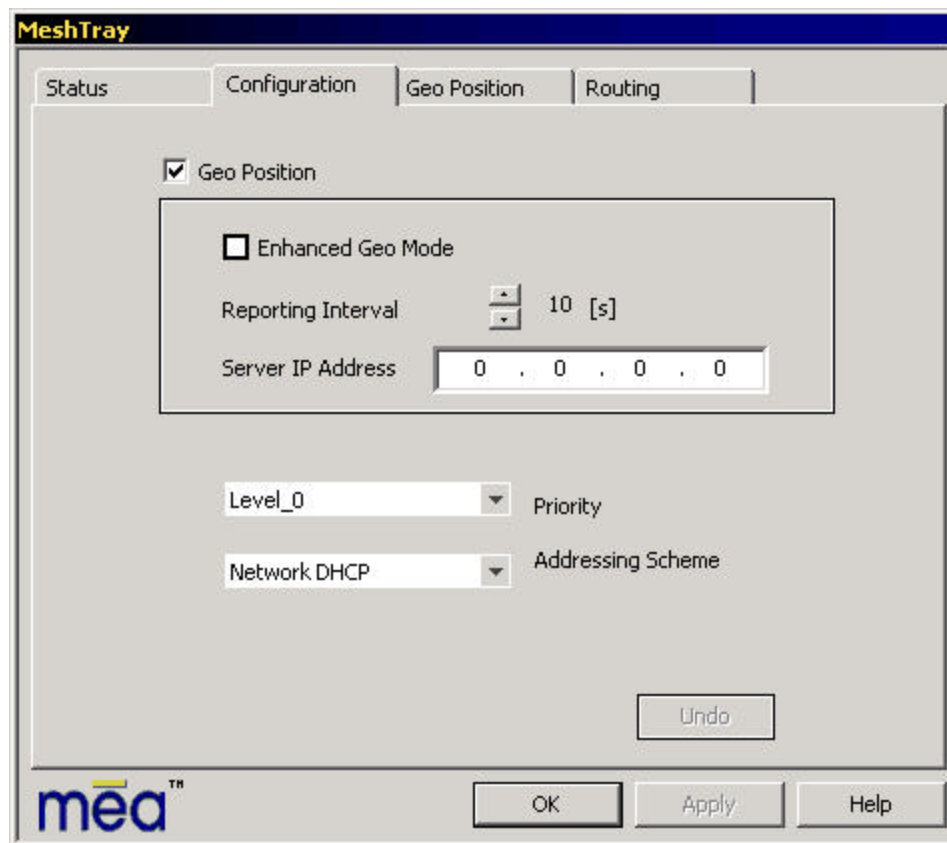


Figure 46. MeshTray Configuration Tab

Geo Position

If Geo-Position has been enabled on the WMC6300, the Geo-Position option will be selectable and the user may configure the reporting interval as shown in [Figure 46](#). Otherwise, the Geo-Position box will be grayed out.

Enhanced Geo Mode

If Enhanced Geo has been enabled on the WMC6300, an additional checkbox will appear to allow the user to select that mode.

Reporting Interval

If Enhanced Geo has been enabled on the WMC6300, the user will be able to set the reporting interval for updating the Geo-Position data for longitude and latitude or X, Y, Z positions for the Spherical Coordinate option to be displayed on the Geo-Position tab.

Server IP Address

The Server IP Address is the address where the geo position is forwarded or reported to. Typically, this is a centralized server that displays the position of all devices on the network.

User Priority Settings and Quality of Service Overview

Classification of Data Packets

The MEA system uses two methods to classify data packets in order to provide them the requested levels of service. The first is the use of the industry-standard Differentiated Services Code Point. The second is a proprietary system based on the assigned priority of the node's user.

Differentiated Services Code Point

The Differentiated Services Code Point (DSCP) is defined in RFC 2474 as a part of the Differentiated Services (DS, or "DiffServe") field. This field is defined for both the IPv4 and IPv6 headers. The DSCP is a dimensionless number used to index a particular class of traffic and, thereby, a particular transport behavior at each hop. These behaviors are known as Per-Hop Behaviors, or PHBs.

Some basic code points are defined in RFC 2474 for backwards compatibility with the overlapping "Precedence" field in the IPv4 header, known collectively as Class Selector Code Points. Extensions to these, called Assured Forwarding and Expedited Forwarding classes, are defined in RFCs 2597 and 2598. Other groups of code points are reserved for experimental or site-local use.

Most often, the indexed per-hop behaviors are described (and sometimes, implemented) simply in terms of queue prioritization of packets at each hop. However, the behaviors may incorporate other features such as traffic pruning to condition the traffic flowing from the node.

For example, voice packets may be assigned a DSCP tag indicating the need for low-latency service. The transport can then intelligently decide to discard stale packets or prioritize new packets to provide the lowest latency possible while, perhaps, sacrificing raw bandwidth or reliability when the demand exceeds capacity. High priority data transfers might be tagged to indicate the need for high reliability. The transport can use this knowledge to increase buffering or provide extra retries, perhaps increasing the stream's latency but serving the data reliably. Likewise, bulk data packets can be assigned "best effort" service so that the transport layer can intersperse them between packets needing lower latency or higher bandwidth.

The MEA system extracts the DS field from IP packets as they enter the wireless mesh, either at the access point or at the subscriber device. The DSCP classification then serves as one of the inputs for selecting an appropriate behavior in the transport mechanisms.

User Priority

The MEA QoS system also augments the standards-based DSCP traffic classification system with a proprietary feature to implement hierarchical service on a per-user basis. While DSCP can be used to classify the traffic by payload, the User Priority feature classifies traffic by the user that originated it, tagging packets with an assigned priority level. Using this tag, data packets from high priority nodes can be granted preferential service over packets from lower priority nodes.

The User Priority at each node is a managed variable with tight control granted to the network operator through the Device Manager utilities available in MeshManager. The user on the

WMC6300 node is free to select a priority level through applications using the MeshAPI software interface. However, the network operator through the Device Manager can put bounds on each node, limiting the node's user priority to a specific range or setting it to a specific value.

The User Priority feature also underpins a secondary feature known as Emergency Mode. The Emergency Mode feature is also accessed by applications using the MeshAPI and can be used to temporarily grant the user elevated priority for use in emergency situations. However, this ability can also be tightly managed and granted by the operator through the Device Manager as needed.

The current User Priority is assigned to every packet transmitted by the user of the node. This priority tag is preserved in each packet as it passes through the mesh until it reaches the final destination or the wired network

A packet's classification based on the current User Priority setting determines the latency, throughput, and reliability of the transmission of the packet, in both relative and absolute terms. For example, packets of one class may be provided relatively higher throughput in the presence of other lower-class packets, but may also have absolute time-to-live limitations, which will impact the reliability of delivery for packets in the class.

A WMC6300 host user's current priority and maximum allowed priority may be configured within a range of Low (priority level 0) to High (priority level 7).

This User Priority feature is unique to the MEA network and only exists between endpoints within the MEA network or between a MEA network node and the entry/exit node on the MEA network.

Nodes outside of the MEA Core LAN cannot request a particular priority for transmitted or received traffic. Any traffic into the MEA network needing prioritization must be prioritized at the entry access point or router. Any traffic out of the MEA network will lose its priority assignment at the exit.

Service Differentiation Mechanisms

The MEA wireless mesh network leverages intelligent and adaptive transport mechanisms in every node in the mesh, including subscriber devices, to provide QoS behaviors. At each hop, the DSCP and User Priority classifications serve as inputs to dictate transport behaviors using these mechanisms. In this way, the mesh nodes cooperate to provide appropriate transport service to packets, even across multiple hops through the mesh

IAP Support for Quality of Service

The IAP queues and shapes traffic as it is relayed into the wireless mesh from the wire, in accordance with the DSCP coding in each packet. As many deployment scenarios have the vast majority of packets entering the mesh at the access points, this mechanism is particularly effective for shaping the traffic in a manner that optimizes the use of bandwidth at what is the main point of contention on most networks.

The IAP provides pre-determined QoS levels to its data traffic. Applications sending data that need prioritized traffic may be configured to set the TOS values in the IP packets at the source/destination devices. IAP support for QoS also provides equal fairness to all traffic within the same precedence class (TOS). Enabling QoS support on an IAP slightly increases priority of best effort UDP traffic over the TCP traffic.

The entries in the table below show the minimum guaranteed bandwidth to traffic at various precedence levels. In the absence of traffic at any class, the bandwidth will be distributed amongst other classes, insuring that no bandwidth is wasted.

IP Precedence	% Bandwidth
14	25 %
12	18 %
10	14 %
8	14 %
6	9 %
4	8 %
2	7 %
0	5 %

Priority Levels for Local Nodes

The User Priority service can be provisioned on a per node basis for use with tiered service and emergency access systems. This priority feature is unique to the MEA network and only exists between endpoints within the MEA network or between a MEA network node and the entry/exit node on the MEA network.

Nodes outside of the MEA Core LAN cannot request a particular priority for transmitted or received traffic. Any traffic into the MEA network needing prioritization must be prioritized at the entry access point or router. Any traffic out of the MEA network will lose its priority assignment at the exit.

MEA wireless traffic will carry priorities attached to each packet. The MeshAPI can be used to tune the default priority of the local node.

The available priority settings are assigned with the Priority Drop-Down box shown in [Figure 46](#).

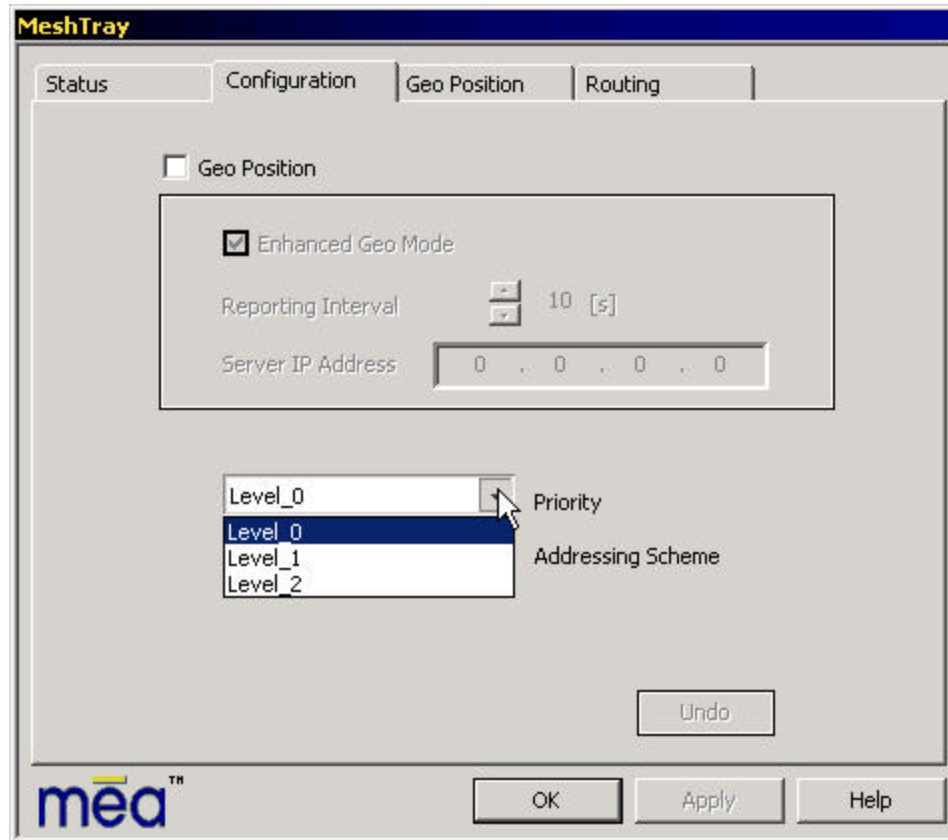


Figure 47. MeshTray Configuration Tab Priority Settings

Setting the Priority Level for the WMC6300

Use the Priority drop-down box to select the desired priority level (Level_0 to Level_7) for the address that will be assigned to the WMC6300. You should consult with your network administrator to determine the overall priority scheme that is currently being observed for your network application and the proper setting to be assigned to your device.

There is also an optional Emergency mode for use by special applications. The priority for use in emergency mode is separately provisioned and must be explicitly enabled per node by the network operator.

Addressing Scheme for Unified Modes of Operation

With MEA Release 3.0, the concept of modes has been replaced by a Unified Modes of operation addressing scheme. The concept of unified modes of operation centers on the current state of network communication: Associated State and Unassociated State. There are three addressing schemes which allow the IT manager increased flexibility in deployment.

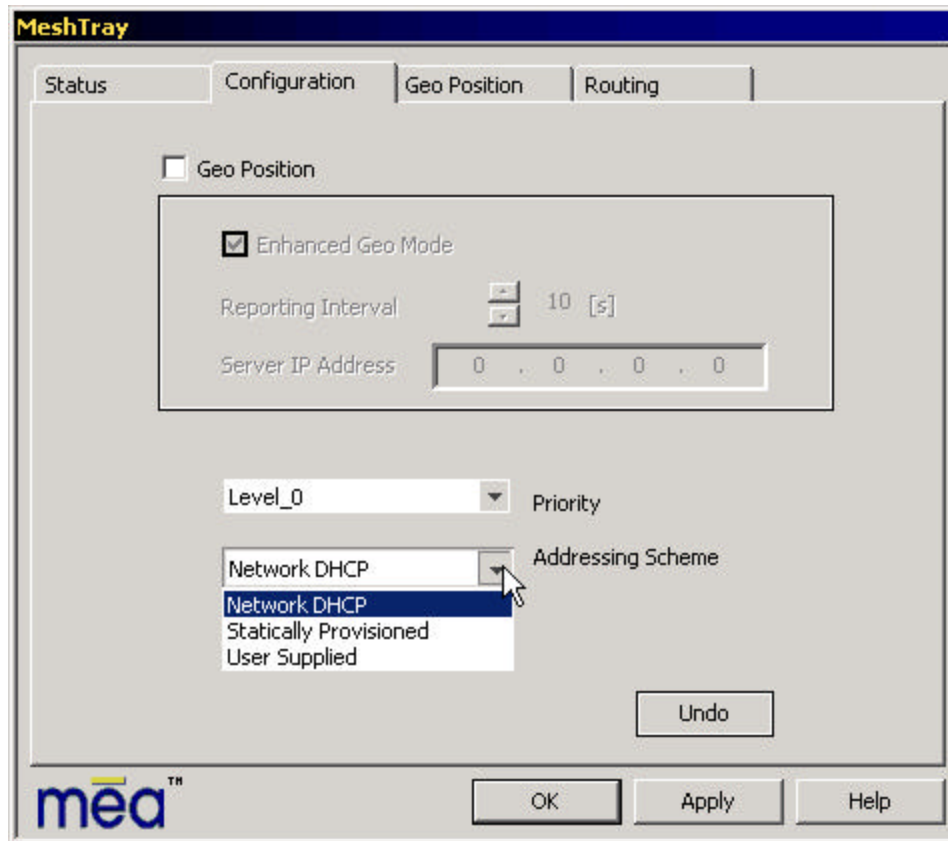


Figure 48. MeshTray Configuration Tab Addressing Scheme

Network DHCP Scheme

Operation under the Network DHCP scheme is similar to that of Release 2 in Infrastructure Mode. The primary difference is users are now allowed to temporarily wander outside of the network infrastructure without losing connectivity.

Network DHCP requires that the user's host device be configured to request an address from a DHCP server and the inclusion of a DHCP server in the core network configuration to answer these requests. With Network DHCP selected, the network device will forward any DHCP requests to the core network once it becomes associated and establishes communications with the infrastructure.

The server may be configured by the operator to hand out temporary or static leases. The user must associate and acquire an address from the network before establishing communications. Once a lease has been granted, the address may be dragged out of network coverage for the remainder of the lease or, if a static lease was granted, until the next power cycle. If the lease expires or the user cycles power while outside of network coverage, the user will again lose the ability to communicate.

This scheme is best for a larger, closely managed network of subscribers who don't need to communicate or communicate only briefly outside of network coverage.

Statically Provisioned Scheme

Operation under the Statically Provisioned scheme is similar to that of Release 2 in Peer-to-Peer Mode. The primary difference is that addresses are configured by the network operator rather than hashed from the MAC address. This serves to eliminate the 10.x.x.x limitation on the network range.

When operating under the Statically Provisioned scheme, the network device will accept DHCP requests from the user's host and internally generate responses to grant the host an IP address and assign any other provisioned options.

This scheme requires that the host be configured to request an address from a DHCP server but does not require a DHCP server on the core network.

It should be noted that a DHCP server can still exist on the network to hand out addresses to other nodes using the Network DHCP Scheme as long as the server's address range does not conflict with addresses assigned to devices using the Statically Provisioned or User Supplied Schemes.

The granted IP addresses granted by the server and options are configurable per-device using MeshManager. The internally generated DHCP messages will assign the host a static lease to the provisioned address, which may be freely used to communicate while associated or unassociated.

The operator must ensure that the provisioned addresses are routable and do not conflict with any other addresses in use. The operator is free to provision any option ordinarily provisioned by a DHCP server (subnet mask, DNS, etc.) through programming of the appropriate fields in each device using MeshManager.

This scheme is ideal for a managed network of users who regularly need to communicate inside and outside of network coverage or for a network lacking a DHCP server.

User Supplied Scheme

Operating under the *User Supplied* scheme, the user's host device is configured to use a *fixed* IP address and subnet mask. The user is responsible for configuring options that would otherwise be configured by a DHCP server.

It is also up to the user to ensure that the assigned address is routable on the core network (if core network access is needed) and that it does not conflict with other addresses in use. This is analogous to and carries the same caveats as plugging an Ethernet card into a LAN and manually assigning an address to the card.

The user is free to communicate while associated or unassociated. This scheme is ideal for small, unmanaged networks lacking a DHCP server.

All of these schemes may be assigned per device, either by the user or by the network manager. The network manager can also limit the user-selectable schemes or force a specific scheme. Devices in each of these schemes can interoperate and communicate with each other, so long as the assigned addresses do not conflict and are mutually routable.

Setting the User Supplied IP Address

To setup the addressing for the User Supplied Scheme, first obtain a valid IP address from your Network Administrator. This is the IP address to be entered in the IP Address box on the Internet Protocol (TCP/IP) Properties dialog General tab.

MeshNetworks

From the **Start** menu, select **Settings** → **Control Panel**. Double click on the Network and Dial-up Connections icon.



Figure 49. Control Panel – Network and Dial-up Connections Icon

The *Network and Dial-up Connections* window will be displayed. Double click on the *Local Area Connection* icon.

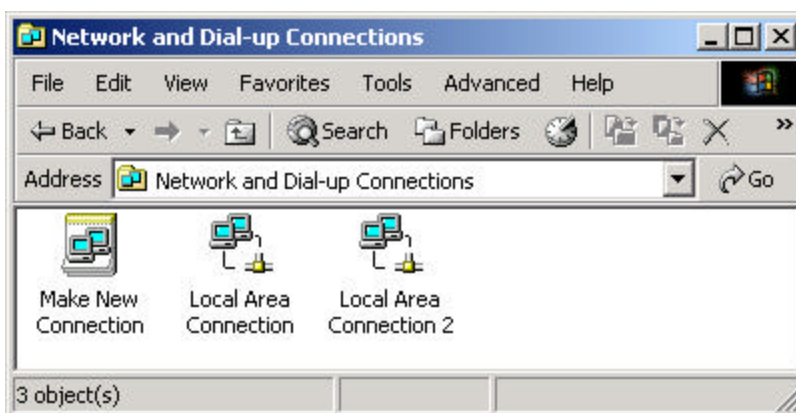


Figure 50. Network and Dial-up Connections Window

On the *Local Area Connection Properties* dialog, click to select *Internet Protocol (TCP/IP)* then click on the **Properties** button.

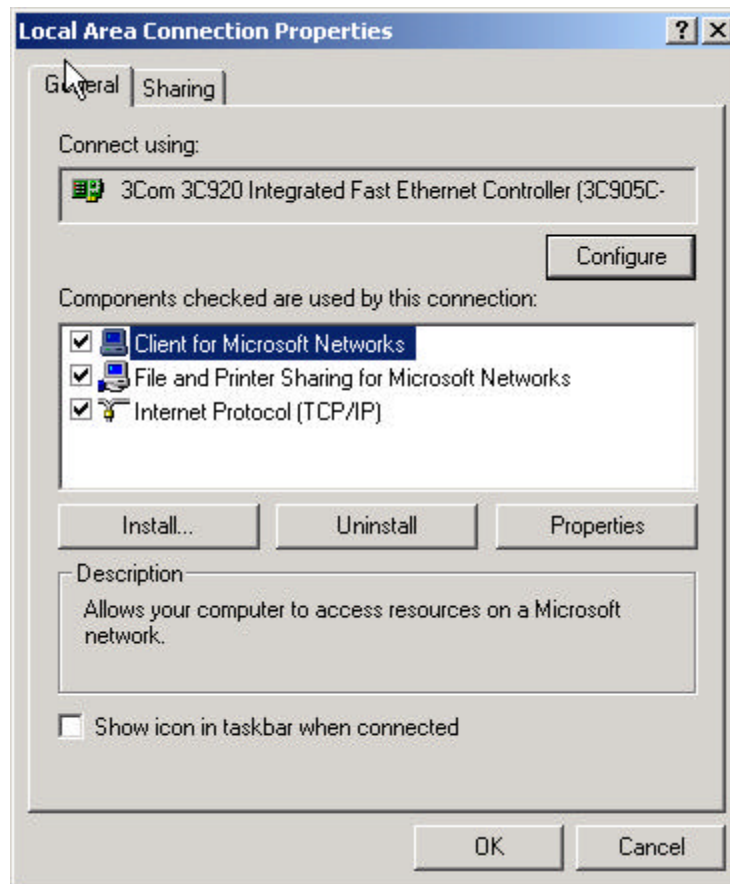


Figure 51. Local Area Connection Properties Dialog Box

The *Internet Protocol (TCP/IP) Properties* dialog box will be displayed.

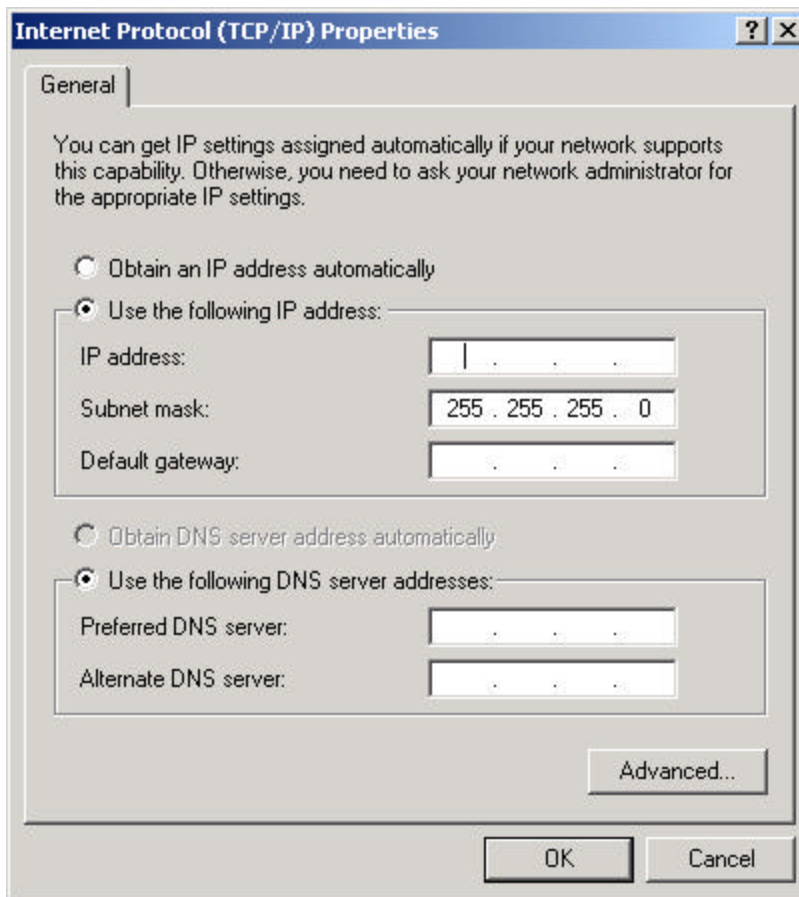


Figure 52. Internet Protocol (TCP/IP) Properties Dialog Box

With the *Use the following IP address:* radio button selected, enter the IP address supplied by the Network Administrator in the *IP Address:* box. Double click in the *Subnet Mask:* box to set the default subnet mask. The *Default gateway:* and the DNS server addresses should have already been set by the Network Administrator. Click on the **OK** button to accept the changes and dismiss the dialog box. Click the **OK** button to dismiss the Local Area Connection Properties dialog and the **Close** button to dismiss the Local Area Connections window.

MeshTray Geo-Position Tab (Optional)

If your WMC6300 has been licensed for Geo-Location, an optional tab will be displayed in MeshTray as shown in [Figure 53](#). This tab will display the user's location via longitude, latitude, and altitude.

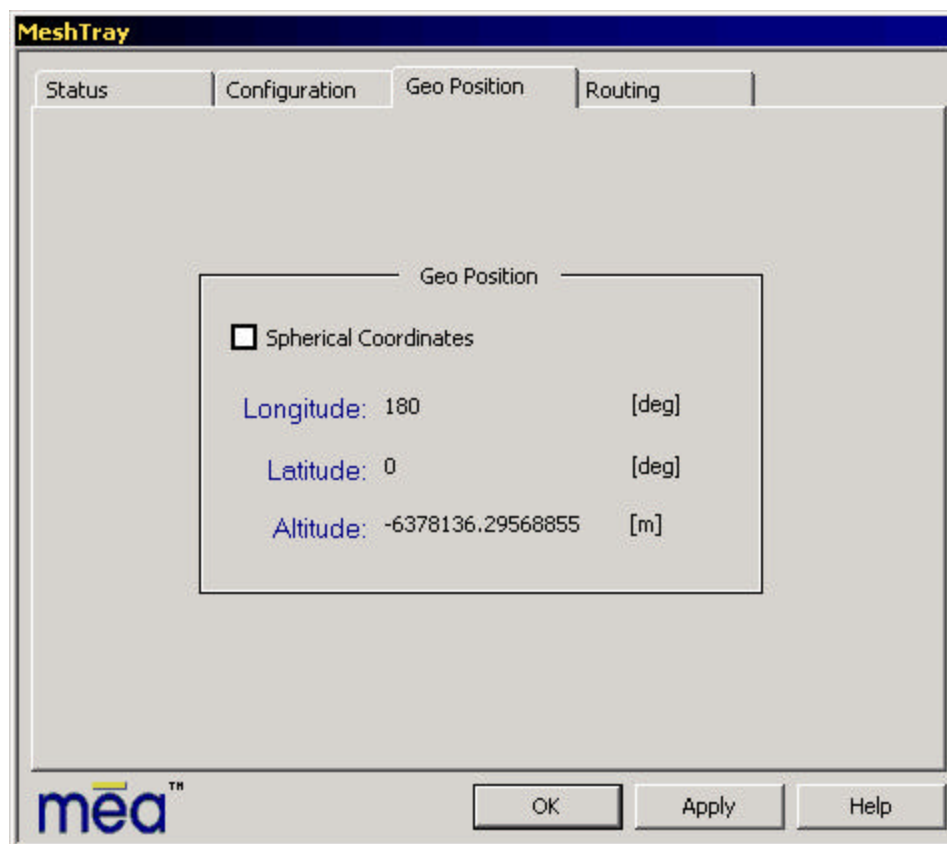


Figure 53. MeshTray Geo Position Tab

Optionally, the user may select to have the location reported in spherical coordinates, which will be displayed as shown in [Figure 54](#).

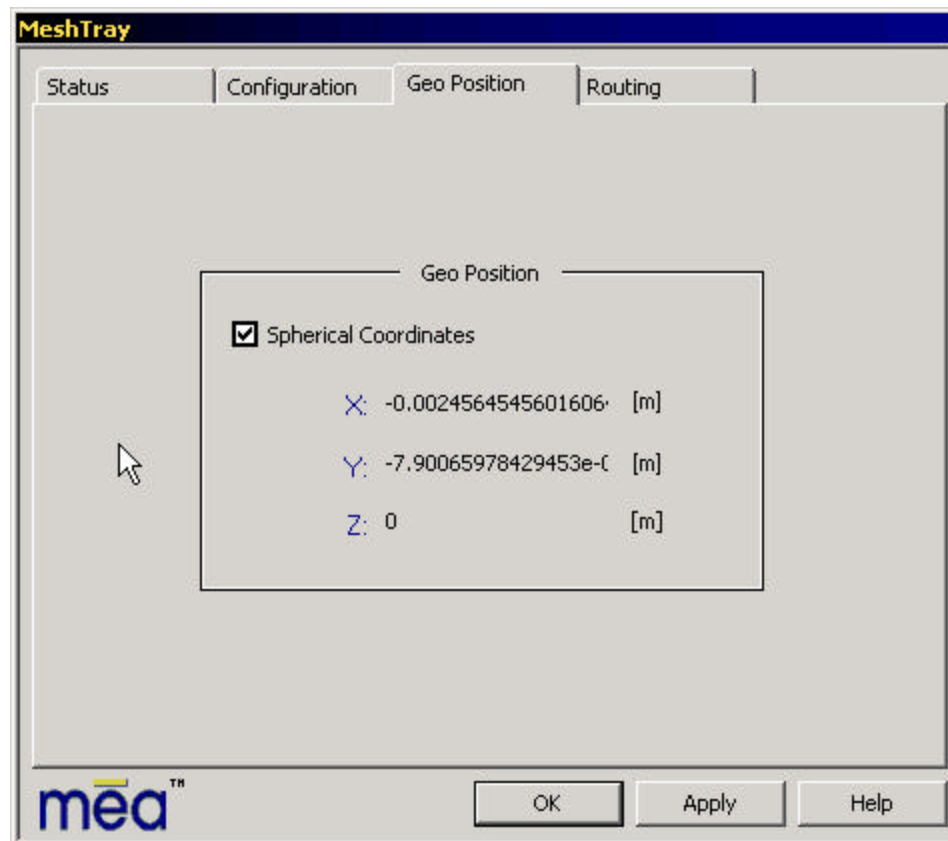


Figure 54. MeshTray Geo Position Spherical Coordinates

MeshTray Routing Tab (Optional)

If your WMC6300 has been licensed to display routing information, an optional tab will be displayed in MeshTray as shown in [Figure 54](#). The Routing Table displays the end nodes that the WMC6300 is currently in communication with. The Neighbor Table displays the adjacent nodes that the WMC6300 may route through, depending on the desired end node.

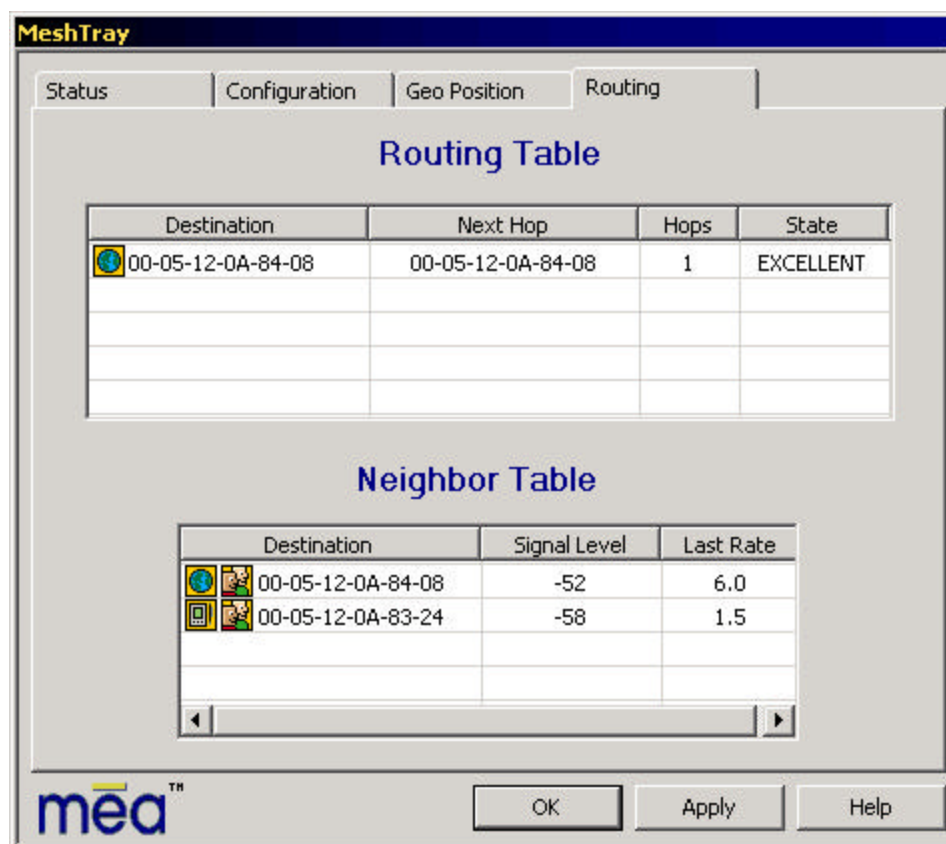


Figure 55. MeshTray Routing Tab

The Last Rate column displays the last data rate used to transmit user data to the neighbor destination. If no user data has been sent to the neighbor destination, a data rate of 1.5 is displayed by default.

Routing Icons

Icon



Root

Description

The Root icon represents the device being monitored. The graphical representation of the network topology is drawn from this device's perspective. All links radiate out from the Root.



Unknown

The Unknown icon is a MEA device in the network that is being used to provide a route to another wireless device in the network.



Subscriber Device (SD)

The Computer icon represents a Subscriber Device using a MEA WMC6300 Wireless Modem Card in the network.



Wireless Router

The Arrow icon represents a MWR6300 Wireless Router in the MEA network. The MWR6300 is an infrastructure device dedicated to routing data.



IAP

The Globe icons represent an IAP6300 Intelligent Access Point in the MEA network. A MEA IAP6300 Intelligent Access Point is an infrastructure device that allows access to the wired network.



Enhanced Router

Wireless

The Enhanced Wireless Router (EWR) icon represents either an EWR or a PWR. An EWR/PWR is not a locally attached device and therefore cannot be viewed directly by MeshView. However, MeshView can connect to an EWR/PWR remotely to display its network topology. This functionality requires a remote server to be running on the EWR.



Vehicle Modem

Mounted

The Vehicle Mounted Modem (VMM) icon represents a wireless modem that has been designed for permanent in-vehicle mounting. A VMM is not a locally attached device and therefore cannot be viewed directly by MeshView. However, MeshView can connect to a VMM remotely to display its network topology. This functionality requires a remote server to be running on the VMM.

Terminating MeshTray

If desired, the MeshTray application may be terminated by positioning the cursor over the MeshTray icon that is located in the system status bar. Then, right-click on the MeshTray icon and select “Exit” as shown in [Figure 56](#). The task is terminated and the icon is removed until the application is started again from the Start menu.

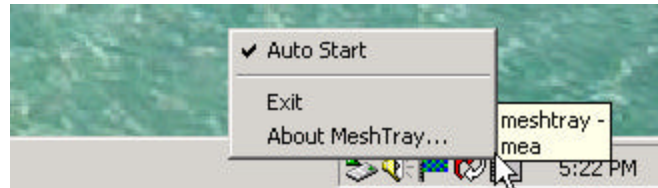


Figure 56. Exit MeshTray

Troubleshooting Using MeshAPI

When MeshTray is running, MeshAPI reports its status to the system application Event Log. To view your system Event Log: right-click on the Windows **My Computer** icon and select Manage.

Choose *EventViewer*→*Application*. Look for the MeshAPI entries under the *Source* column.

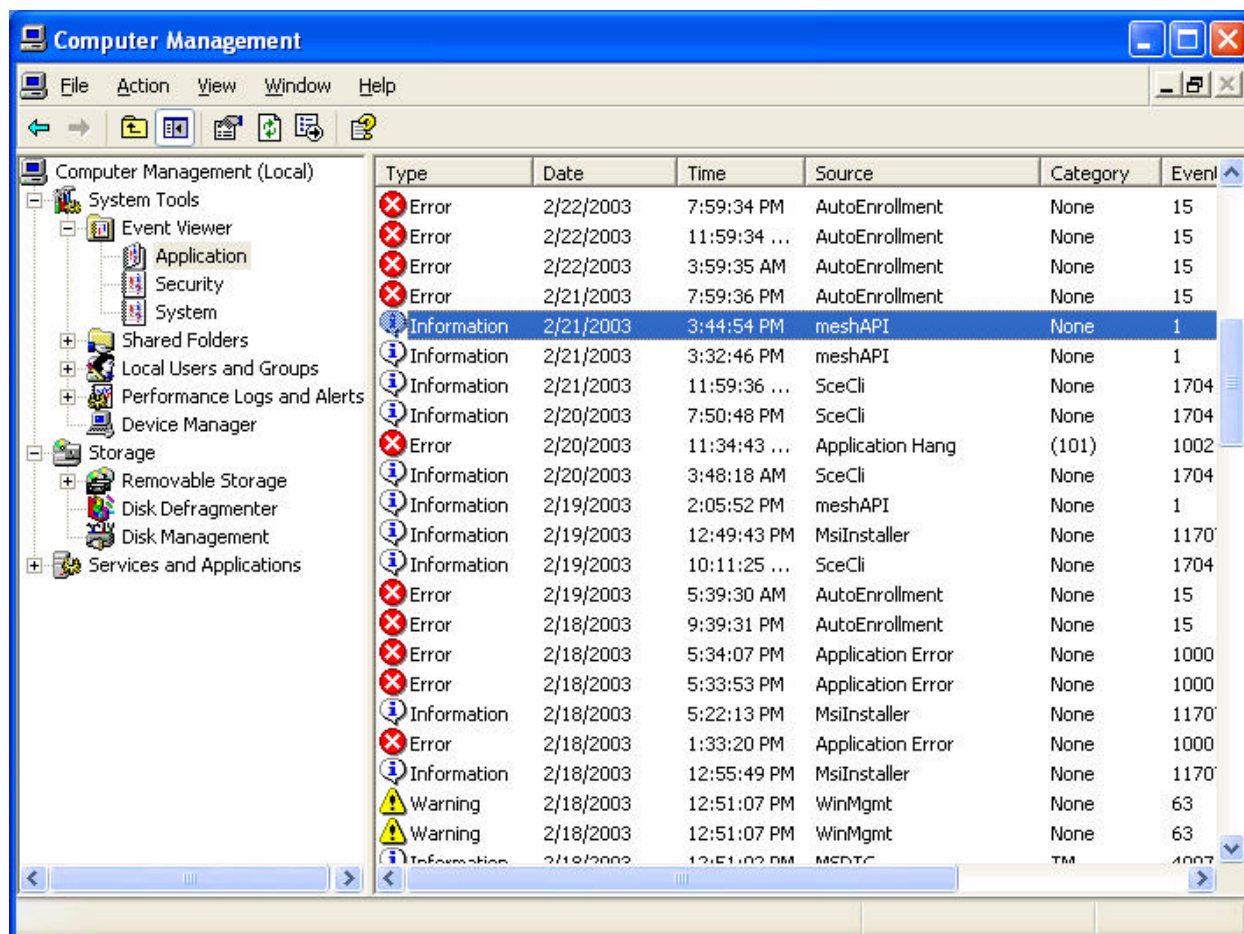


Figure 57. Using EventViewer To Troubleshoot MeshAPI

Customer Service Information

If you have read this document and made every effort to resolve installation or operation issues yourself and still require help, please contact MeshNetworks Customer Support using the following information:

MeshNetworks, Inc.
Attention: Customer Support
PO Box 948133
Maitland, Florida 32794-8133

Hours of Operation
Monday through Friday 8:00 AM – 5:00 PM (Eastern Standard Time)

Technical Support: **(407) 659 – 5300**
Toll Free in U.S. **(800) 311 – 3365**
e-mail measupport@meshnetworks.com

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- 5.6 Transfer any of your rights in the Licensed Software or the Documentation to another party;
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 - 6.2.b THE FUNCTIONS OR FEATURES OF THE LICENSED SOFTWARE WILL MEET YOUR REQUIREMENTS, OR THAT THE LICENSED SOFTWARE WILL OPERATE IN THE

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13 EXPORT CONTROLS. This Agreement is subject to the laws, regulations, orders, and decrees of the United States that may be imposed from time to time restricting the import/export of the Products to/from the United States. You will not export or re-export the Licensed Software, or any part of the Licensed Software, directly or indirectly, prohibited by or in violation of the laws, rules or regulations of the United States or any applicable jurisdiction. Nor will You export or re-export the Licensed Software, or any part of the Licensed Software, directly or indirectly without first obtaining the required permission to do so from the applicable governmental agencies.

14 COMPLIANCE WITH LICENSES. You agree that upon request from MeshNetworks or the Source, You will within fifteen (15) days fully document and certify in writing that use of any and all Licensed Software at the time of the request is in conformity with this Agreement or some other valid license from MeshNetworks.

15 MISCELLANEOUS. This Agreement is governed by the laws of the state of Florida, United States of America. The state or federal courts located in or having jurisdiction over Orlando, Florida, United States of America will have exclusive jurisdiction over all matters pertaining to this Agreement. If any term or condition of this Agreement is or will become invalid or unenforceable, then such part will be ineffective to the extent of such invalidity only, without affecting this Agreement's remaining provisions. Those rights and obligation, which by their nature are intended to survive the expiration or termination of this Agreement, will survive. The remedies at law of either party in the event of default or impending default by the other party in the performance of any terms of this Agreement will not be adequate, and such terms may be specifically enforced by a decree for specific performance, injunction or other appropriate equitable relief. The failure of MeshNetworks to enforce at any time any provision of this Agreement will in no way be construed to be a present or future waiver of such provision, nor will it affect MeshNetworks ability to enforce any provisions of this Agreement. This Agreement is the entire agreement between the parties with respect to the subject matter set forth herein and supersedes all prior oral written agreements between the parties with respect thereto and may only be amended in writing by the parties.

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 Radiation Exposure Statement

1. **CAUTION:** This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.
2. 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.

Safety Information for the MEA WMC6300

The Federal Communications Commission (FCC) with its action in ET Docket 96-8 has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC certified equipment. MeshNetworks' MEA products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper operation of this radio according to the instructions found in this manual and the hardware and software guides on the MEA CD will result in user exposure that is substantially below the FCC recommended limits.

- Do not touch or move the antenna(s) while the unit is transmitting or receiving.
- Do not hold any component containing a radio such that the antenna is very close to or touching any exposed parts of the body, especially the face or eyes, while transmitting.
- Do not operate a portable transmitter near unshielded blasting caps or in an explosive environment unless it is a type especially qualified for such use.
- Do not operate the radio or attempt to transmit data unless the antenna is connected; otherwise, the radio may be damaged.

WARNING

Use the antenna supplied by MeshNetworks.
Use of other antennas is prohibited and may violate 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.

Safety Certification



3041788

- Conforms to UL STD ANSI/UL 60950 3rd Edition
- Certified to CAN/CSA C22.2 NO. 60950-00
- Equipment shall be suitable for use in Air pressure: 86kPa to 106kPa

CE Mark Certification

The **CE mark** is the official marking required by the European Community for all Electric and Electronic equipment that will be sold, or put into service for the first time, anywhere in the European community. It proves to the buyer or user that this product fulfills all essential safety and environmental requirements as they are defined in the European Directives.

MeshNetworks Products are covered under the following product certification Europe:

ETSI EN 300 328 V 141 (2003-04)

Products covered - IAP6300, EWR6300, WMC6300, and MWR6300

ETSI EN 301 489-1 (2002-08) and 301 489-17

Products covered - IAP6300, EWR6300, WMC6300, and MWR6300

EN 55022:1998 and EN 55024:1998

Products covered - IAP6300, EWR6300, WMC6300, and MWR6300

CENELEC EN 50360 and EN50371 – Specific Absorption Test - SAR

Products covered - WMC6300

The following countries are currently covered under the CE Mark:

Austria, Belgium, Denmark, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK

CE Marking on the product will grant access to the European Economic Area (EEA). Some countries may require a declaration of conformity, please check with your MeshNetworks sales team for details.

The following is an example of the CE Marking on a product label:



The alert symbol indicates that MeshNetwork's products are **not** certified to operate in France. Outdoor use in France is restricted to 10mW EIRP for band 2454 - 2483.5 MHz.