AR 400 Reader
User's Manual

Published: June 21, 2004
Part Number: 110003-001

Notices

Trademarks

Statement of Rights

Contents

Section 1. Introduction

This *AR 400 Reader User's Manual*, designed for end-users of a Matrics Radio Frequency Identification (RFID) System, describes the Matrics AR 400 Reader (Model Number: AR-400-US) and how to install, configure, and use it.

Document Conventions

The following conventions are used in this *User's Manual*:

CONVENTION	DESCRIPTION
1. Numbered list	Provides step-by-step procedures for performing an action
Bulleted list	Provides grouped information, not procedural steps

Acronyms and Abbreviations

The following acronyms and abbreviations are used in this *User's Manual*:

ACRONYM	DEFINITION
IC	Integrated Circuit
MVM	Matrics Visibility Manager
OOK	On Off Keyed
RFID	Radio Frequency Identification
TBD	To Be Determined

References

For additional information, refer to the following documentation:

Matrics API Programmer's Manual (PN: 110009-001)

Disclaimer

While Matrics has committed its best efforts to providing accurate information and timely updates to this *User's Manual*, we assume no responsibility for any inaccuracies that may be contained herein, and we reserve the right to make changes to this *User's Manual* without notice.

Section 2. System Description

Matrics develops and markets Radio Frequency Identification (RFID) solutions that are effective and affordable by offering a combination of low cost, long read range, and a very high read rate unmatched by other RFID systems. A Matrics RFID System gives you real-time, end-to-end visibility of products and assets in your factory, distribution center, retail outlet, or other facility. A typical Matrics RFID system consists of these main components:

Silicon-based **RFID tags** that can be attached to vehicles, trailers, containers, pallets, boxes, etc., to create a "people-free" wireless environment for tracking assets; and

Reader network components (readers, antennas, cables, connectors, power supplies, etc.) that power and communicate with the tags.

Product Description

The Matrics **AR 400 Reader** is a true multi-protocol reader providing real-time, seamless tag processing for all EPC-compliant tags: Class 0 (Read), Class 0+ (Read/Write), and Class 1 (Read/Write). This operational flexibility is useful in protecting customers' RFID infrastructure investment.

The AR 400 is architected to be an intelligent reader. It provides a rich feature set for tag management such as tag filtering, reconciliation, user defined association and selective visibility. The AR 400 also provides timely and pertinent information to customers' Network Management platform by real-time reporting of events and status using SNMP. To address security concerns, it provides security and privilege controls and full traceability of operator actions.

The AR 400 is a ready-to-connect network element that provides a variety of options for connecting to customers' corporate networks via Ethernet or Serial connections and wirelessly via 802.11. A configuration Setup Wizard makes commissioning tags extremely easy.

All these new capabilities further enhance Matrics' industry-leading performance. With improved dynamic range, AR 400 remains Best-in-Class in RF performance with a typical read range in excess of 25 feet. Matrics' patented contention-free protocol to communicate with tags provides unmatched read rates of up to 1,000 tags per second for Class 0/0+ tags. Using advanced digital signal processing techniques, the AR 400 allows superior interference management to operate in noisy environments.

Other key features include:

Up to four (4) individually addressable antennas (read points), reducing cost per read point;
Allows read point grouping;
Local tag buffering;
Tag filtering;
Ad-hoc tag querying;
Event notification and real-time reporting; and
Trusted host security and Access Control.

Section 3. Specifications and Diagrams

AR-400-US Reader Specification

CHARACTERISTIC	DESCRIPTION	
Physical		
Dimensions	Height 8.75" x Width 11.75" x Depth 2"	
Weight	~ 6 pounds	
Base Material(s)	Aluminum, Silver; Die-cast	
Visual Status Indicators	LEDs for Power (Green), Activity (Yellow) and Error (Red)	
Connectivity		
Network	RS422/485 10BaseT Ethernet RS232 Console (Management) Control I/O Port (6) (User programmable)	RJ45 RJ45 DB9 DB15
RF Connectors	1.0/2.3 DIN Jack	
Read Points (Channels)	4 (4 Transmit and 4 Receive) 2 or more can be combined into one logical read point	
Power Supply	+24vDC @ 1.2 amps	
Environmental		
Environmental Sealing	IEC 529 IP54	
Temperature	IEC 60068-2-1/2/14	Operational: 0° to +55° C (+32° to +131° F) Storage: -20° to +70° C (-4° to +158° F)
Humidity	IEC 60068-30/56	5-95% Non-condensing
Vibration	IEC 60068-2-6	
Compliance		
Safety	EMI/RF Emissions	
Regulatory	Region 1, FCC Part 15	
Operational Features		
Frequency	UHF band, 902-928 MHz	
Method	Frequency Hopping Spread Spectrum (FHSS)	
Power Output	Up to 30 dBm (only 1 Watt Part 15)	
Air Link Protocol	EPCglobal: Class 0, Class 0+ and Class 1	
Tag Communication	Interleaved	
Tag Buffering	Local	
Synchronization	Network Time Protocol	
IP Addressing	Static and Dynamic	
Host Interface Protocols	XML and Byte Stream	
Network Management		
Protocol	SNMP	
Configuration	Via Setup Wizard	
Event Management	Auto Reported Events User Controlled Thresholds, Damping and Filtering	
Administrative Management	Security/Privilege Controls, Change Traceability	
Tag Management	ID-based Selection Ability User-defined Association to Tag IDs Taglist Management Features for Reconciliation and Visibility	

AR-400-US Reader Diagrams

Top View

Side View

AR 400 Reader User's Manual © 2003-2004 Matrics, Inc.

LEDs and Connectors

ITEM	DESCRIPTION
RJ45 Connector	10BaseT Ethernet
DB9 Connector	RS232 Console (Management)
DB15 Connector	Control I/O Port (6)
RS422/RS485 Connector	Connect to host PC and bus power.
Power/Link LED	LED is **green** when the Reader is powered on and linked to the host PC.
Error LED	LED is **red** when commands are incorrectly received from the host PC.
Read LED	LED is **yellow** when commands are correctly received from the host PC.
+24vDC 1.2A Connector (Unit Power)	The power supply should be plugged into a wall outlet and into the DC power connector (2.1mm jack.)
Antenna Connectors	Connect to external antennas (4 Transmit and 4 Receive.)

Interface Pin-Outs

I/O Interface

15-pin Female D-sub Connector:
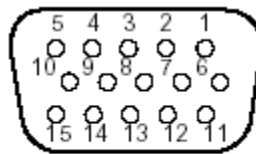
(view from back of unit)

PIN: FUNCTION	PIN: FUNCTION	PIN: FUNCTION
1: Ground	6: In2	11: Out1
2: Out4	7: In0	12: In5
3: Out2	8: Ground	13: In3
4: Out0	9: Out5	14: In1
5: In4	10: Out3	15: Vcc +5V power supply

PARAMETER	MIN.	TYPICAL	MAX.	UNIT
Inx VIL			0.8	V
Inx VIH	2.0			V
Outx VOL			0.55	V
Outx VOH	3.7			V
Outx IOL			24	mA
Outx IOH			-24	mA
Vcc	4.5		5.5	V
Vcc Imax			100	mA

Ethernet Interface

Modular Jack RJ45:
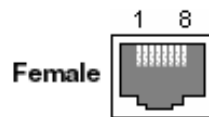
PIN: FUNCTION	PIN: FUNCTION	PIN: FUNCTION
1: TD+	4: Common	7: Common
2: TD-	5: Common	8: Common
3: RD+	6: RD-	

RS422/485 Interface

Modular Jack RJ45:
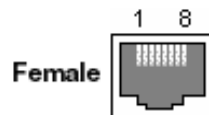
PIN: FUNCTION	PIN: FUNCTION	PIN: FUNCTION
1: Tx+	4: NC	7: Rx-
2: Tx-	5: NC	8: Rx+
3: Ground	6: Ground	

RS232 Interface

9-pin Female D-sub Connector:
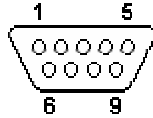
PIN: FUNCTION	PIN: FUNCTION	PIN: FUNCTION
1: NC	4: NC	7: NC
2: Tx	5: Ground	8: NC
3: Rx	6: NC	9: NC

Power Supply

PWR JACK 2.1X5.5MM:

ITEM	DESCRIPTION
Rating	24vDC @ 1.2A
Contact Resistance	30m OHMS Max
Insulation Resistance	50m OHMS Min: 100vDC
Voltage Withstand	250v AC R.M.S. for 1 minute
Life	5,000 cycles
Pin Assignments	Center Pin: Ground Outer Pin: Vcc Imax:

PCMCIA Interface

PC Card Internal Slot, PCMCIA header 68-pin:

PIN: FUNCTION	PIN: FUNCTION	PIN: FUNCTION
1: Ground	24: PA5	47: N/C
2: PD3	25: PA4	48: N/C
3: PD4	26: PA3	49: N/C
4: PD5	27: PA2	50: N/C
5: PD6	28: PA1	51: VCC
6: PD7	29: PA0	52: VPP2
7: CE1#	30: PD0	53: N/C
8: PA10	31: PD1	54: N/C
9: OE#	32: PD2	55: N/C
10: N/C	33: IOIS16#	56: N/C
11: PA9	34: Ground	57: VS2#
12: PA8	35: Ground	58: RESET
13: N/C	36: CD1#	59: WAIT#
14: N/C	37: PD11	60: INPACK#
15: WE#	38: PD12	61: REG#
16: IREQ#	39: PD13	62: SPKR#
17: VCC	40: PD14	63: N/C
18: VPP1	41: PD15	64: PD8
19: N/C	42: CE2#	65: PD9
20: N/C	43: VS1#	66: PD10
21: N/C	44: IORD#	67: CD2#
22: PA7	45: IOWR#	68: Ground
23: PA6	46: N/C	

Section 4. Installing the Reader

The instructions provided in this section describe a generic installation of the AR 400 Reader. Depending upon your application, your installation steps may vary. Contact Matrics (refer to the "Contact Us" section in this *User's Manual*) if you need further assistance for a customized installation.

Follow the steps listed below (and detailed in the following sections) to install and test your AR 400 Reader:

1. Check that you have all of the items you need before you proceed with your Reader installation (refer to the "Getting Started" section below.)
2. Mount the Reader in a location chosen for optimal surveillance.
3. Connect antenna(s) to the Reader.
4. Connect the Reader to your host computer.
5. Power on the Reader.
6. Verify that your Reader installation is operational.

Getting Started

Before you proceed with your Reader installation, check that you have all of the items you need. Contact Matrics (refer to the "Contact Us" section in this *User's Manual*) if any of the parts listed in this section are missing from your Reader package, or any of the items you received are damaged.

> **NOTE:** You should use ONLY those parts provided in your Reader package or specifically recommended by Matrics. Do not substitute any other cables, etc., since doing so may degrade your system's performance, damage your Reader, and void your warranty.

In addition to this *User's Manual*, you should have received the following items in your package:

MODEL NUMBER (MN)	PART NUMBER (PN)	QTY.	DESCRIPTION
AR-400-US	250009-001	1	AR 400 Reader
	201529-001	1	24vDC Power Supply

In addition, you will need:

Four (4) screws for mounting the Reader, and
Several wire ties to secure any extra lengths of cable.

Mount the Reader

Before mounting the Reader, you must select a location for it. For best results, consider the following when determining the optimal placement for your Reader:

☑ Mount the Reader indoors, in operating range, and out of direct sunlight, high moisture, or extreme temperatures.

☑ Mount the Reader in an area free from electromagnetic interference. Such sources of interference may include: generators, pumps, converters, non-interruptible power supplies, AC switching relays, light dimmers, computer CRT terminals, etc.

☑ Mount the Reader within 15 feet of your antennas (antenna connector cables from Matrics are 15-feet long.)

☑ Make sure the local power supply cord, when attached to the Reader, can reach the power source outlet.

☑ Do not mount the Reader within 12 inches of a computer CRT terminal.

☑ Make sure that you will be mounting the Reader onto a permanent fixture (wall or shelf) where it won't get disturbed, bumped, or damaged. Keep in mind that you will need five (5) inches of clearance on all sides of the Reader.

> **WARNING:** The antenna must be installed in a manner that ensures a minimum separation distance of 23 centimeters between the antenna and human beings.

> **CAUTION:** If the Reader is not installed properly, it could be damaged and your system performance diminished.

To mount the Reader:

1. Position the AR 400 Reader at the desired mounting position on the wall or shelf. Make sure that there are five (5) inches of clearance on all sides of the Reader.

2. Using the pre-drilled holes at the corners of the Reader to guide you, drill four holes for mounting the reader.

3. Securely affix the Reader to the wall of shelf using the four screws that you provided.

Connect Antenna(s) to the Reader

Attach your antenna(s) to the Reader in sequential order (first connecting Antenna 1 to Reader connectors Tx_1 and Rx_1, then Antenna 2 to Reader connectors Tx_2 and Rx_2, Antenna 3 to the Tx_3/Rx_3 connectors next, and Antenna 4 to the Tx_4/Rx_4 connectors last.)

1. Attach the large ends of your antenna connector cables to the large connectors on the antenna.

2. Attach the small ends of the cables to the corresponding connectors on the Reader (Antenna 1 to Reader connectors Tx_1 and Rx_1, etc.)

3. Secure your cables using wire ties (do not bend the cables.)

> **WARNING:** Do not disconnect antenna cables when actively reading tags (if the LED is lit on the Reader, don't disconnect the antenna cables.) You could severely damage your Reader. Make sure that you unplug the power supply to power off the system first before disconnecting cables.

Connect the Reader to a Host Computer

The steps you must follow to interface the Reader with your system depend upon the software package you choose to use. Contact Matrics (refer to the "Contact Us" section in this *User's Manual*) for more information.

Power On (and Off) the Reader

1. Connect the provided 24vDC power supply to the Reader's Unit Power port.

2. To power on the system, insert the plug end of the power supply into a 24v power outlet. The green Power/Link LED on the Reader should turn on, indicating that the Reader is powered on and the system is live.

3. To power off the Reader, unplug the power supply from the power outlet. The green Power/Link LED on the Reader should turn off, indicating that the Reader is powered off and the system is not operational.

Verify the Reader Installation

Reader On?

After you have installed the AR 400 Reader as described in this *User's Manual*, test that the Reader is on by following the instructions provided above in the "Power on (and Off) the Reader" section.

To verify that the Reader is operational, power it on by plugging the power supply (attached to the Reader) into the appropriate power outlet. The green Power/Link LED on the Reader should turn on, indicating that the Reader is powered on and the system is operational.

Test Read Range

After you have installed the AR 400 Reader as described in this *User's Manual*, test the read distance of your hardware configuration to verify that it meets your needs.

1. To measure the read distance between the Reader and a tag, hold a tag in front of you (with the tag face parallel to the antenna face.)

2. Walk slowly toward the antenna until the Reader responds by lighting the yellow Read LED. This indicates that the Reader has detected and read the tag.

> **NOTE:** For purposes of this test, we recommend that you do not hold the tag at an angle, or wave the tag in front of the antenna, as that may cause the measured read distance to vary.

3. In order to read the same tag again, first remove the tag completely from the Reader's read field, and then perform Step 2 again.

Section 5. Configuring the Reader

Follow the steps listed below (and detailed in the following sections) to configure your AR 400 Reader:

1. Launch and log in to the Reader Administrator Console via its Web interface.
2. Familiarize yourself with the system by using the Setup Wizard and/or Online Help.
3. Create standard Read Point configurations (via the Read Point Class and Read Point Zone pages.)
4. Perform the basic configuration of Reader Ports (via the Configuration page.)
5. Define the list of trusted hosts (via the Trusted Hosts page), and enable or disable trusted hosts checking.
6. Set user access controls (via the Manage Users page.)
7. Commit or discard your changes (via the Commit/Revert page.)
8. Log out of the system (via the Logout link on any page.)

Launch and Log In to the Reader Administrator Console

Users must log in to the system to ensure that: 1) System access is granted only to authorized users, and 2) Only one user is logged in at a time to ensure that multiple users don't make conflicting changes to the system.

1. Using the Web browser of your choice, launch the Reader Administrator Console by typing http://your Reader's IP address into the browser's Address field. If the Reader is not defaulted to DHCP, the default IP address is 192.168.127.254.

   The User Login page displays.
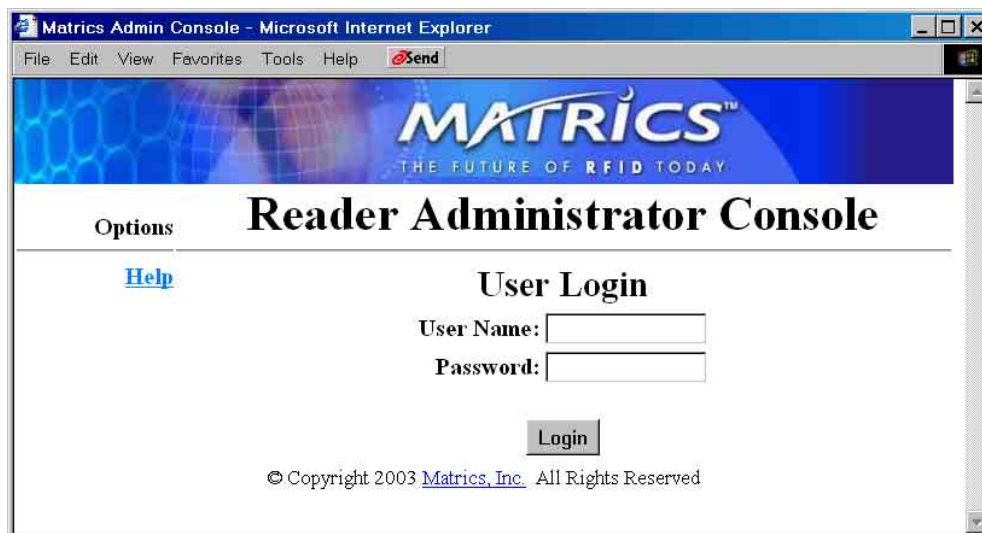
2. If this is the first time you have logged into your system, login to the default Admin account by typing 'admin' in the User Name field, 'change' in the Password field, and then clicking **Login**.

For subsequent logins, after you've created users (refer to the "Manage Users" section in this manual for more information), type your user name in the User Name field, your password in the Password field, and then click **Login**.

The Main page displays.
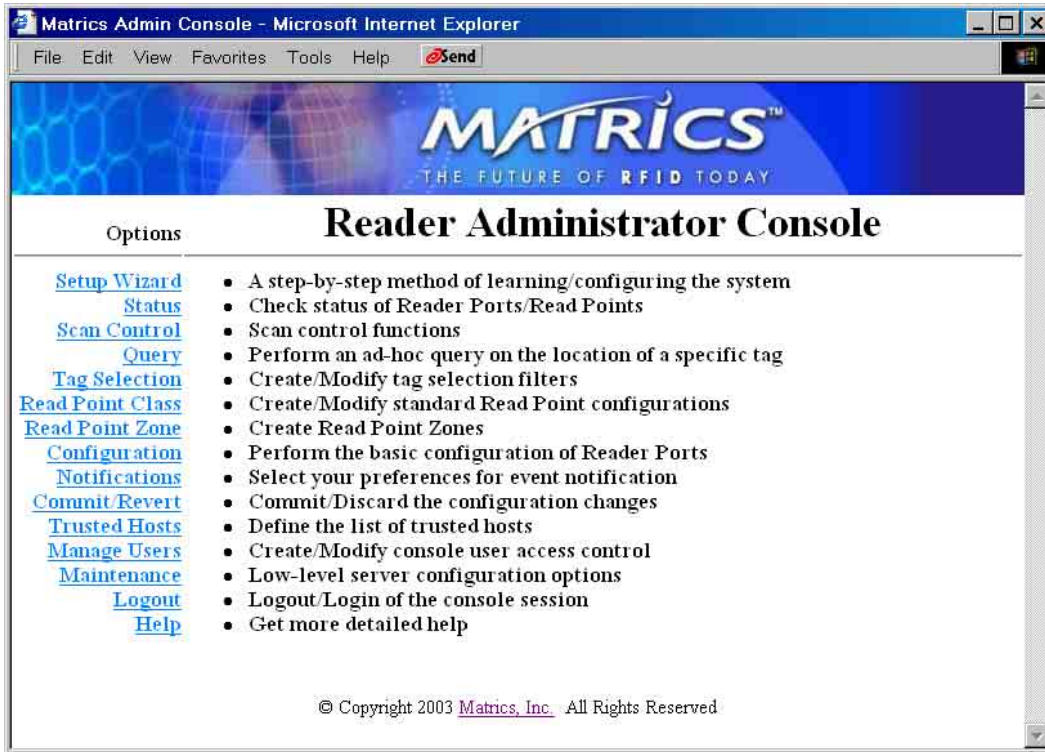
The Main page provides an informational list of Reader functions, and links to each of the Reader's dynamic web pages. Click a link on the left-hand side of the Main page to display the corresponding page.

AR 400 Reader User's Manual © 2003-2004 Matrics, Inc.

Use Setup Wizard

The Setup Wizard walks you through a test setup of the system to familiarize you with the process of configuring a system.

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the Setup Wizard link on the left-hand side of the main page. The Reader Administrator Console Configuration Wizard page displays.
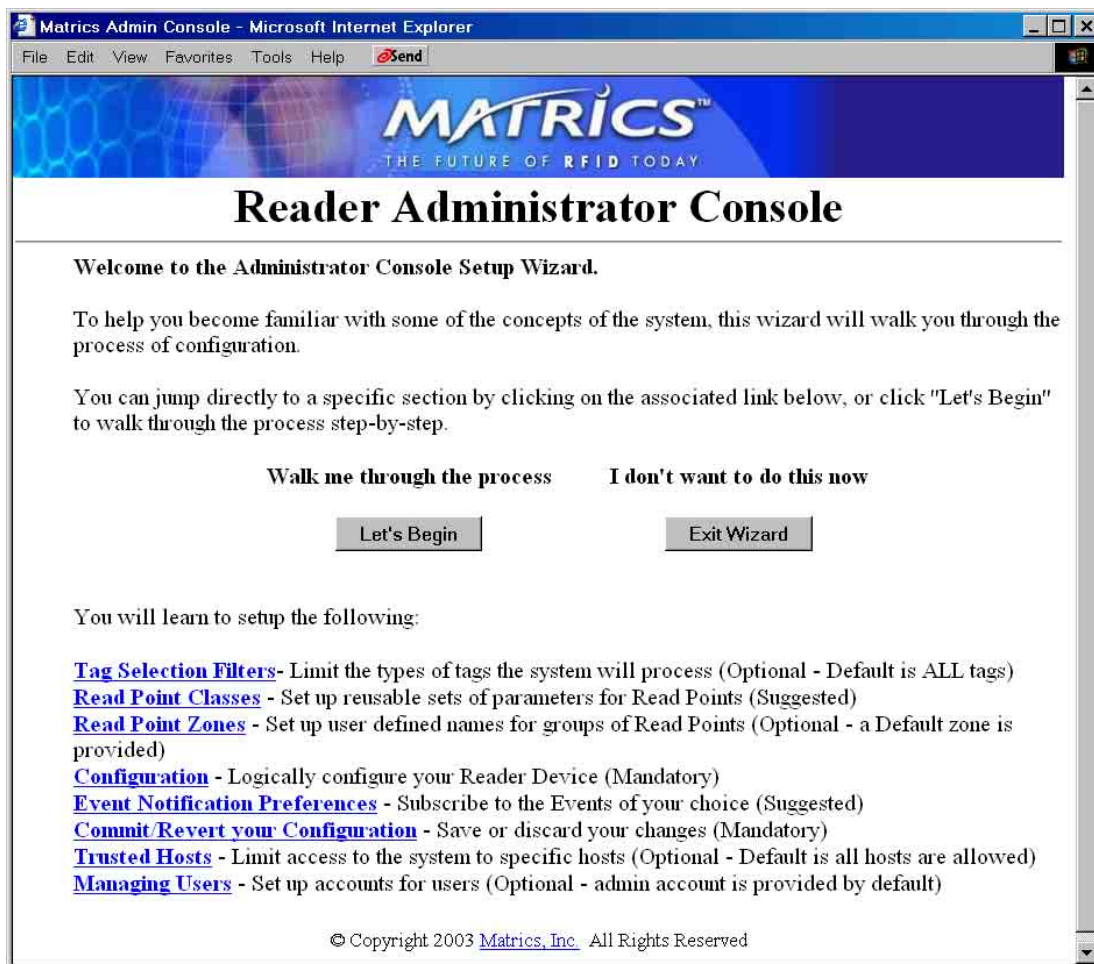

Click the **Let's Begin** button to start the Setup Wizard from the beginning, or click a topic link at the bottom of the page to jump directly to that topic. Then, simply read the pages displayed for you, and click **Next Step** to move through the Wizard page-by-page.

Use Online Help

The Help pages provide easy online access to conceptual and procedural information related to the Reader Administrative and Maintenance Consoles.

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. To view Help for the Administrator Console, click the Help link on the left-hand side of any page in the Administrator Console. The Administrator Console Help page displays in a separate window.
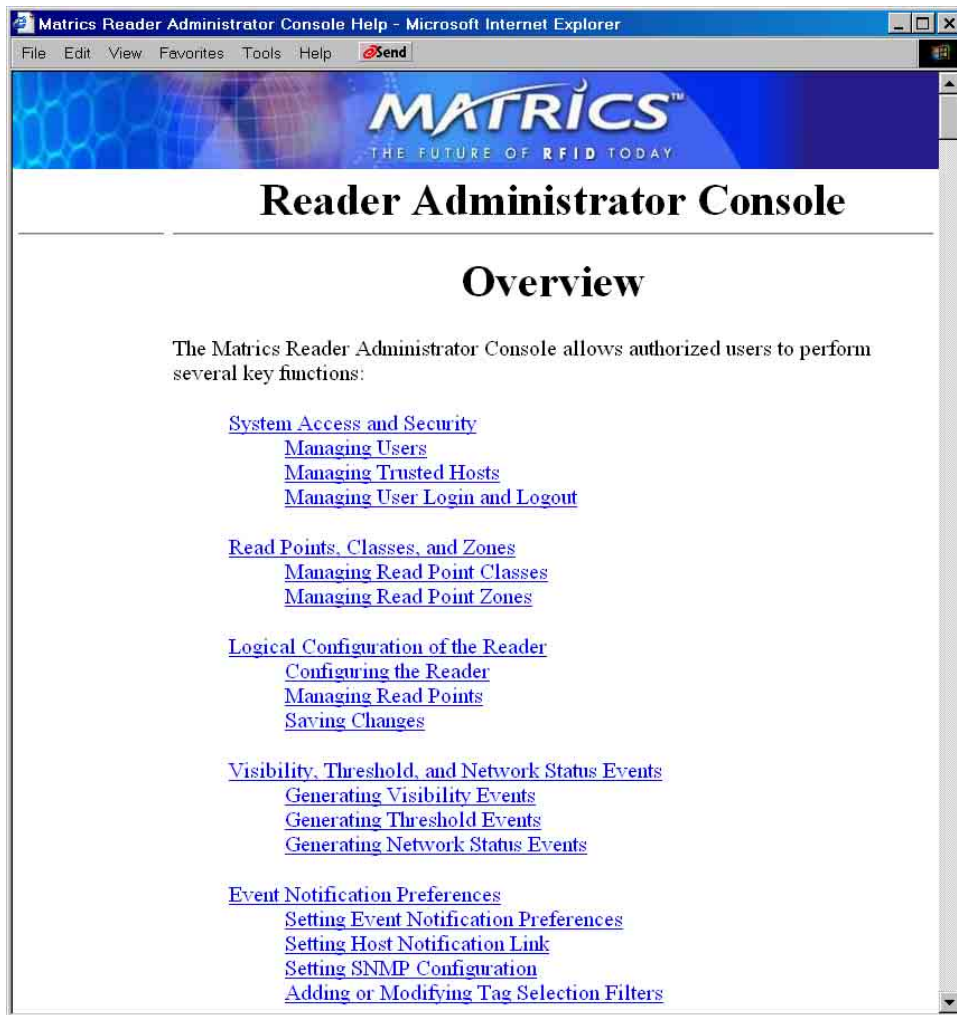

The Overview section at the top of the Help page provides a 'table of contents' of topic links. Click a topic link in the Overview section to jump to that topic.

3. To view Help for the Maintenance Console, click the Help link on the left-hand side of any page in the Maintenance Console. The Maintenance Console Help page displays in a separate window.

Save or Discard Changes (or Revert to Backup)

Whenever you add or make modifications to your Reader configuration using the Reader Administrator Console, the changes are not immediately applied to the underlying physical Reader Network of hardware components and networked connections. You must click **Commit** to save the changes and notify the Reader to update its configuration file, which updates your physical Reader configuration. While a successful update may take up to a minute to complete, your system will continue to operate with only a brief one- or two-second period where no polling is taking place.

1. Click the **Commit/Revert** link on the left-hand side of any Reader Administrator Console page. The Configuration Commit/Revert page displays.
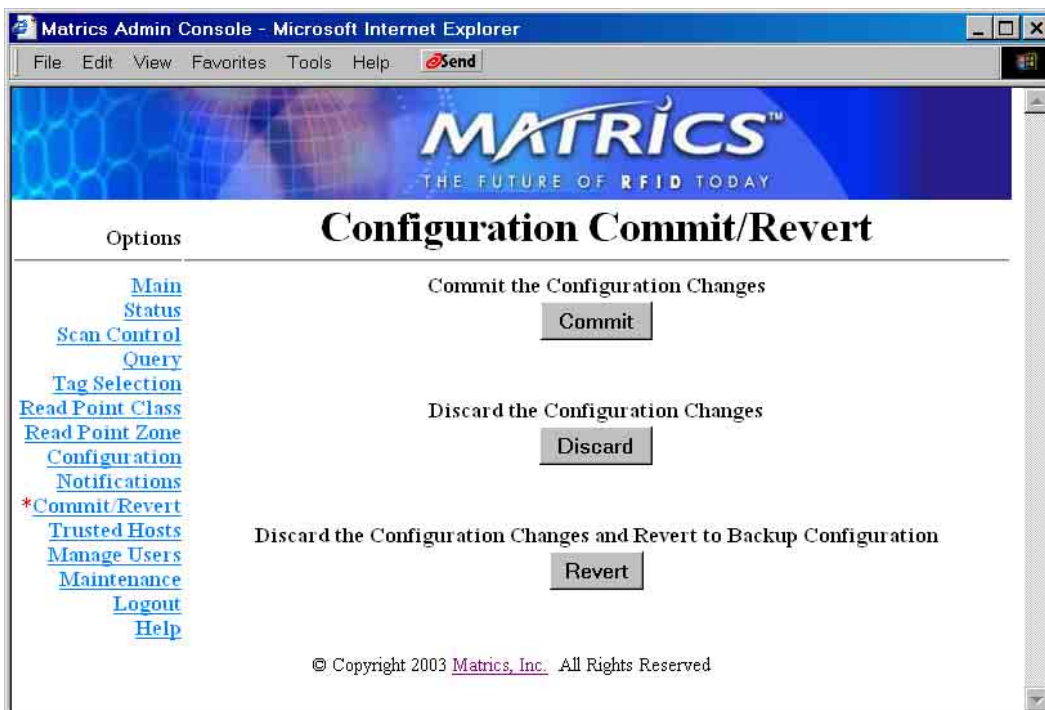
2. Click **Commit** to save a new configuration, and apply changes to the Reader's configuration file.

3. Click **Discard** ONLY if you decide you DO NOT want to save changes to the Reader's configuration file that you've made to the Reader configuration during this session.

4. Click **Revert** ONLY if you've saved a backup configuration, and you want to discard your current changes AND revert your physical Reader configuration to the backup configuration.

Create Read Point Classes

A read point is an individually addressable antenna. Every read point must have a read point class associated with it, which is where you define certain parameters in an effort to fine tune the performance and characteristics of the read point.

Multiple read points may share a single read point class. So, once you define a read point class, you can re-use it many times without re-entering the same parameters over and over again.

You can add a new read point class from scratch (naming it and specifically setting its parameters), or you can use an existing read point class as a template (copying its settings, and renaming it.)

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the Read Point Class link on the left-hand side of any page. The Read Point Classes page displays.

3. To add a new read point class, enter the following information:

A unique **Class Name** (one that does not already exist in the system),
The antenna **Type**--AREA (long range), SHELFv1 (existing short range shelf type), SHELFv2 (next generation short range shelf type), COMBINED1, or COMBINED2,
Set the **Scan Period** to tell how often the read point is to be checked for tags,
Set the **Gain** (as a percentage) to designate the antenna's power setting,

Set **Retry** to tell the Reader how many times to repeat the read command each time a scan is to be performed,

Set **Air Protocol** to All, Class 0, or Class 1 to tell the Reader which protocol to use to interrogate tags, and

Set **Tag Selection** to designate which tags to read.

After typing the required information, click the **Add Class** button. If the data is valid, the read point class is added and the Class List updated.

> **NOTE:** Your physical Reader configuration is not updated until you click **Commit** [refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.] If not successful, the system should indicate the problem and allow you to correct it by repeating the operation.

4. To create a new read point class by copying an existing class, select the existing class' name in the Class List, and then click the **Select Class** button. The values of the existing class are copied (including the name.) Change the name of the copied class, and then click **Add/Modify Class**. A new read point class is created.

5. To modify a read point class, select the class' name in the Class List, and then click the **Select Class** button. The values of the class auto-populate the fields on the left-hand side of the Read Point Classes page.

Modify the parameters as needed, and then click **Add/Modify Class**.

> **NOTE:** If you modify the class' name, a new class is created. If you modify the class' parameters and DO NOT modify its name, then the existing class is updated with the changes you made to its parameters.

When you modify a read point class' parameters, all read points that are associated with that class are automatically updated.

6. To delete an unused read point class, select the class' name in the Class List, click **Select Class**, and then click the **Delete Class** button. You cannot delete default read point classes.

7. Commit or discard your changes (refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.)

Create Read Point Zones

While you are not required to create or use them, read point zones allow you to group several read points in a logical, customized manner. For example, you might create a zone named Warehouse XYZ to group all read points installed in a particular warehouse area, or Store ABC to group all read points installed in a particular retail location. A default zone (named 'Default') is provided for you.

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the Read Point Zone link on the left-hand side of any page. The Read Point Zones page displays.
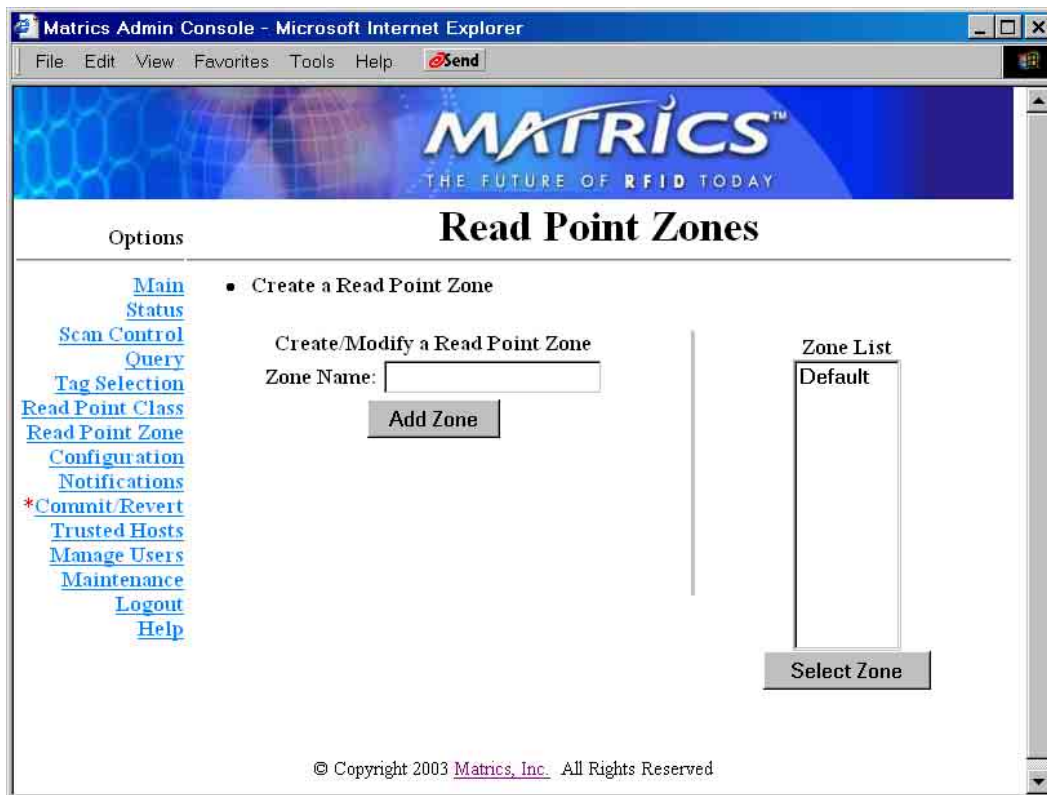
3. To add a new read point zone, type a unique zone name (one that does not already exist in the system), and then click the **Add Zone** button. The new zone name displays in the Zone List.

   The new zone can now be associated with one or more read points (refer to the "Add or Modify Read Points" section in this manual for more information.)

> **NOTE:** Your physical Reader configuration is not updated until you click **Commit** [refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.] If not successful, the system should indicate the problem and allow you to correct it by repeating the operation.

4. To modify a read point zone, select the zone's name in the Zone List, and then click **Select Zone**. The Zone Name field on the left-hand side of the Read Point Zone page auto-populates with the selected zone's name.
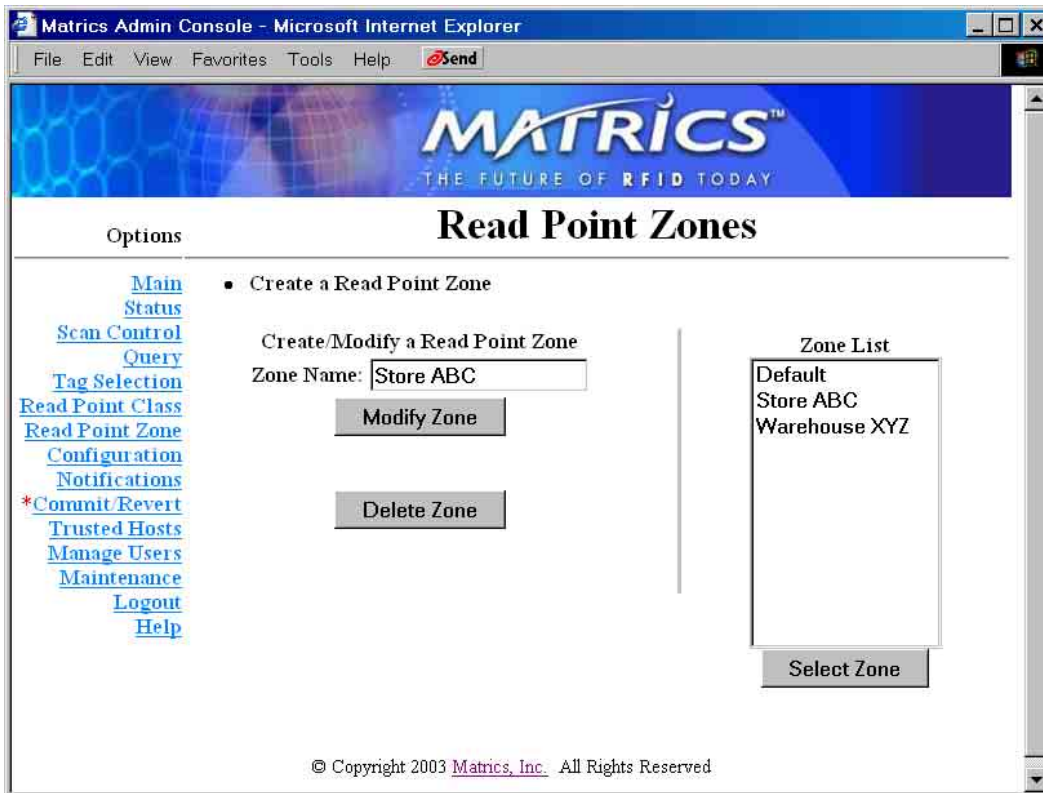
Change the selected zone's name as needed, and then click **Modify Zone**.

5. To delete an unused read point zone, select the zone's name in the Zone List, click **Select Zone**, and then click the **Delete Zone** button. You cannot delete the default read point zone.

6. Commit or discard your changes (refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.)

Configure the Reader

The Reader Administrator Console's Reader Configuration pages allow you to logically describe the antenna connections of your physical Reader, so that the AR 400 Reader can communicate to other systems the connectivity and parameters of the devices.

Before you use the Reader Administrator Console to define the configuration of your Reader, you must gather certain information about your physical devices from the personnel who installed them. For example, you will need to know what types of devices are connected to each port and the parameters associated with those devices. You also need to know the network configuration parameters (such as IP addresses, netmask and default gateway, etc.)

Once you have obtained the information you need about your physical devices, you can access the dynamic web pages in the Reader Administrator Console, which act as a wizard to walk you through the process of defining your Reader configuration and the association of its devices.

By default, a standard Reader configuration is displayed with a Reader link and links for four Reader ports. A port can connect directly to a read point (antenna), or combine with a subsequent port to connect to a splitter. The following list describes the four possible port combinations:

> 4 Ports -- All four ports connect directly to read points.
>
> 1 Splitter + 2 Ports -- The first two ports connect to one splitter, the other two connect directly to read points.
>
> 2 Ports + 1 Splitter -- The first two ports connect directly to read points, the other two connect to one splitter.
>
> 2 Splitters -- The first two ports connect to one splitter, the other two connect to another splitter.

The current Reader port status (direct port or splitter port) determines what kind of read points can be attached to this specific port. In other words, it determines what Read Point Class types can be used with this attached read point, essentially determining a subset of compatible Read Point Classes with these types.

> If a port connects to a read point directly, the link for the read point provides access to its parameters.
>
> If a port is empty, **Add ReadPoint** and **Add Splitter** links are displayed.
>
> If a splitter is used:
>
> o If a read point has not been added yet to this splitter, a **Delete Splitter** link is provided if you want to remove the splitter, and an **Add ReadPoint** link is provided if you want to add a read point to the splitter.
>
> o If a read point has been added to this splitter, the only link provided is to access to the read point's parameters.

Modify a Reader's Attributes

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the Configuration link on the left-hand side of any page. The Reader Configuration page displays.
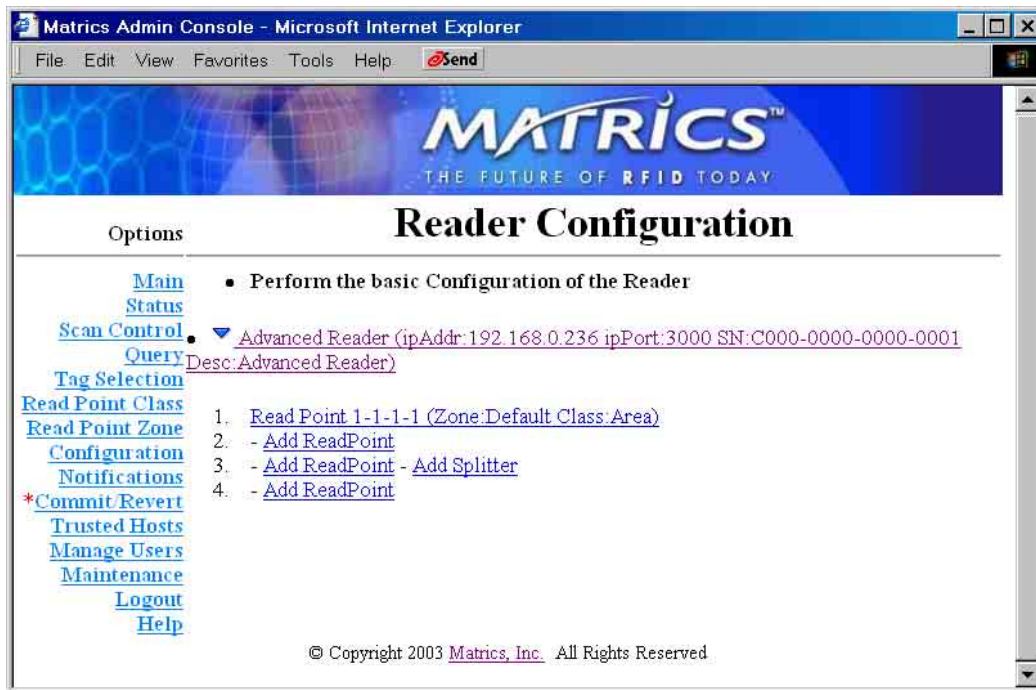

3. To view the Reader's attributes, click the Reader link at the top of the Reader Configuration page. The Reader Configuration's Modify a Reader page displays. The fields on the Modify a Reader page auto-populate with the selected Reader's attributes.
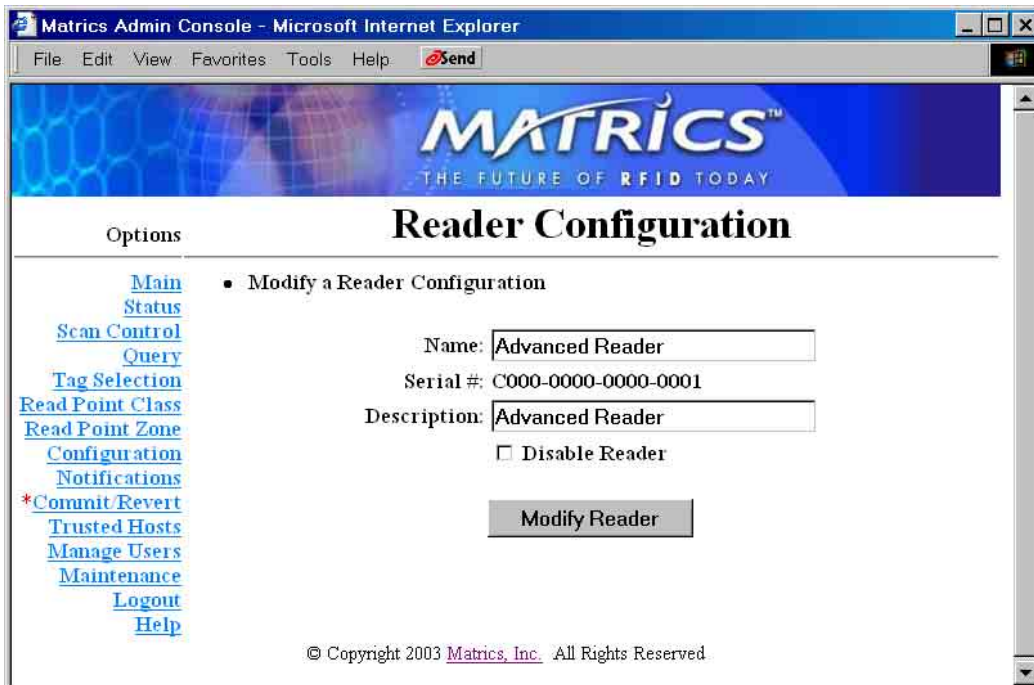
To customize the Reader's name and/or descriptive information, type a unique name (one that does not already exist in the system) and/or description to help identify the Reader (for example, its location), in the corresponding fields. Click **Modify Reader** when you are done to return to the Reader Configuration page.

A unique (factory defined) serial number is displayed in the **Serial #** field in the format "nnnn-nnnn-nnnn-nnnn."

Check **Disable Reader** on the Reader Configuration's Modify a Reader page if you want to disable this Reader from add and modify operations. Click **Modify Reader** when you are done to return to the Reader Configuration page.

Add, Modify, or Delete Read Points

When you add a read point to the logical view of your Reader, you add it to a Reader port.

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the Configuration link on the left-hand side of any page. The Reader Configuration page displays.

3. To add a single read point to a particular Reader port, click **Add ReadPoint**. The Reader Configuration's Add Read Point page displays.
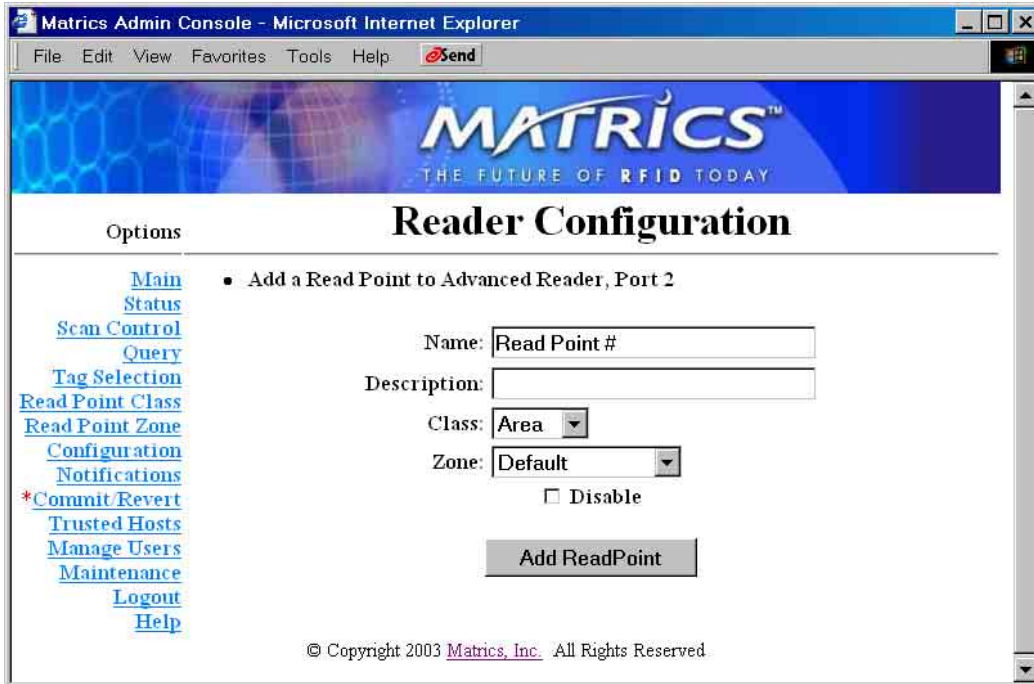
4. To add a read point to the associated Reader port, enter the following information:

A unique read point **Name** (one that does not already exist in the system),
An optional **Description** to help identify the read point (for example, its location),
The read point **Class** to associate with this read point, and
The read point **Zone** to associate with this read point.
Check **Disable** if you want to disable this read point from add and modify operations.

5. After typing the required information, click the **Add ReadPoint** button. If the data is valid, the read point is added and the updated logical view of your Reader configuration displays.

> **NOTE:** Your physical Reader configuration is not updated until you click **Commit** [refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.] If not successful, the system should indicate the problem and allow you to correct it by repeating the operation.

6. To modify a read point, select it on the Reader Configuration page, and the Reader Configuration's Modify Read Point page displays. The fields on the Modify Read Point page auto-populate with the selected read point's settings.

AR 400 Reader User's Manual © 2003-2004 Matrics, Inc.
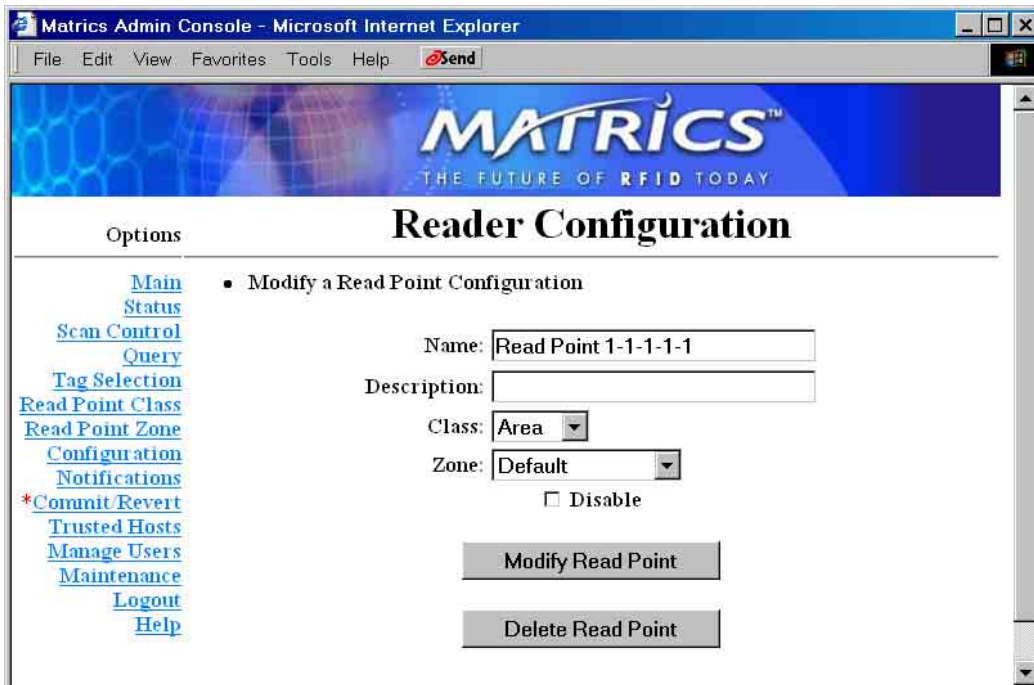
Change the selected read point's settings as needed, and then click **Modify Read Point**.

7. To delete a read point, select it on the Reader Configuration page, and the Reader Configuration's Modify Read Point page displays. The fields on the Modify Read Point page auto-populate with the selected read point's settings.

    Click **Delete Read Point**. The selected read point is removed from the logical view of your Reader configuration.

8. Commit or discard your changes (refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.)

Add or Delete a Splitter

When you add a splitter to the logical view of your Reader, you add it to a Reader port.

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the Configuration link on the left-hand side of any page. The Reader Configuration page displays.

3. To add a splitter to a particular Reader port, click **Add Splitter**. A **Delete Splitter** link is provided if you choose to remove the splitter later, and an **Add ReadPoint** link is provided if you want to add a read point to the splitter.
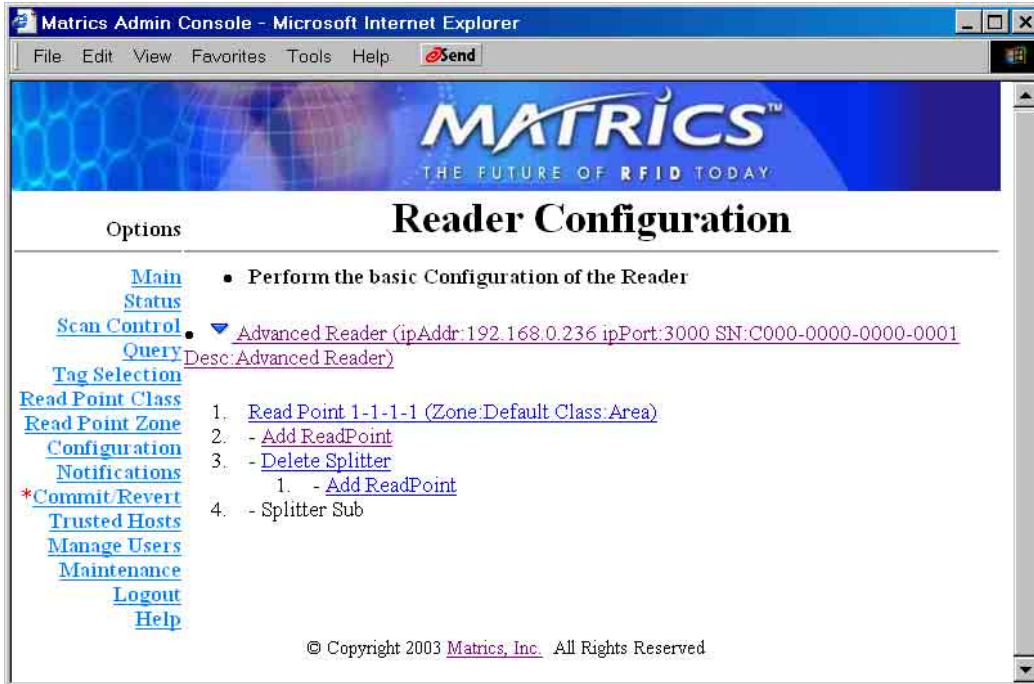
4. Click **Add ReadPoint** to add a read point to the splitter. The Reader Configuration's Add Read Point page displays.

5. To add a read point to the associated splitter, enter the following information:

> A unique read point **Name** (one that does not already exist in the system),
> An optional **Description** to help identify the read point (for example, its location),
> The read point **Class** to associate with this read point, and
> The read point **Zone** to associate with this read point.
> Check **Disable** if you want to disable this read point from add and modify operations.

6. After typing the required information, click the **Add ReadPoint** button. If the data is valid, the read point is added and the updated logical view of your Reader configuration displays.

> **NOTE:** Your physical Reader configuration is not updated until you click **Commit** [refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.] If not successful, the system should indicate the problem and allow you to correct it by repeating the operation.

AR 400 Reader User's Manual © 2003-2004 Matrics, Inc.

Define Trusted Hosts

To ensure the controlled and secured access to Reader Administrator Console functions, you should designate which computers are authorized to have system access. You do this by setting up "trusted hosts" (authorized computers.) Only computers that are registered in the system as trusted hosts can successfully access Reader Administrator Console functions.

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the Trusted Hosts link on the left-hand side of any page. The Trusted Hosts page displays.
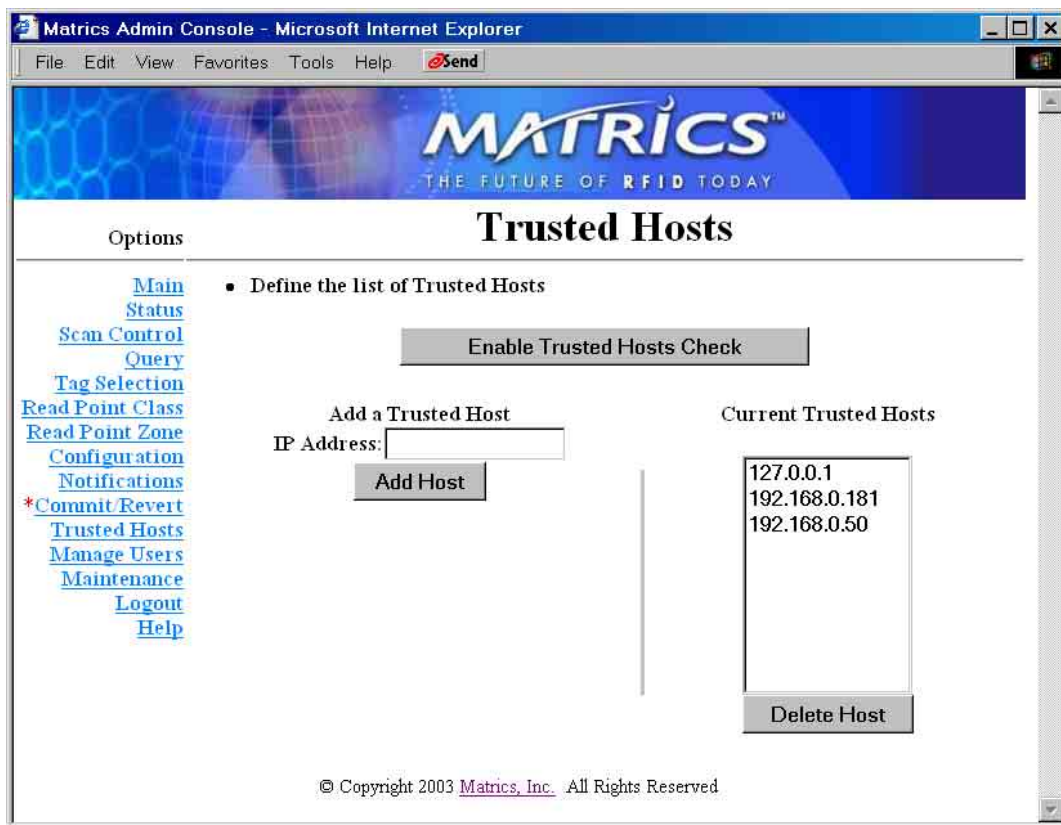
Trusted hosts checking is disabled by default (to allow your first admin to log in from anywhere.) With trusted hosts checking disabled, the IP address of any system that accesses the Reader is automatically added to the Current Trusted Hosts List. You can use this feature to see which systems have accessed the Reader, thereby enabling you to track down any unauthorized users.

However, if you wish to limit Reader access to only those computers that you've designated in the Current Trusted Hosts List, then you should enable trusted hosts checking for higher security.

3. To enable trusted hosts checking, click the **Enable Trusted Hosts Check** button on the Trusted Hosts page. When enabled, the **Enable Trusted Hosts Check** button toggles to a **Disable Trusted Hosts Check** button. Click **Disable Trusted Hosts Check** to turn off trusted hosts checking.

4. To add a trusted host, type the computer's IP address in the dotted notation form (0.0.0.0), not hostname, in the **IP Address** field on the Trusted Hosts page. After you have entered the IP address, click the **Add Host** button.
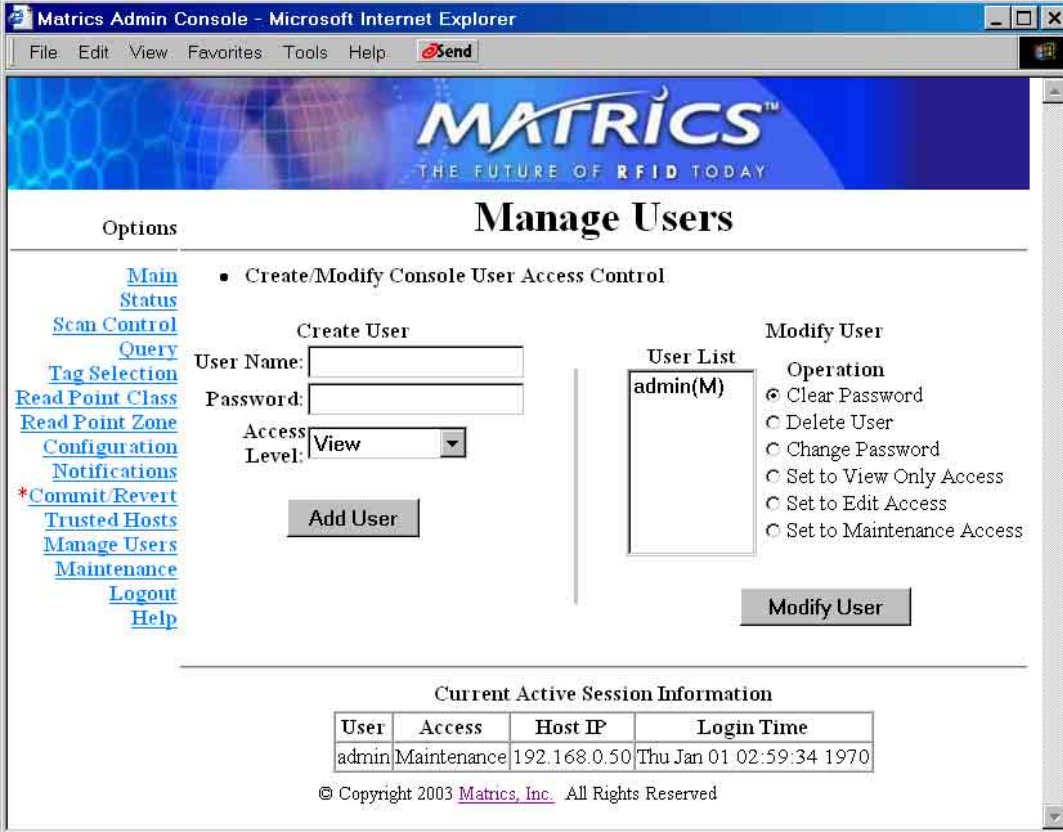
   The system will attempt to validate the IP address by "pinging" it. If the address is properly formatted and can be pinged, it is added to the Current Trusted Hosts List.

5. To delete a trusted host, select the computer's IP address in the Current Trusted Hosts List on the Trusted Hosts page, and then click the **Delete Host** button. The local host (127.0.0.1) cannot be deleted.

6. Commit or discard your changes (refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.)

Manage Users

To ensure the controlled and secured access to Reader Console functions, you should designate which users are authorized to have system access, and what level of access they are allowed. You do this by setting up authorized user accounts. Only users logging in with a registered user name and password can successfully access Reader Console functions.

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the Manage Users link on the left-hand side of any page. The Manage Users page displays.

3. To add a new user, type a valid **User Name** and **Password** for him or her on the Manage Users page.

   A valid user name must be unique (no other user can be assigned the identical user name), and both user name and password must consist of at least one but not more than 32 alphanumeric characters. Also, user name and password are case-sensitive (for example, a password that is assigned to a user typed in all lower-case letters must be entered by the user at log-in in all lower-case letters.)

4. Select an access level for the new user from the **Access Level** drop-down list box.

    The **Maintenance** option gives the new user all privileges (including upgrading firmware.) The **Edit** option allows the new user to change system parameters, but not as extensively as Maintenance access. The **View** option allows the new user to see system settings, but not change them.

    > **NOTE:** You will only see the **Maintenance** option in the **Access Level** drop-down list box if you have been granted Maintenance level access. If you have Edit level access, for example, you will only be able to create users with the same (Edit) or lesser level access (View) than you have.

5. Click the **Add User** button. If successful, the new user name displays in the User List. If not successful, the system should indicate the problem and allow you to correct it by repeating the operation.

6. To delete an existing user, select the user name in the User List, select the **Delete User** radio button, and then click **Modify User**. When you delete a user, you remove him or her from the system entirely. After a user has been deleted, a new user may be added using the old user name again.

Reset (Clear) a Password

1. To reset a user's password (in the event he or she has forgotten it), select the user name in the User List, and then select the **Clear Password** radio button.

2. Click **Modify User**. The user's password is re-set automatically to the default password, "change."

    When the user attempts to log in next, the Reader will display the Change User Password page to prompt the user to change his or her password from the default.

Change a Password

1. To change a user's password, select the user name in the User List, select the **Change Password** radio button, and then click **Modify User**. The Change User Password page displays.
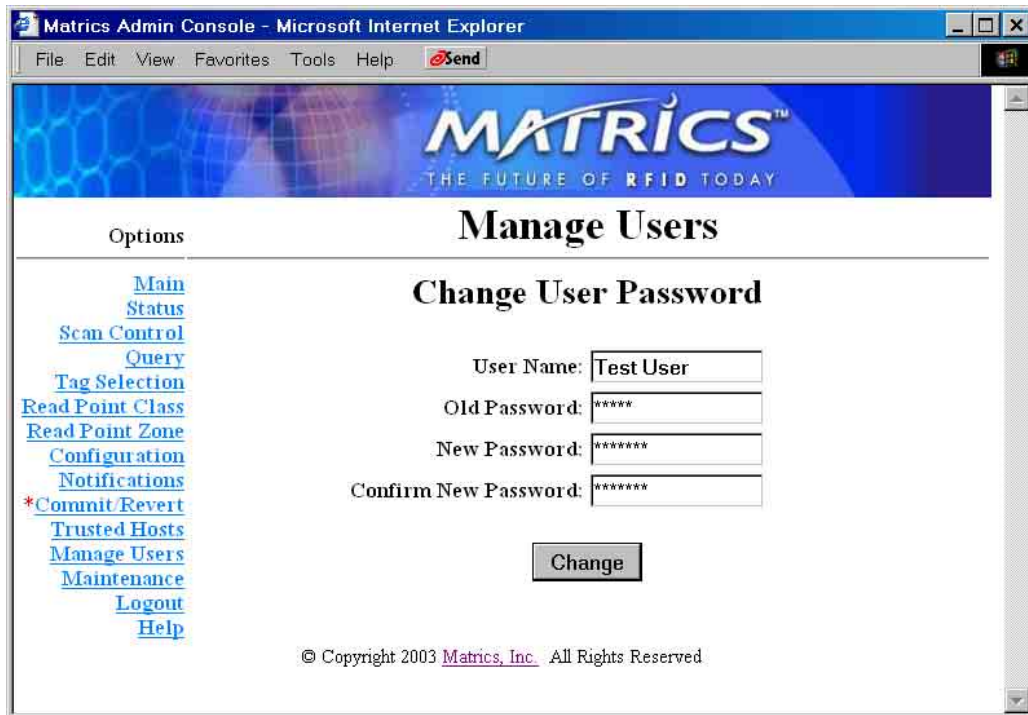
2. Type the **Old Password**, and the **New Password** (twice) on the Change User Password page, and then click **Change**.

3. Commit or discard your changes (refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.)

Change an Access Level

To change a user's access level, select the user name in the User List, and then select one of the following radio buttons: **Set to View Only Access**, **Set to Edit Access**, or **Set to Maintenance Access**. Then click **Modify User**.

> **NOTE:** You cannot increase another user's access level higher than your own. If you have Edit level access, for example, you cannot increase another user's access level to Maintenance. Also, if you only have View access, you cannot change another user's access level at all.

Display Current Active Session Information

At the bottom of the Manage Users page, the **Current Active Session Information** section displays information about your current login session, such as: your login name and access level, the IP address of the computer from which you are accessing the system, and the date and time that you logged in.

Log Out of the System

After you have configured your new system and committed your configuration to save it, you can log out of the system. Logging out ensures the security and integrity of your system, denying unauthorized users access to the Reader.

> **NOTE:** If you do not log out, and you haven't used the system for a pre-set amount of time, the Reader logs you out of the system automatically.

1. Click the **Logout** link on the left-hand side of any page.

   If you have any unsaved changes, the Reader will prompt you to commit or discard them.

2. If prompted to do so, commit or discard your changes (refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.)

Your session ends, and the User Login page displays.

Section 6. Notification of Events

Events Overview

The AR 400 Reader generates several types of events: **Visibility** and **Threshold** Events that report tag activity; and **Network Status** and **Exception** Events that report device/system activity. If you want to be notified when particular events occur, you can choose (subscribe to) these events via the Event Notifications page. You may also choose whether or not you want to receive any event notifications at all.

Visibility Events

There are three types of Visibility Events that are generated when changes in tag visibility occur:

New Tag Event— A New Tag Event is a special case event generated to notify you when a new tag appears for the first time. A new tag is one that has never been seen before, and has not previously been known to the Reader. You can then commission the tag (or associate an User ID and a threshold rule to the tag.)

This event should be processed in a timely fashion to give meaningful results, so set the Notify option to Immediate (the default for this event type). If you don't want to be notified when this type of event occurs, set the Notify option to Never, in which case the event is promoted to a generic Visibility Changed Event.

Tag Not Visible Event—A Tag Not Visible Event is a special case event generated to notify you when a tag is not currently visible to any Read Point. For example, if a tagged item is removed from a shelf and is out of RF range (not being seen by any Read Point), then a Tag Not Visible Event would apply. The Event reports where the tag was located when last visible to the system.

Since there may be cases, in the normal course of operation, that a tag has transient periods when it is changing visibility in the system, set the Notify option to Moderated to smooth out temporary conditions, and generate an event only when the tag is no longer being actively tracked. (The AR 400 Reader still knows about the tag, but it is not visible to any Read Point.) If you don't want to be notified when this type of event occurs, set the Notify option to Never, in which case the event is promoted to a generic Visibility Changed Event.

Visibility Changed Event—A Visibility Changed Event is a generic event (not as specific as a New Tag or Tag Not Visible Event) generated any time that the visibility of a tag changes. The visibility change may be due to more, less, different, or even no Read Points being associated with a tag. For example, if a tagged item moves from a shelf on aisle 2 to another shelf on aisle 4 (visibility changes from one Read Point to another), then a Visibility Changed Event would apply.

Note: If you have enabled Tag Not Visible Events, then a tag not currently visible to any Read Point(s) will generate the more specific Tag Not Visible Event instead. Likewise, a New Tag Event will be generated for the first visibility change when applicable.

This event should be processed in a timely fashion to give meaningful results, so set the Notify option to Immediate (the default for this event type.)

Threshold Events

A Threshold Event is generated when the number of visible tags drops below or rises above a threshold that you specify via a Tag List notification reply. Before you can generate Thresholds Events, you must import and associate rules for your thresholds. Since some users may not want to set up rules and thresholds, by default, this event's notify option is set to Never. Threshold events are only generated when the notify option is enabled, and User IDs and thresholds have been supplied via a Tag List. Since there may be cases, in the normal course of operation, that a tag may have transient periods when it is changing visibility in the system, set the Notify option to Moderated to smooth out temporary conditions, and generate an event only when the tag is not experiencing a temporary moment of invisibility.

Network Status Events

Network Status Events alert you to changes in status of the managed resources of the Reader. For example, if a Reader problem is detected, an event is generated by the Reader and sent without a server request.

If you want to receive Network Status Event notifications, you must subscribe to them by setting the SNMP configuration on the Event Notifications page. If the SNMP host is not set (or is not valid), no Network Status Events will be sent

Network Status Events are divided into two categories, 'device' and 'program.' A Device Event notes the change in a device's status. A Device Event is further divided into two categories, 'user' and 'system.' Both categories have an addition specification as to whether the status change is being reported for itself or in association with a 'parent' device.

For example, if the 'user' disabled a Reader, several events would be generated. The Reader would get a 'user/disable' status notification. The Read Point(s) below the Reader would get a 'user/disable/parent' notification. If the system detected a problem with the Reader, it would automatically disable the device, and the matching events would be generated. These classifications allow you to not only see the overall effect on the Reader Network, but also allow the likely offending component to be identified. When the fault is fixed, you can 'enable' the device. Any device below it that was 'parent disabled' is automatically brought back online.

Exception Events

Exception Events provide the same type of information available via SNMP, except over XML. An Exception Event gives you information when a device goes off-line, polling is turned off, etc.. You may choose this option if you don't support SNMP, but still want to receive feedback if the device/program changes state. XML is enabled by setting the Notify option for Exception Events to 'Immediate' in the Notify column on the Event Notifications page.

Set Event Notification Preferences

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the **Notifications** link on the left-hand side of any page. The Event Notifications page displays.
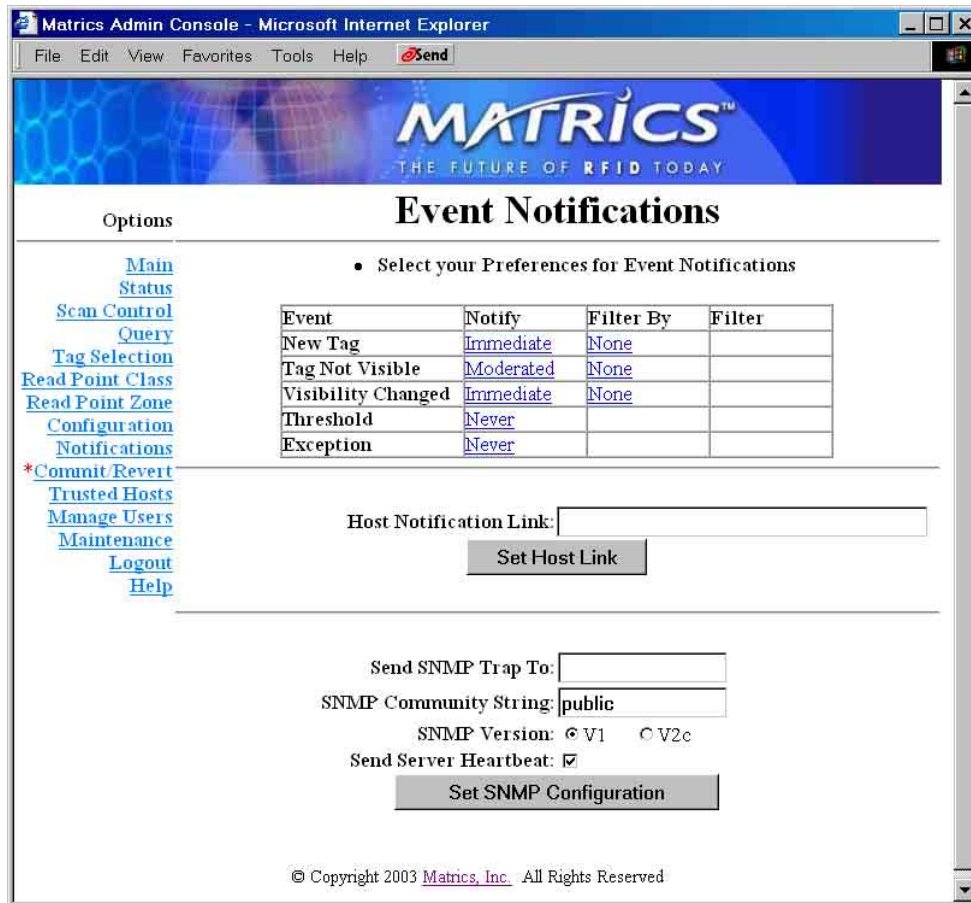
3. To specify the event notifications that you want to receive, click the link in the Notify column corresponding to each event type, and then select the appropriate Notify Option for the event:

    Never—The system never generates notifications for this event type.

    Immediate—The system generates notifications for this event type as soon as they are detected, assuming they are not 'filtered' out.

    Moderated—The system retests this condition every minute up to the timeout value. If the condition still exists and an intervening event has not happened since, the system generates notifications for this event type, assuming they are not 'filtered' out.

    Click **Set Notify Option.** The Event Notifications page displays again.

4. To specify the event filter option that you want to use, click the link in the Filter By column corresponding to each event type (not available for Threshold or Exception Events because they provide system-wide information), and then select the appropriate Filter Option for the event:

None - No filter. Allows all events to pass through.
Zone Inclusive - Only allow events that occur in a specific Read Point Zone to pass through.
Class Inclusive - Only allow events that occur in a specific Read Point Class to pass through.
Read Point Inclusive - Only allow events that occur in a specific Read Point to pass through.
Zone Exclusive - Only allow events that do NOT occur in a specific Read Point Zone to pass through.
Class Exclusive - Only allow events that do NOT occur in a specific Read Point Class to pass through.
Read Point Exclusive - Only allow events that do NOT occur in a specific Read Point to pass through.

Click **Set Filter Option.** The Event Notifications page displays again.

5. Commit or discard your changes (refer to the "Save or Discard Changes (or Revert to Backup)" section in this manual for more information.)

Set Host Notification Link

If the Host Notification Link is not set (or is not valid), no notifications will be sent. If you want to receive event notifications, you must supply a valid link in the **Host Notification Link** field on the Event Notifications page, and then click **Set Host Link**.

Set SNMP Configuration

If the SNMP host is not set (or is not valid), no Network Status Events will be sent. If you want to receive Network Status Event notifications, you must subscribe to them by setting the SNMP configuration on the Event Notifications page.

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the **Notifications** link on the left-hand side of any page. The Event Notifications page displays.

3. Type a valid link (a static IP address) in the **Send SNMP Trap To:** field.

4. Type the SNMP variable (the default value is "public") in the **SNMP Community String** field.

5. Click the radio button corresponding to the version of SNMP you are using.

6. Click and check the **Send Server Heartbeat** checkbox if you want to receive a "positive" feedback letting you know that the Reader is up and running. The system could detect it has gone offline (i.e., lost power) if it doesn't see a heartbeat within two minutes.

7. Click **Set SNMP Configuration**.

Section 7. Tag Selection Filters

By creating tag selection filters (and associating rules to those filters), you can specify tag selection criteria that you want the AR 400 Reader to use to limit the tags on which it reports.

Add, Modify, or Delete Tag Selection Filters

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the **Tag Selection** link on the left-hand side of any page. The Tag Selection Filter page displays.
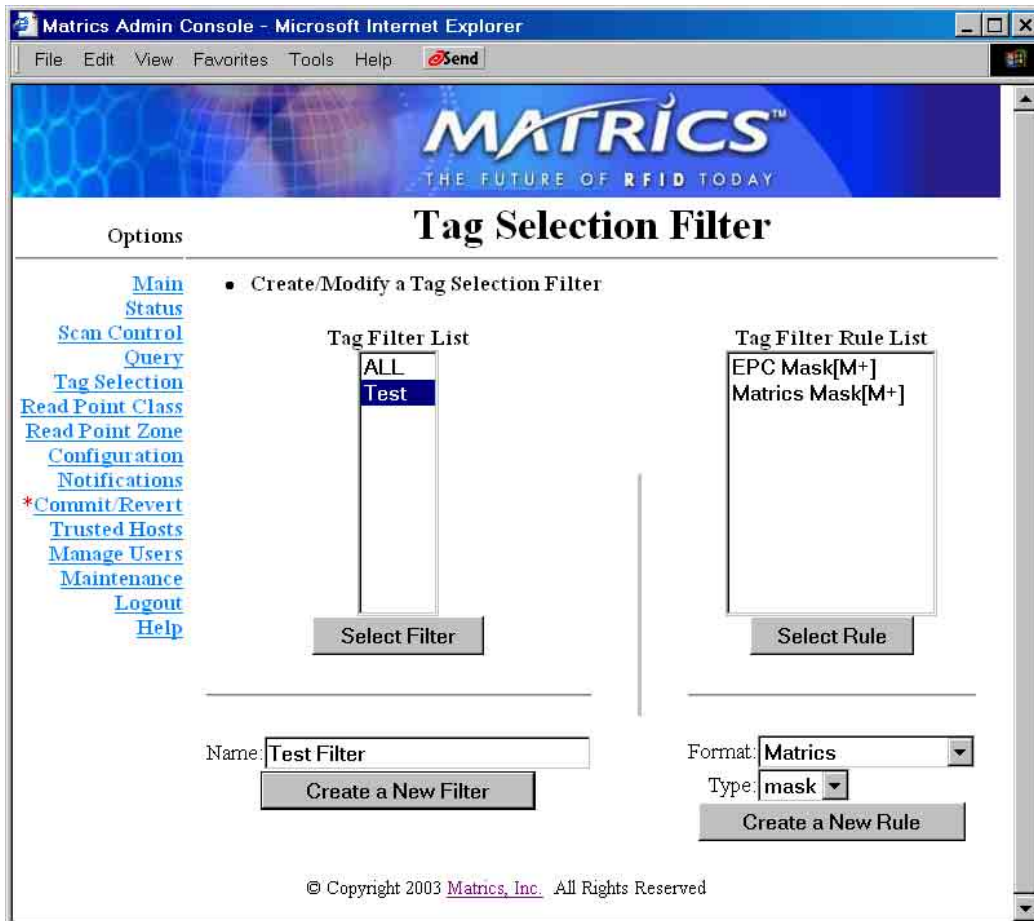
3. To create a new filter, type a new name in the **Name** field, and then click **Create a New Filter**. The Tag Filter page displays.
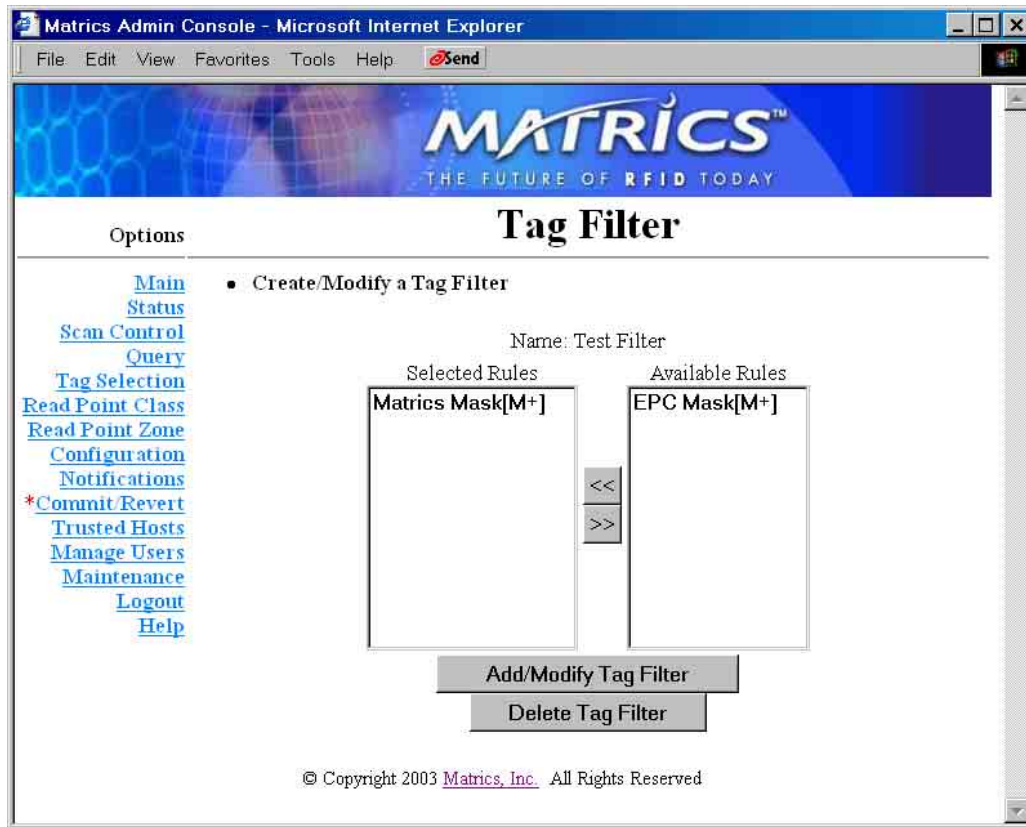

4. Select a rule from the Available Rules list, and then click the << button to associate the selected rule to the new filter. The selected rule displays in the Selected Rules list.

5. Click **Add/Modify Tag Filter**. The newly created filter displays in the Tag Filter List on the left-hand side of the Tag Selection Filter page.

6. To modify a filter, select it in the Tag Filter List on the left-hand side of the Tag Selection Filter page, and then click **Select Filter**. The Tag Filter page displays. Change the selected filter's associated rules as needed using the << and >> buttons, and then click **Add/Modify Tag Filter**.

7. To delete a filter, select it in the Tag Filter List on the left-hand side of the Tag Selection Filter page, and then click **Select Filter**. The Tag Selection Filter page displays. Click **Delete Tag Filter**. The selected filter is removed from the Tag Filter List on the left-hand side of the Tag Selection Filter page.

    NOTE: Only filters not being used at any read point can be deleted.
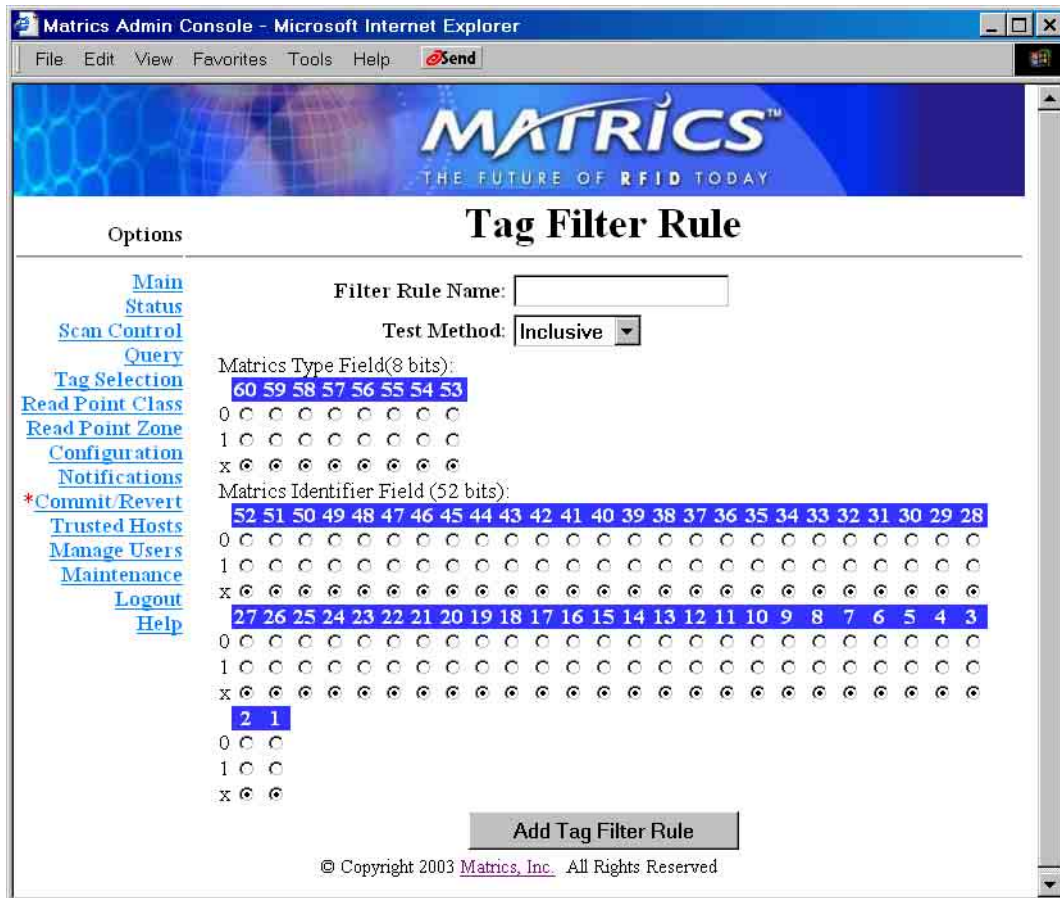
Add, Modify, or Delete Tag Filter Rules

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the **Tag Selection** link on the left-hand side of any page. The Tag Selection Filter page displays.
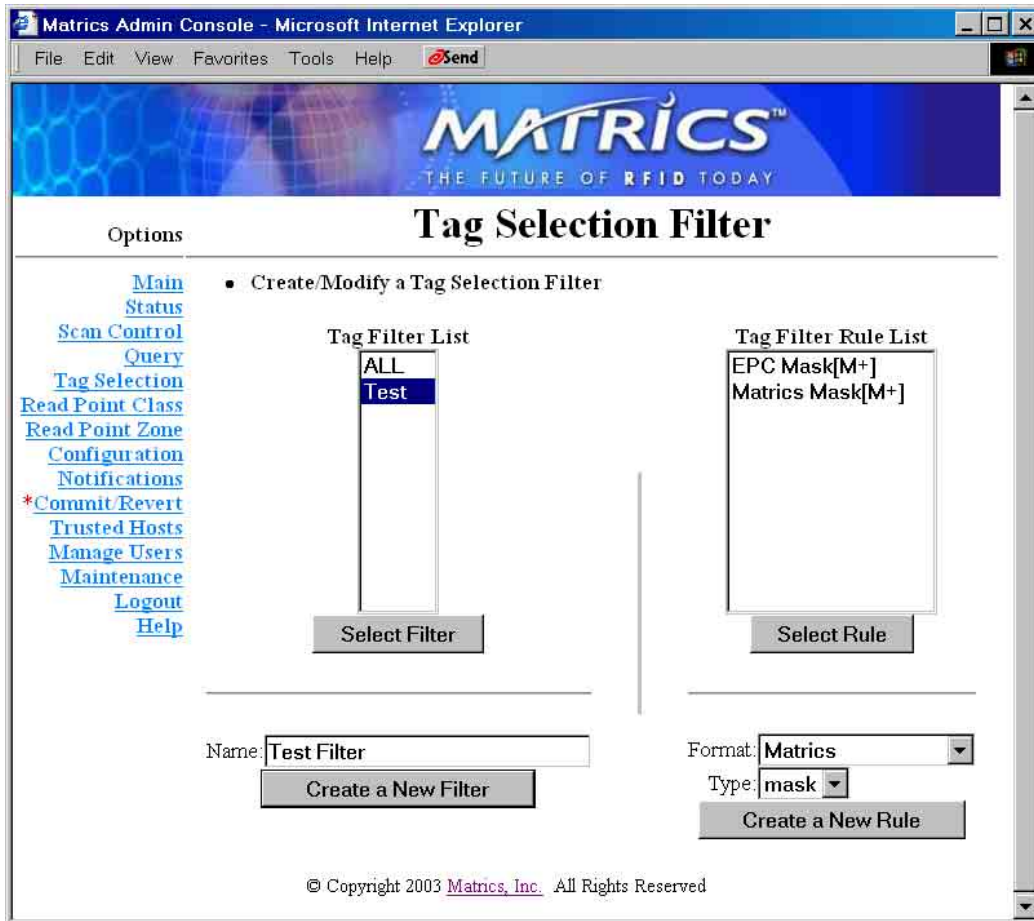
3. To create a new tag filter rule, select a tag format to filter and a tag type from the corresponding drop-down list boxes on the bottom right-hand side of the Tag Selection Filter page, and then click **Create a New Rule**.

4. If you select "Matrics" in the **Format** field and "mask" in the **Type** field on the bottom right-hand side of the Tag Selection Filter page, the following Tag Filter Rule page displays.

Type a name for the new rule in the **Filter Rule Name** field.

Select **Inclusive** (include all tags that match this rule) or **Exclusive** (exclude all tags that match this rule) in the **Test Method** drop-down list box.

Click the radio buttons associated with each numbered bit position for its specific bit mask choice.

Note: If specifying 0 or 1 does not matter for a particular bit, simply click the **x** radio button for that bit.

Click **Add Tag Filter Rule** when you are done to create the new tag filter rule.

The newly created tag filter rule displays in the Tag Filter Rule List on the right-hand side of the Tag Selection Filter page.

5. If you select "Matrics" in the **Format** field and "field" in the **Type** field on the bottom right-hand side of the Tag Selection Filter page, the following Tag Filter Rule page displays.

Type a name for the new rule in the **Filter Rule Name** field.

Select **Inclusive** (include all tags that match this rule) or **Exclusive** (exclude all tags that match this rule) in the **Test Method** drop-down list box.

Select a tag category in the **Tag Category** drop-down list box.

Using the hex values associated with Matrics EPC tags, type the value for the extra 6 bits in the EPC 96 bit header in the **EPC 96bit Header** field, the Matrics Tag Type/EPC Manager value in the **Matrics Tag Type/EPC Manager** field, the EPC Object Class value in the **EPC Object Class** field, and the serial number in the **Serial Number** field.

Click **Add Tag Filter Rule** when you are done to create the new tag filter rule.

The newly created tag filter rule displays in the Tag Filter Rule List on the right-hand side of the Tag Selection Filter page.

6. If you select "Matrics" in the **Format** field and "range" in the **Type** field on the bottom right-hand side of the Tag Selection Filter page, the following Tag Filter Rule page displays.

Type a name for the new rule in the **Filter Rule Name** field.

Select **Inclusive** (include all tags that match this rule) or **Exclusive** (exclude all tags that match this rule) in the **Test Method** drop-down list box.

Select a tag category in the **Tag Category** drop-down list box.

Using the hex values associated with Matrics EPC tags, type both low range and high range values for the value for the extra 6 bits in the EPC 96 bit header in the **EPC 96bit Header** fields, the Matrics Tag Type/EPC Manager value in the **Matrics Tag Type/EPC Manager** fields, the EPC Object Class value in the **EPC Object Class** fields, and the serial number in the **Serial Number** fields.

Click **Add Tag Filter Rule** when you are done to create the new tag filter rule.

The newly created tag filter rule displays in the Tag Filter Rule List on the right-hand side of the Tag Selection Filter page.

7. If you choose an "EPC" selection in the **Format** field and "mask" in the **Type** field on the bottom right-hand side of the Tag Selection Filter page, the following Tag Filter Rule page displays.

Type a name for the new rule in the **Filter Rule Name** field.

Select **Inclusive** (include all tags that match this rule) or **Exclusive** (exclude all tags that match this rule) in the **Test Method** drop-down list box.

Click the radio buttons associated with each numbered bit position for its specific bit mask choice.

Note: If specifying 0 or 1 does not matter for a particular bit, simply click the **x** radio button for that bit.

Click **Add Tag Filter Rule** when you are done to create the new tag filter rule.

The newly created tag filter rule displays in the Tag Filter Rule List on the right-hand side of the Tag Selection Filter page.

8. If you choose an "EPC" selection in the **Format** field and "field" in the **Type** field on the bottom right-hand side of the Tag Selection Filter page, the following Tag Filter Rule page displays.

Type a name for the new rule in the **Filter Rule Name** field.

Select **Inclusive** (include all tags that match this rule) or **Exclusive** (exclude all tags that match this rule) in the **Test Method** drop-down list box.
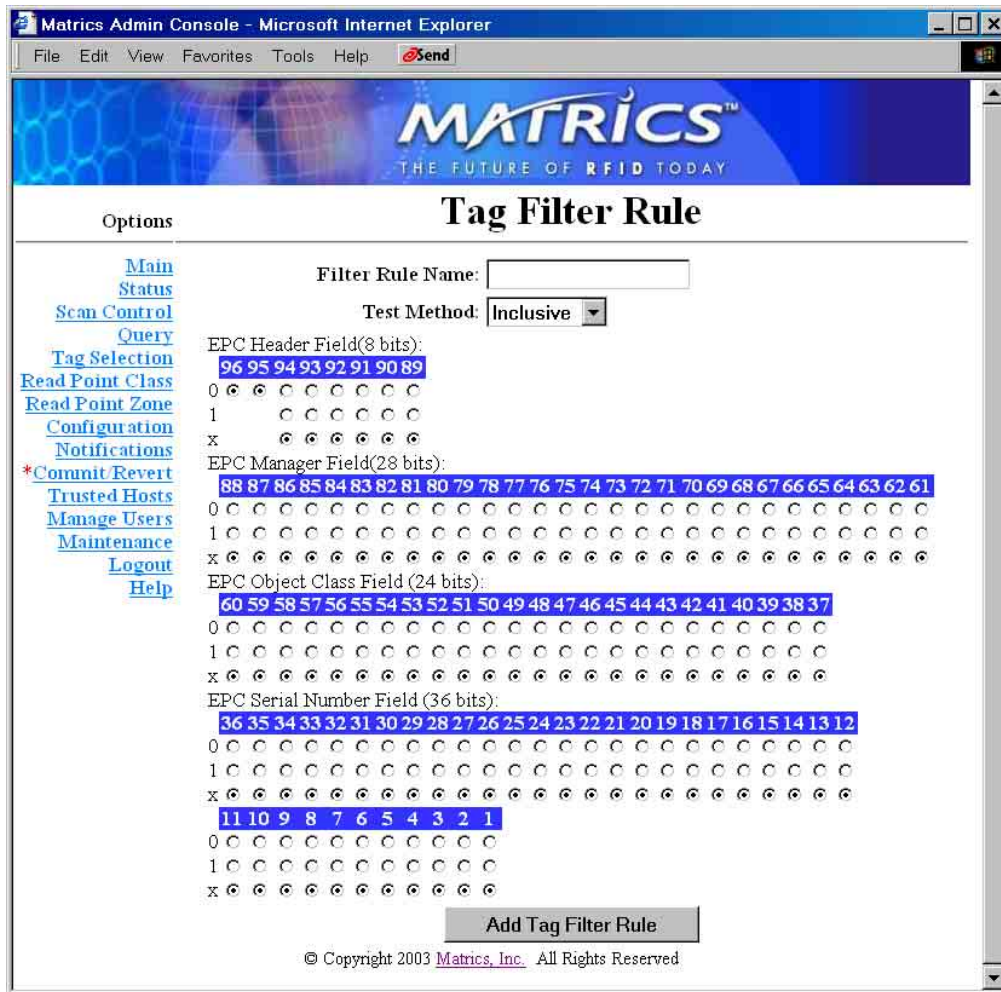
Select a tag category in the **Tag Category** drop-down list box.

Using the hex values associated with Matrics EPC tags, type the value for the extra 6 bits in the EPC 96 bit header in the **EPC 96bit Header** field, the Matrics Tag Type/EPC Manager value in the **Matrics Tag Type/EPC Manager** field, the EPC Object Class value in the **EPC Object Class** field, and the serial number in the **Serial Number** field.

Click **Add Tag Filter Rule** when you are done to create the new tag filter rule.

The newly created tag filter rule displays in the Tag Filter Rule List on the right-hand side of the Tag Selection Filter page.

9. If you choose an "EPC" selection in the **Format** field and "range" in the **Type** field on the bottom right-hand side of the Tag Selection Filter page, the following Tag Filter Rule page displays.

Type a name for the new rule in the **Filter Rule Name** field.

Select **Inclusive** (include all tags that match this rule) or **Exclusive** (exclude all tags that match this rule) in the **Test Method** drop-down list box.

Select a tag category in the **Tag Category** drop-down list box.

Using the hex values associated with Matrics EPC tags, type both low range and high range values for the value for the extra 6 bits in the EPC 96 bit header in the **EPC 96bit Header** fields, the Matrics Tag Type/EPC Manager value in the **Matrics Tag Type/EPC Manager** fields, the EPC Object Class value in the **EPC Object Class** fields, and the serial number in the **Serial Number** fields.

Click **Add Tag Filter Rule** when you are done to create the new tag filter rule.

The newly created tag filter rule displays in the Tag Filter Rule List on the right-hand side of the Tag Selection Filter page.

10. To modify a tag filter rule, select it in the Tag Filter Rule List on the right-hand side of the Tag Selection Filter page, and then click **Select Rule**. The corresponding Tag Filter Rule page displays with the fields auto-populated with the selected rule's settings. Change the selected rule's settings as needed, and then click **Add/Modify Tag Rule**.

11. To delete a tag filter rule, select it in the Tag Filter Rule List on the right-hand side of the Tag Selection Filter page, and then click **Select Rule**. The corresponding Tag Filter Rule page displays with the fields auto-populated with the selected rule's settings. Click **Delete Tag Rule**. The selected tag filter rule is removed.

   NOTE: Only tag filter rules not associated with a filter can be deleted.
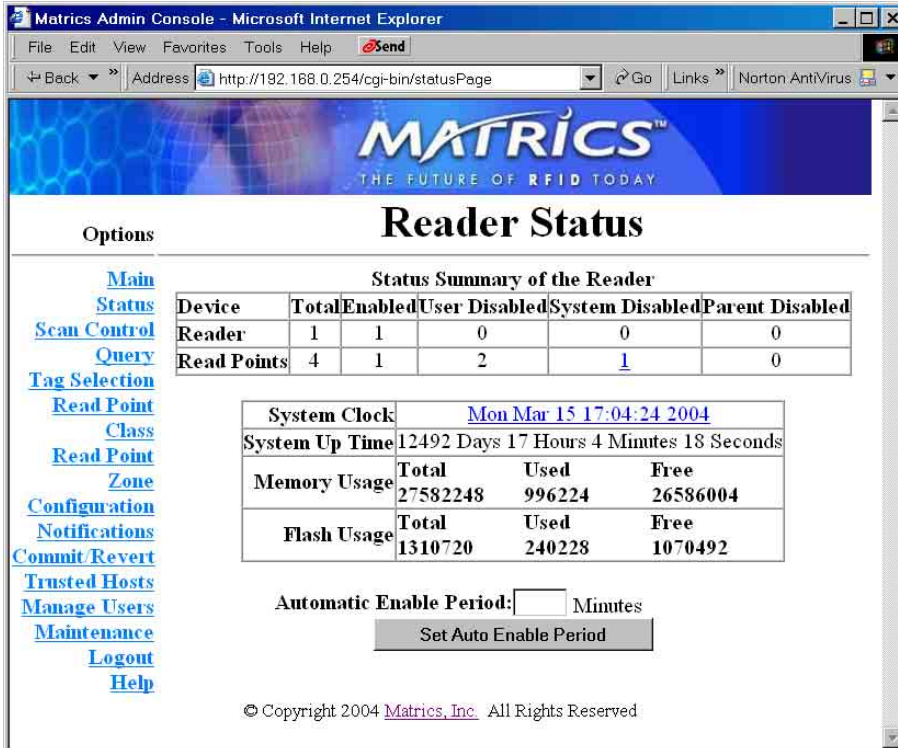
Section 8. Reader Server Controls

While most of the Reader Administrative Console functions allow you to create a logical view of your Reader, the Reader Server Status and Scan Control pages give you a view of (and control over) the actual "running" system configuration.

Check Status of Reader

The AR 400 Reader monitors the health and welfare of Readers and associated devices. Under normal circumstances, the table displayed on the Reader Status page should show the same number of devices in the Total column and the Enabled column. However, if devices are off-line (not enabled), you will see a non-zero number in some of the other columns.

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the **Status** link on the left-hand side of any page. The Reader Status page displays.

If you have disabled a device, you will see an entry in the User Disabled column. User-disabled devices can be enabled via the Reader Configuration page. If there are child devices (lower in the hierarchy) such as Read Points connected to a Reader that you have disabled, a value displays in the Parent Disabled column.

During the operation of the system, if a device becomes non-operational, the system will disable it automatically, but allow the rest of the system to continue to operate. If this happens, a SNMP trap is generated, the appropriate device or devices are marked as system-disabled, child devices are marked as parent-disabled, and a non-zero entry (link) displays in the System Disabled column.

For devices with multiple read points (such as a shelf), a read point can become non-operational (its status changing to "degraded") while its other read points continue to operate. An additional value displays in the Enabled column for a degraded device. For example, if four read points were enabled and one of them became degraded, "4/1" would display in the Enabled column. The "1" links to a list of degraded devices, allowing you to enable degraded devices like you would a system-disabled device.

3. To attempt to re-enable a system-disabled device, click the link in the System Disabled column, and the associated Enable Device page displays. Select a device to enable and then click **Enable Device**, or click **Enable All Devices** to attempt to enable all devices. If the device(s) is successfully brought back into service, it will automatically enable all of the parent-disabled children, and it will be removed from the Disabled lists.

4. If you want to automatically attempt to re-enable degraded or system-disabled devices after a specified number of minutes, type the number of minutes in the **Automatic Enable Period** field on the Reader Status page, and then click **Set Auto Enable Period**.

5. Information displayed in the **System Clock** field tells you the time on the Reader. When tags are seen and/or events are generated, they are time-stamped with this time value. To change the time, click the link. The System Time Management page displays. Select the appropriate values from the **Year**, **Month**, **Day**, **Hour**, **Minute**, and **Second** drop-down list boxes, and then click **Set Date and Time**.

6. Information displayed in the **System Up Time** field tells you how long it has been running since the system was last rebooted. The **System Up Time** field value is reset automatically each time the Reader is rebooted.

7. Information displayed in the **Memory Usage** and **Flash Usage** fields shows you the total number of memory and flash space, and divides the space into how much is currently used and how much is free.

Scan Control

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the **Scan Control** link on the left-hand side of any page. The Reader Scan Control page displays.
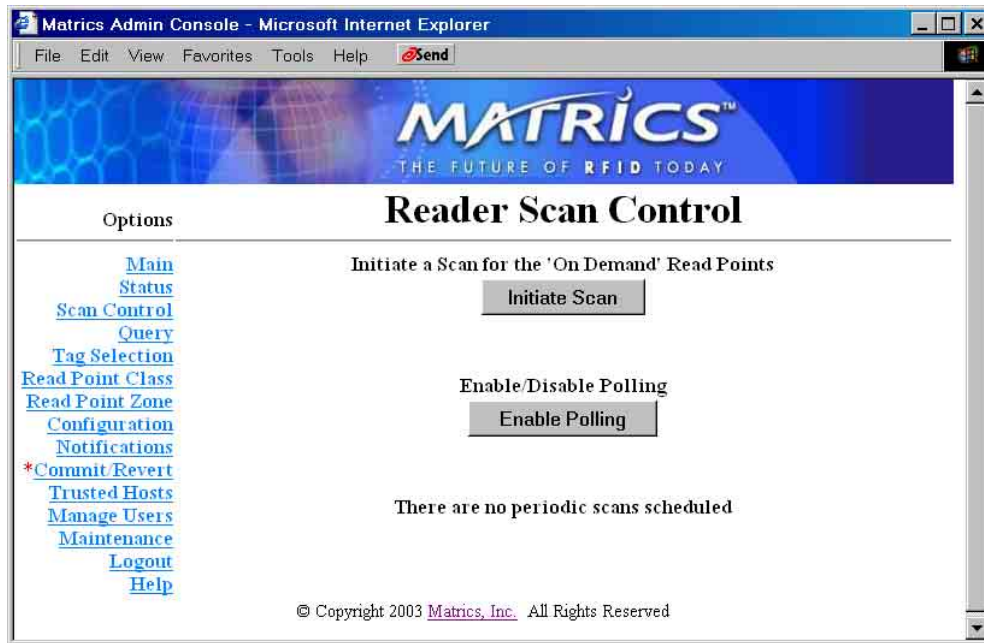
3. To initiate a scan for all On Demand read points associated with a Read Point Class that has selected the "On Demand" Scan Period, click **Initiate Scan** on the Reader Scan Control page.

    The Reader queues the On Demand scans.

4. To poll read points associated with a Read Point Class that has selected the "Polled" Scan Period, click **Enable Polling** on the Reader Scan Control page (the button toggles to **Disable Polling**.) To stop polling, click **Disable Polling** (the button toggles back to **Enable Polling**.)

    The polling state is saved in the configuration file when committed, so the system will come up with the last saved setting.

    The bottom of the Reader Scan Control page displays the next periodic scan time (i.e., "Periodic Scan schedule in 3 minutes" or "There are no periodic scans scheduled.")

Section 9. Ad-hoc Queries

While the AR 400 Reader is not designed to be your primary source for querying tags, you can use the Tag Query page to perform simple queries to locate a specific tag.

Perform an Ad-hoc Query for a Specific Tag

To query for a specific Matrics tag, type the tag type and ID in the corresponding Matrics Method fields on the Tag Query page. To query for a specific EPC tag, select the tag type, and type the hex values for the 96bit type, Manager, Object Class, and Serial Number (ID) in the corresponding EPC Method fields on the Tag Query page.

Note: The Matrics Method will work for any tag type.

One of the following statements will result:

The tag is not known to the system. (The tag has never been seen or imported.)

The tag is not visible to the system. (The tag is known to the system, but is currently not visible to any read point.)

The tag is visible at one or more read points. (A list of read points where the tag can be seen displays.)

Section 10. Maintaining the Reader

The Reader Maintenance Console allows you to view information that may be helpful to you in maintaining a healthy Reader.

Access the Reader Maintenance Console

1. If you haven't already done so, launch and log in to the Reader Administrator Console.

2. Click the **Maintenance** link on the left-hand side of any page. The Reader Maintenance Console Main page displays.
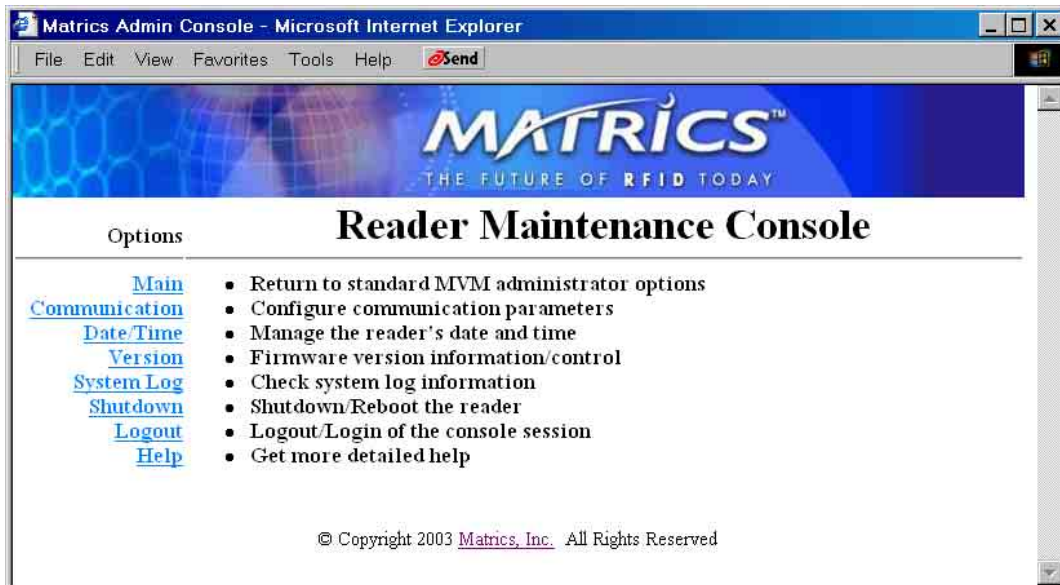
The Reader Maintenance Console Main page provides an informational list of Reader maintenance functions, and links to each of the Maintenance Console's dynamic web pages. Click a link on the left-hand side of the Main page to display the corresponding page.

The Main link returns you to the Reader Administrator Console.

Manage Communication Configuration Settings

The AR 400 Reader supports RS232 and RS485 serial communication protocols, or TCP/IP network communication protocol.

1. If you haven't already done so, access the Reader Maintenance Console.

2. Click the **Communication** link on the left-hand side of any Reader Maintenance Console page. The Communication Configurations page displays.

3. To configure the Reader's Serial Port communication settings, enter the following information:

Set the **Protocol** to **Enable** or **Disable** serial communication.

Set the **Data Rate** to designate the baud rate for the selected protocol.

(Applies only to RS485) Set the **Node Address** to designate the node address the AR 400 Reader will use in a RS485 serial bus network environment. It can be in the range of 0 ~ 30, or set to **Auto** to be automatically set by the Matrics Visibility Manager.

The **Data Format** fields show that the Reader supports one fixed data format: 8 data digit/ 1 stop bit/ No parity check.

After typing the required information, click **Set Serial Port Properties**.

4. To configure the Reader's TCP/IP communication settings, enter the following information:

Click and check (or uncheck) the **Obtain IP Address via DHCP** checkbox to enable (or disable) the system from automatically obtaining an IP Address via the Dynamic Host Configuration Protocol (DHCP.)

Set the **IP Address** (in dotted notation) to designate the desired fixed IP address of the Reader.

Set the **Subnet Mask** (in dotted notation) to designate the subnet mask for the network on which the Reader is going to reside.

Set the **Default Gateway** (in dotted notation) to designate the gateway for the network on which the Reader is going to reside.

Set the **TCP Port** to designate the number (the default is 3000) of the Reader by which the host program will be able to talk.

After typing the required information, click **Set TCP/IP Properties**.

> **NOTE:** You must reboot the system whose communication settings have been changed before they will take effect.

Manage System Time Settings

To reach public time servers on the Internet, the gateway must be set on the AR 400 Reader system.

1. If you haven't already done so, access the Reader Maintenance Console.

2. Click the **Date/Time** link on the left-hand side of any Reader Maintenance Console page. The System Time Management page displays.
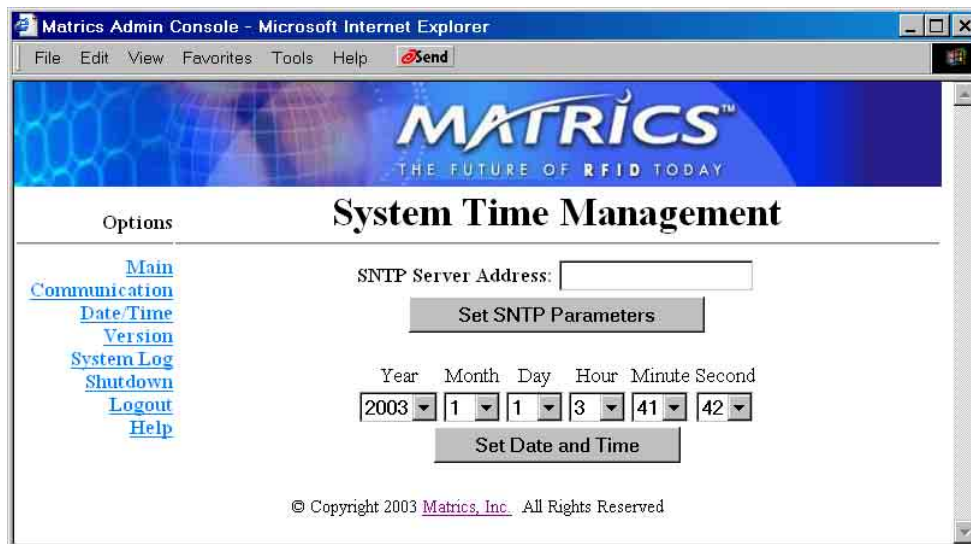
3. Type the address of the server you want to designate as your SNTP (Simple Network Time Protocol) Server in the **SNTP Server Address** field, and then click **Set SNTP Parameters**.

4. To set the date and time on the Reader, select the appropriate values from the **Year**, **Month**, **Day**, **Hour**, **Minute**, and **Second** drop-down list boxes, and then click **Set Date and Time**.

Display Version Control Information and Load Firmware via FTP

1. If you haven't already done so, access the Reader Maintenance Console.

2. Click the **Version** link on the left-hand side of any Reader Maintenance Console page. The Version Control page displays.

The Version Control page displays data that tells you the current version number of the AR 400 firmware, including when it was created, and when it was loaded and from where.

3. To load another version of firmware for the Reader via FTP, type the URL to the FTP location on the Web in the **New Firmware FTP Link** field, enter your FTP user name and password in the appropriate fields, and then click **Download New Firmware**.

Display the System Log and/or Access History

The System Log page allows you to see system log and access history information stored on the Reader.

The System Log provides system information generated by the Reader's internal instructions. The System Log is a circular queue that holds a maximum of 200 records.

The Access History log provides a historical log of user access to this Reader. Every successful login to the Reader through the web interface is recorded. The Access History log is a circular queue that holds a maximum of 20 records.

1. If you haven't already done so, access the Reader Maintenance Console.

2. Click the **System Log** link on the left-hand side of any Reader Maintenance Console page. The System Log page displays system log information in the scrolling text box.

3. To view access history information, click the **Access History** radio button, and then click **Show log**. The System Log page displays access history information in the scrolling text box.
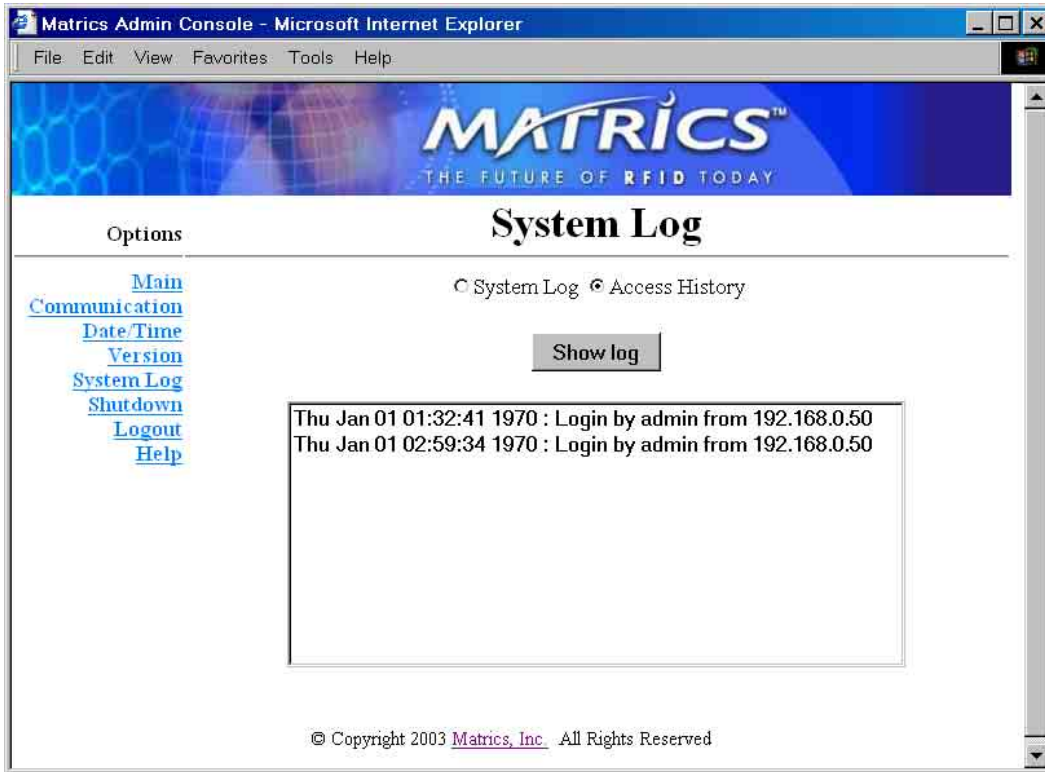
4. To view system log information again, click the **System Log** radio button, and then click **Show log**. The System Log page again displays system log information in the scrolling text box.

Shut Down and/or Restart the System, and Turn Off the HTTP Server

In order to protect the integrity of the data in the Reader, it is strongly recommended that you shut down or restart the Reader via the Shut Down System page when necessary. The request must be confirmed by checking the **Please confirm** checkbox.

> **CAUTION:** If you choose to turn off the Web interface (using the **Turn off HTTP Server** command on the Shut Down System page), you must physically re-connect via serial cable to re-enable Web interface communication. It is not recommended that you use **Turn off HTTP Server** unless you require the highest level of security and understand the process for restart.

1. If you haven't already done so, access the Reader Maintenance Console.

2. Click the **Shutdown** link on the left-hand side of any Reader Maintenance Console page. The Shut Down System page displays.

3. Click and check the **Please confirm** checkbox to indicate that you understand that you are about to shut down and/or restart the system, which may interrupt normal system operation.

4. Select either **Restart** or **Shut down** from the **What do you want to do** drop-down list, or select **Turn off HTTP Server** if you want to shut down (disable) the Web interface.

> **CAUTION:** If you choose to turn off the Web interface via the **Turn off HTTP Server** command, you must physically re-connect via serial cable to re-enable Web interface communication. It is not recommended that you use **Turn off HTTP Server** unless you require the highest level of security and understand the process for restart.

5. Click **Go**.

Use Online Help

The Reader Maintenance Console's Help page provides easy online access to conceptual and procedural information related to the Reader Maintenance Console.

1. To view Help for the Maintenance Console, click the Help link on the left-hand side of any page in the Maintenance Console.

   The Maintenance Console Help page displays in a separate window (refer to the "Use Online Help" section provided previously in Section 3 of this *User's Manual* for more information.)

Log Out of the System

When you are done using the Maintenance Console, you can log out of the system. Logging out ensures the security and integrity of your system, denying unauthorized users access to the Reader.

> **NOTE:** If you do not log out, and you haven't used the system for a pre-set amount of time, the Reader logs you out of the system automatically.

1. Click the **Logout** link on the left-hand side of any page.

   If you have any unsaved changes, the Reader will prompt you to commit or discard them.

2. If prompted to do so, commit or discard your changes [refer to the "Save or Discard Changes (or Revert to Backup)" section provided previously in Section 3 of this *User's Manual* for more information.]

   Your session ends, and the User Login page displays.
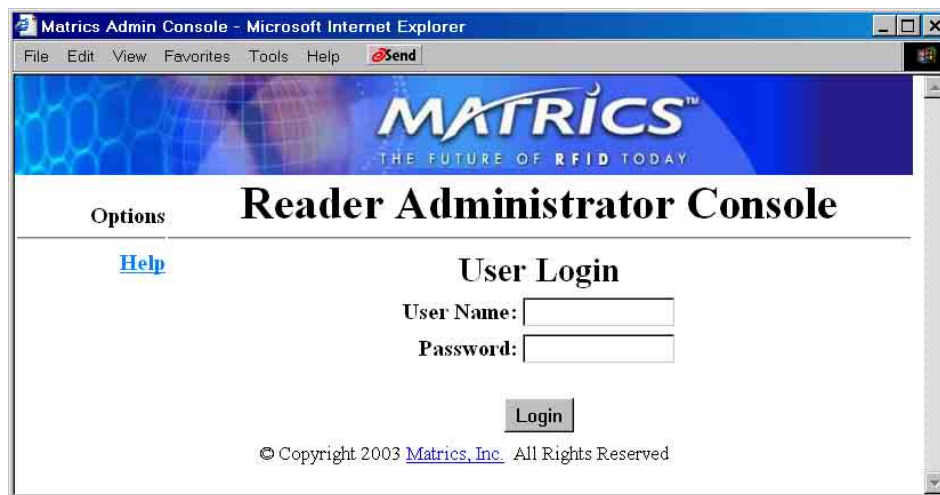
Section 11. Cautions, Notes, and Approvals

Matrics products are approved (or approval pending) by the appropriate regulatory agencies:

Federal Communications Commission (FCC), Part 15

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the *User's Manual*, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

> **CAUTION:** Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Information to the User: 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.

> **WARNING:** This device must be installed in a location that is not accessible to the general public. Install the device so that the antenna is at least 23 centimeters from unsuspecting personnel. Failure to install this device as described will result in a failure to comply with FCC rules for RF exposure and is discouraged.

Disclaimer: Operation of any radio transmitting equipment, including this product, may interfere with the functionality of inadequately protected medical devices. Consult a physician or the manufacturer of the medical device if you have any questions. Other electronic equipment may also be subject to interference.

Section 12. Warranties and Returns

Limited Warranty

Matrics warrants its products to the original purchaser to be free of defects in workmanship and material for a period of ninety (90) days from date of receipt. Matrics' sole and complete responsibility under this warranty is expressly limited to repair or replacement of the defective product.

Replacement products may be new or reconditioned. All products that are replaced shall become the property of Matrics The warranty for replacement products is the same as the equivalent newly purchased product.

Any tampering or modification to the product, or subjecting of product to abnormal electrical, mechanical, or environmental abuse will void this product warranty.

Return Material Authorization (RMA)

You must obtain a return material authorization (RMA) number from Matrics Customer Service (refer to the "Contact Us" section in this *User's Manual*) before you return any parts for repair or replacement. This RMA number must be clearly marked on the outside of the returned package, and referenced in any correspondence contained within the package.

> **NOTE:** If you return parts to Matrics without a RMA number, they will be returned to you at your own expense.

Before you call Matrics to receive a RMA number, make sure that you have the following information available for the Customer Service technician:

☑ A description of the returning item.

☑ Serial numbers (if applicable.)

☑ A description of the fault or failure. (Example: The antenna cable appears to have been pulled out of the antenna, and the system is not functioning.)

☑ Fault or Error message (if applicable.)

Section 13. Contact Us

For sales, service, and technical assistance, contact Matrics at:

Tel: 301.610.6100
      Monday-Friday 8:30 a.m. – 5:00 p.m. EST
Fax: 301.610.6101

http://www.matrics.com/

Matrics, Inc.
7361 Calhoun Place
Suite 250
Rockville, MD 20855
USA

Appendix A. Error Messages and Resolutions

User Messages

Access Denied - Non-trusted Host

Cause: The machine that is attempting access is not set up as a Trusted Host in the system.

Resolution: Add the IP address to the Trusted Host list, or disable Trusted Host check.

Operation failed.

Cause: A user operation did not complete, typically due to invalid input.

Resolution: Validate all of your inputs, and then retry the operation. If it is not successful, contact Matrics Customer Support at 410-872-0300.

You have entered an invalid User Name and/or Password - Try again.

Cause: The User Name and/or password that you typed are not found in the system, or do not match the current user registry.

Resolution: Retype your login information to ensure its accuracy. If it is not successful, contact your site's System Administrator to add/edit your user account.

Your session has Timed-out - Log in again.

Cause: The current session was inactive beyond the timeout period, so the system automatically logged you out.

Resolution: Log in again. As a security precaution to protect against unauthorized system access, you should always log out of the system when you are done using it.

Invalid Name.
The User Name is not correct.

Cause: The User Name that you typed does not match the current user registry (may be illegal characters, too long, too short, unknown or duplicate.)

Resolution: Retype your User Name to ensure its accuracy.

The user name has already been used.

Cause: The User Name is a duplicate (when adding a new user to the user registry.)

Resolution: Retype a new User Name.

Not a legal IP address (1.0.0.0 - 255.255.255.255).
The Host Link is not valid.
Cannot reach the specified IP Address.
The SNMP Host Link is not valid.

Cause: The IP address that you entered is either formatted inaccurately or cannot be accessed (pinged.)

Resolution: Correct any typos in the IP address, and make sure your Host device is connected and online.

Invalid network mask.

Cause: The network mask that you entered is formatted inaccurately.

Resolution: Make sure you get the correct network mask from the network administrator and type it in correctly.

Invalid SNMP version number.

Cause: The version number for SNMP protocol is not a supported version.

Resolution: Use version number 1 for SNMP version 1, and 2 for SNMP version 2c.

Invalid Serial Number (0000-0000-0000-0000).

Cause: The serial number that you entered is formatted inaccurately.

Resolution: Correct any typos in the serial number.

Invalid Description.

Cause: The description you entered contains invalid characters (<,>,or').

Resolution: Remove the invalid characters to correct the description.

Invalid Password.

Cause: The password that you typed does not match the current user registry (may be illegal characters, too long, or too short.)

Resolution: Retype your password to ensure its accuracy.

Cannot delete the admin user account.

Cause: You may have tried to delete the "admin" user account.

Resolution: No action. The operation is ignored because the system will not allow deletion of this user account.

Cannot delete local Host Address.

Cause: You may have tried to delete the 127.0.0.1 IP address.

Resolution: No action. The operation is ignored because the system will not allow deletion of this IP address.

Cannot delete the IP address of the active session host.

Cause: You may have tried to delete the IP address of the host that has the current active session.

Resolution: No action. The operation is ignored because the system will not allow deletion of this IP address.

The IP address is still used in ReaderNetwork configuration.

Cause: You may have tried to delete the IP address that has been automatically added in the trusted hosts database for a reader network device.

Resolution: No action. The operation is ignored because the system will not allow deletion of this IP address.

Cannot modify Default zone.

Cause: The Default read point zone cannot be modified.

Resolution: No action. The operation is ignored because the system will not allow modification of the Default zone.

Cannot modify the default tag filter ALL.

Cause: The default tag filter "ALL" cannot be modified.

Resolution: No action. The operation is ignored because the system will not allow modification of the tag filter "ALL".

This Name has already been used.
This Serial Number has already been used.
This IP Address has already been used.

Cause: The Name, Serial Number, or IP Address that you entered already exists in the system.

Resolution: Type a unique value for the new Name, Serial Number, or IP Address.

You must select an item from the list.

Cause: The system requires that you select an item from the list box before continuing.

Resolution: Select an item from the list box, and then continue.

Last command is still pending. Try again later.

Cause: The system has not completed processing the previous command.

Resolution: Wait a few moments for the previous command to complete, before sending another command.

Another Administrator is currently logged in. Try again later.

Cause: The system will not allow more than one Administrator to log in at a time.

Resolution: Wait until the other Administrator logs out (or times-out) before you log in.

Backup configuration file does not exist.

Cause: The system cannot revert to a backup of the current configuration unless a backup file exists.

Resolution: Commit the new configuration to create a backup file.

Failed to confirm the new Password.

Cause: The system requires that you type your password identically two times.

Resolution: Retype your password twice to ensure its accuracy.

Reader Network configuration change(s) have not been saved.

Cause: The user has requested to log out prior to committing/reverting the changes made during their session.

Resolution: Select one of the Commit/Revert options.

The new Password is the same as the old one.

Cause: The system requires that you type a new password (that is different from your existing password) during the Change Password operation.

Resolution: Type a new password that is different from your existing password.

The old Password is not correct.

Cause: The system requires that you correctly type your existing password during the Change Password operation.

Resolution: Retype your existing password to ensure its accuracy.

Commit Accepted - Configuration Changes are queued for action.
Discard Accepted - Configuration reverted to last committed version.
Revert Accepted - Configuration reverted to backup version.
Command Accepted - All 'On Demand' scans queued.
Command Accepted - Polling is Enabled.
Command Accepted - Polling is Disabled.
Operation was Successful.

Cause: You asked the system to perform a function.

Resolution: No action required. The system is reporting that your request was accepted.

Unspecified error occurred - code:

Cause: A specific error message is missing for the given status code.

Resolution: Note the code number, and contact Matrics Customer Support at 410-872-0300.

The page that you requested was not found.
Internal Web Server Error.

Cause: The system experienced an internal web server error.

Resolution: Contact Matrics Customer Support at 410-872-0300.

Internal Messages

Request method was NULL.
No query string was provided.

Cause:	The system does not permit a proxy program to be executed from the command line rather than the web server.
Resolution:	No action required. The system is reporting that this action is not permitted.

Content length is unknown.

Cause:	The system cannot accept an incorrectly formatted HTTP POST request (from an unsupported Browser application.)
Resolution:	Use a GET request instead, or update your software.

Couldn't read complete post message.

Cause:	The system stopped a POST operation before completion.
Resolution:	Retry the operation, and allow it to complete.

Unhandled reply type.

Cause:	The system generated an unexpected value.
Resolution:	Contact Matrics Customer Support at 410-872-0300.

Failed to open port.
Failed to connect.
Failed to transmit.
Failed to receive.
Error during Receive of Command.

Cause:	The system experienced an internal network failure.
Resolution:	Contact Matrics Customer Support at 410-872-0300.

DB open failed.
DB put failed.
DB get failed.
DB delete failed.

Cause:	The system experienced internal database errors. If you have recently installed the system, this error may be a configuration problem (open permissions.) If the system has been operational for a while, this error may be due to a full or corrupt database. This error may also be caused by disk failure.
Resolution:	Contact Matrics Customer Support at 410-872-0300.

FIFO open failed.

> **Cause:** The system experienced an internal communication failure.
>
> **Resolution:** Contact Matrics Customer Support at 410-872-0300.

Invalid Read Point Type.
Invalid Read Point Scan Period.
Invalid tag category.
Invalid value for the header field of EPC tag.
Invalid value for the manager field of EPC tag.
Invalid value for the class field of EPC tag.
Invalid User Access value.
The option is not valid.

> **Cause:** The system does not recognize the value that you entered, or requires you to make a menu selection.
>
> **Resolution:** Contact Matrics Customer Support at 410-872-0300.

Invalid Device Address.

> **Cause:** The device address info (parent) is invalid, missing, or formatted inaccurately.
>
> **Resolution:** Retry the operation. If it is not successful, contact Matrics Customer Support at 410-872-0300.

The size of command over limit.
The size of value over limit.
Too many command/value pairs.

> **Cause:** The command input has exceeded some internal limit.
>
> **Resolution:** Contact Matrics Customer Support at 410-872-0300.

Command parsing state error.
Missing argument for the command.
Command internal type case error.
Missing operator.
Unknown operator.

> **Cause:** A command has been formatted inaccurately.
>
> **Resolution:** Contact Matrics Customer Support at 410-872-0300.

Failed to register the Read Point.
Failed to unregister the Read Point.
Failed to unregister the Reader.

> **Cause:** The system could not process the item as intended.
>
> **Resolution:** Contact Matrics Customer Support at 410-872-0300.

Cannot find Read Point Class.
Cannot find Reader.
Cannot find Read Point Zone.
Converter was not found.
Cannot find the Event.
Cannot find the Read Point.
Cannot find the specified Reader Port.
Cannot find the specified Host Address.
Cannot find the specified Tag Filter.
Cannot find the specified Read Point Zone.

Cause:	The system could not find (or process) the item as intended.
Resolution:	Retry the operation. If it is not successful, contact Matrics Customer Support at 410-872-0300.

The reader is not empty.

Cause:	The device cannot be deleted if it is not empty.
Resolution:	Delete all children devices at first.

The action must be confirmed.

Cause:	The user must confirm the requested action before it is executed.
Resolution:	Select the confirmation option.