SCANNER WINDOWS MANAGEMENT INSTRUMENTATION DRIVER DEVELOPER'S GUIDE

SCANNER WMI DRIVER DEVELOPER'S GUIDE

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Revision A

April 2019

Revision History

Changes to the original guide are listed below:

Change	Date	Description
-01 Rev A	5/2011	Initial Release.
-02 Rev A	3/2012	Updates for 64-bit.
-03 Rev A	4/2015	Zebra Rebranding.
-04 Rev A	4/2019	Updated: - File directory on pg 3-1, 3-8, 4-2 and 4-5 - Copyright statement on the last page.

TABLE OF CONTENTS

ABOUT THIS GUIDE

Introduction

This guide provides information about Windows Management Instrumentation (WMI), a free component of the Microsoft Windows® operating system, that provides a scalable system management infrastructure.

Chapter Descriptions

Topics covered in this guide are as follows:

- *Chapter 1, INTRODUCTION TO THE ZEBRA SCANNER WMI DRIVER* provides an overview of Windows Management Instrumentation (WMI) and the Zebra Scanner Driver Architecture.
- *Chapter 2, INSTALLATION INSTRUCTIONS* describes how to verify successful installation of the Zebra WMI provider and provides configuration bar codes.
- *Chapter 3, ZEBRA WMI PROVIDER SCHEMA IN COMMON INFORMATION MODEL (CIM)* provides information about the Zebra scanner WMI schema, Managed Object Format (symbscnr.mof) file, and the properties, methods, and events exposed by the instance/method provider.
- *Chapter 4, TEST UTILITIES AND SOURCE CODE* provides information about the sample applications which demonstrate subscription for scanner discovery events and firmware update events.
- *Appendix A, XML SCHEMAS* provides the XML schemas to communicate with an RSM-ready scanner.

Notational Conventions

The following conventions are used in this document:

- Courier New font is used for code segments.
- *Italics* are used to highlight:
  - Chapters and sections in this and related documents
  - Dialog box, window and screen names
  - Drop-down list and list box names
  - Screen field names
  - Check box and radio button names
  - File names
  - Directory names.
- **Bold** text is used to highlight:
  - Parameter and option names
  - Icons on a screen
  - Key names on a keypad
  - Button names on a screen.
- bullets (•) indicate:
  - Action items
  - Lists of alternatives
  - Lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.
- Notes, caution and warning statements appear as follows:

NOTE This symbol indicates something of special interest or importance to the reader. Failure to read the note will not result in physical harm to the reader, equipment or data.

CAUTION This symbol indicates that if this information is ignored, the possibility of data or material damage may occur.

WARNING! **This symbol indicates that if this information is ignored the possibility that serious personal injury may occur.**

Service Information

If you have a problem using the equipment, contact your facility's technical or systems support. If there is a problem with the equipment, they will contact the Global Customer Support Center at: www.zebra.com/support.

CHAPTER 1 INTRODUCTION TO THE ZEBRA SCANNER WMI DRIVER

Overview

Windows Management Instrumentation (WMI) is a free component of the Microsoft Windows® operating system that provides a scalable system management infrastructure. Using a free provider plug-in from Zebra, WMI enables local and network remote management of a scanner. System administrators can leverage WMI to query and set information on desktop systems, applications, networks, components, and accessories, such as a scanner. Developers can use the underlying WMI Application Programmers Interfaces (APIs) to create system management applications/tools that organize system information for the purposes of asset management or other enterprise level activities. The WMI API supports the use of several high level languages such as C++, C#, VB, VBScript, and Jscript.

For more information, search for WMI on http://msdn.microsoft.com.

Zebra Scanner WMI Driver Architecture

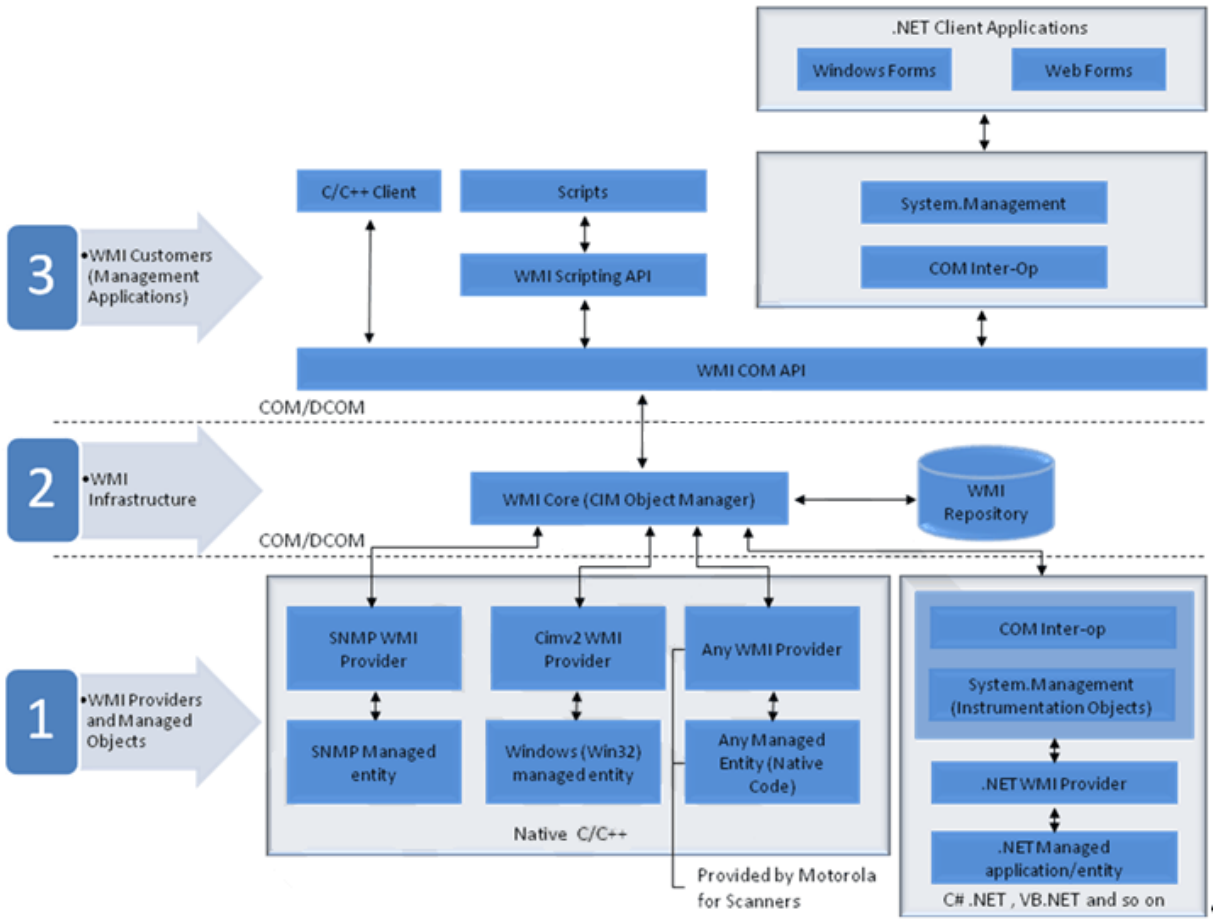


Figure 1-1 *Zebra Scanner WMI Driver Architecture*

Managed Objects and Providers

A provider is a COM object that monitors one or more managed objects for WMI. Similar to a driver, a provider supplies WMI with data from a managed object. A provider also handles messages from WMI to the managed object.

A managed object is a logical or physical enterprise component, such as a hard drive, network adapter, database system, operating system, process, or service. A managed object communicates with WMI through a WMI provider that calls methods in the COM API for WMI.

For example, the Platform SDK ships with the Registry provider, which accesses data in the system registry. WMI passes information from the providers to the WMI infrastructure when client applications and scripts request registry data. The Registry provider has one WMI class, StdRegProv, with many methods but no properties. Other providers, such as the Win32 provider, usually have classes with many properties but few methods, such as Win32_Process or Win32_LogicalDisk.

WMI Infrastructure

The WMI infrastructure is a Microsoft Windows operating system component comprised of two components: the Windows Management service, including the WMI Core, and the WMI repository. The Windows Management service acts as an intermediary between the providers, management applications, and the WMI repository. The repository contains only static data about objects, such as the classes defined by providers. WMI obtains most data dynamically from the provider when a client requests it.

Most provider classes, such as Win32_LogicalDisk, are defined in Managed Object Format (MOF) files, are then compiled into the WMI repository by mofcomp.exe. A provider also has a DLL file which contains the code that implements the classes.

WMI Management Applications and Scripts

A management application or script is an application that interacts with the WMI infrastructure. A management application can query or enumerate management data by calling either the COM API for WMI or the Scripting API for WMI. Management applications can call methods in either API to send instructions or reconfigure a managed object. The only data or actions available for a managed object such as a disk drive or a service are those that a provider supplies.

Zebra WMI Provider Plug-in

Zebra's driver provides a WMI interface with a mechanism to view and program scanner settings. It also enables an administrator to perform actions such as firmware updates, event reporting on the progress of a firmware update and the discovery of scanners, as defined in the Symbol Scanner Managed Object Format (MOF) file. By leveraging the WMI infrastructure built into the Windows Operating System, an application developer can write a management application to perform the following enterprise level activities:

- Discovery (asset management)
- Configuration deployment
- In system firmware update.

Supported Devices

- Any RSM-ready Zebra scanner
- Supported Scanner Communication Modes
- IBM Hand-held USB.

System Requirements

For system requirements, refer to the Scanner SDK Developer’s Guide.

CHAPTER 2 INSTALLATION INSTRUCTIONS

Overview

The Zebra WMI providers are installed as part of the Zebra Scanner SDK Installshield® package. There are two WMI providers: Scanner WMI provider; and, Driver WMI provider. Two Windows services (Symbol Scanner Management and RSM Driver Provider Service) are installed and start automatically. These two services are called Zebra's WMI provider, also called the WMI plug-in.

For general installation instructions to install the Zebra Scanner SDK, refer to the installation instructions in the Zebra Scanner SDK Programmer's Guide.

NOTE The Zebra CoreScanner Driver is a prerequisite for the Zebra WMI provider. The Zebra Scanner SDK Installshield® package automatically installs the CoreScanner Driver if it is not already on the system. A complete installation of the SDK installs the Zebra WMI provider. If you select the custom installation, you must select the Scanner WMI provider and Driver WMI provider components.

Basic Installation Verification

You can perform a basic inspection on your system process list to verify a successful installation of the Zebra WMI provider.

To do a simple check of the Zebra WMI provider's operation:

1. Right click on the *Windows Task Bar* and select *Task Manager*.

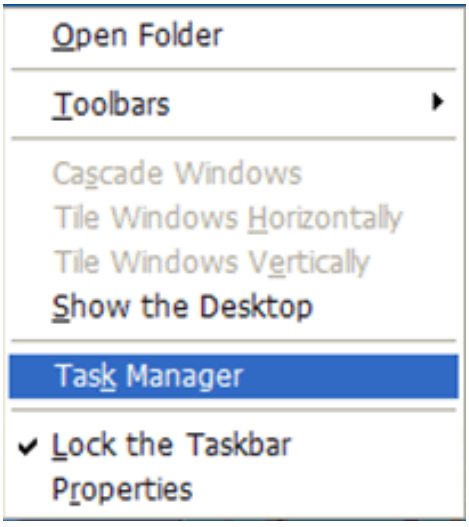


Figure 2-1 *Task Bar Menu - Task Manger*

2. Select the *Processes* tab.

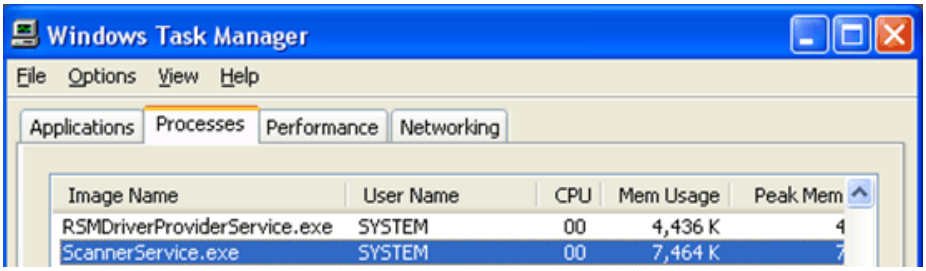


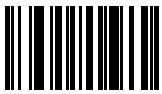
Figure 2-2 *Task Manager - Processes*

3. In the *Image Name* list, find *RSMDriverProviderService.exe* and *ScannerService.exe*. The presence of these two processes in the list indicates a successful installation.

Configuration

Scanner Configuration Bar Codes

Scan the **Set All Defaults** bar code below to return all parameters to the scanner's default values. Refer to the scanner's Product Reference Guide for default values.



Set All Defaults

Scan the bar code below to configure the scanner for the IBM Hand-held USB communication protocol.

USB Communication Protocol

USB (OPOS Hand-held)

CHAPTER 3 ZEBRA WMI PROVIDER SCHEMA IN COMMON INFORMATION MODEL (CIM)

Zebra Scanner WMI MOF File

The Zebra scanner WMI schema is defined using Managed Object Format (MOF) in *symbscnr.mof*. This file is located in the directory *\Zebra Technologies\Barcode Scanners\Common*. The *symbscnr.mof* describes and lists the properties, methods, and events exposed by the instance/method provider. If a specific device or class of device does not support a property, its property value is defined as null.

Properties, Methods and Events

Properties

Table 3-1 *Properties Descriptions*

Name	Type	Access Allowed	Description	Valid Values
PartNumber	String	R (key)	Part number (model number) on the label (P/N) attached to the device. This is an 18 digit number but comes from the COM API trimmed.	Matches exactly against the label on the tag.
SerialNumber	String	R (key)	Serial Number (S/N) on the label attached to the device. This is a 16 digit number but comes from the COM API trimmed.	Matches exactly against the label on the tag.
DateOfManufacture	String	R	Manufacturing date of the device. Format DDMMMYY.	
DateOfService	String	R	Date of last repair within a Zebra Authorized repair facility. Format DDMMMYY.	

Table 3-1 *Properties Descriptions (Continued)*

Name	Type	Access Allowed	Description	Valid Values
DeviceClass	String	R	Description of the device's hardware.	"1D Laser" "2D Laser" "Imager" "Cordless 1D Laser" "Cordless 2D Laser" "Cordless Imager" "Cordless Base Station"
Caption	String	R	This property is identical to PartNumber	
Description	String	R	This property is identical to PartNumber	
FirmwareVersion	String	R	Version of firmware in the scanner.	
FirmwareUpdateStatus	String	R	Status of the last firmware update operation.	
FirmwareUpdateBlockCount	Integer	R	Count of firmware blocks downloaded to scanner in the current firmware update operation.	
FirmwareUpdateTotalBlocks	Integer	R	Total number of blocks the firmware file used in current update operation.	
FirmwareUpdateStatusCode	Integer	R	Status code of the last completed stage of the firmware update operation.	0 - Success 106 - Invalid file path 107 - Management failure 108 - Firmware update failure 109 - Invalid DAT file 118 - Firmware update underway
FirmwareUpdateStatusCodeEx	Integer	R	Download status of software component contained in the firmware file. Zero indicates at least one component successfully downloaded. Non-zero value indicates no software component was downloaded, and the reason why.	0 - Success 110 - Firmware resident
MiddlewareDriverVersion	String	R	Indicates the version of the Management Suite.	

Table 3-1 *Properties Descriptions (Continued)*

Name	Type	Access Allowed	Description	Valid Values
LastDecodeData	String	R	Identifies the last successfully decoded bar code information. The scanner can scan the bar code if it supports its symbology and the symbology is enabled.	
TotalDecodes	Integer	R	Total bar codes the scanner decoded. The values reset to 0 when the WMI service stops.	
TotalGoodDecodes	Integer	R	Total successful bar codes the scanner decoded. The values reset to 0 when the WMI service stops.	
LowPowerMode	Boolean	R/W	Determines whether power remains on after a decode attempt. In low power mode, the scanner enters into a reduced power consumption mode to preserve battery life after each decode attempt.	TRUE, FALSE
RasterMode	Byte	R/W	Sets the raster mode of the scanner.	0, 1, 2
InCradle	Boolean	R	Reports if the cordless scanner is in a charging cradle (applies to cordless only).	TRUE, FALSE
OperationMode	Byte	R	Reports if the scanner is being used in Hand-held Mode or Hands-Free Mode.	0, 1
UPCA	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
UPCE	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
UPCE1	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
EAN8	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
EAN13	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
ConvertUPCEtoA	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
ConvertUPCE1toA	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
UCCCouponExtendedCode	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
Code 128	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
UCCEAN128	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
Code39	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE

Table 3-1 *Properties Descriptions (Continued)*

Name	Type	Access Allowed	Description	Valid Values
TriopticCode39	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
Code93	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
Code11	Boolean	R/W	Enable/Disable this symbology.	TRUE, FALSE
RedundancyLevel	Integer	R/W	Sets the scanner's decode redundancy level. There are four levels. Select higher levels for decreasing levels of bar code quality. As redundancy levels increase, the scanner's aggressiveness decreases. Refer to the scanner Product Reference Guide.	0, 1, 2, 3
Code11Length1	Byte	R/W	Defines the allowable lengths for the symbology. Range: L1 < L2;Two Lengths: L2 > L1; One Length: L1 = len; L2=0; Any Length: L1=0; L2=0	
Code11Length2	Byte	R/W	Defines the allowable lengths for the symbology. Range: L1 < L2Two Lengths:L2 > L1One Length:L1 = len; L2=0Any Length:L1=0; L2=0	
Code39Length1	Byte	R/W	Defines the allowable lengths for the symbology. Range:L1 < L2Two Lengths:L2 > L1One Length:L1 = len; L2=0Any Length:L1=0; L2=0	
Code39Length2	Byte	R/W	Defines the allowable lengths for the symbology. Range: L1 < L2Two Lengths:L2 > L1One Length:L1 = len; L2=0Any Length:L1=0; L2=0	
Code93Length1	Byte	R/W	Defines the allowable lengths for the symbology. Range: L1 < L2Two Lengths:L2 > L1One Length:L1 = len; L2=0Any Length:L1=0; L2=0	
Code93Length2	Byte	R/W	Defines the allowable lengths for the symbology. Range:L1 < L2Two Lengths:L2 > L1One Length:L1 = len; L2=0Any Length:L1=0; L2=0	

Table 3-1 *Properties Descriptions (Continued)*

Name	Type	Access Allowed	Description	Valid Values
LaserOnTime	Byte	R/W	Defines the maximum time decode processing continues during a scan attempt.	"99" = 9.9 seconds"
SecurityLevel	Byte	R/W	Sets decode security for delta bar codes, which include the Code 128 family, UPC/EAN, and Code 93. There are four levels. Select increasing levels of security for decreasing levels of bar code quality. As security levels increase, the scanner's aggressiveness decreases. Refer to the scanner Product Reference Guide.	0, 1, 2, 3
BeeperFreq	Byte	R/W	Gets/sets the Beeper Tone (Low = 2, Med = 1, High = 0) Valid values range from 0 to 2 for LS4208. May vary for other scanners.	Supports values from 0 to 127; which values within this range depend on the scanner.
BeeperVolume	Byte	R/W	Gets/sets the Beeper Volume (Low = 2, Med = 1, High = 0) Valid values range from 0 to 2 for LS4208. May vary for other scanners.	Supports values from 0 to 127; which values within this range depend on the scanner.

Methods

The methods in *Table 3-2* are counterparts of the functions defined in the Scanner SDK driver COM API. See *Appendix A, XML SCHEMAS* for the XML schema, which is shared with the Scanner SDK driver COM API.

Table 3-2 *Methods Descriptions*

Name	Parameters	Return Values	Description
GetAllAttributes	[OUT] string attributes	Integer 0 = Success Non-zero=Failure	Returns all supported attributes of the selected scanner as an xml through the Attributes parameter. The attributes returned as an out value in the Attributes parameter must match the schema on *page A-2*. This function is an exact mapping of the ATTR_GET method in the Scanner SDK.
GetAttributes	[IN] string attNumberList [OUT] string attValueList	Integer 0 = Success Non-zero=Failure	Retrieves values of specific attribute numbers. Use this to query values of one or more attributes numbers. attrNumberList [in]: The attribute numbers whose values must be queried. These attribute numbers should be comma separated. See *page A-3* for the schema for the attribute numbers. attrValueList [out]: The attribute values returned as output. See *page A-3* for the schema for the attribute numbers. This function is an exact mapping of the ATTR_GET method in the Scanner SDK.
SetAttributes	[OUT] string attributeSettings	Integer 0 = Success Non-zero=Failure	Changes the value of writable attributes in the scanner. See *page A-4* for the schema for attributeSettings. This function is an exact mapping of the ATTR_GET method in the Scanner SDK.
StoreAttributes	[OUT] string attributeSettings	Integer 0 = Success Non-zero=Failure	Changes the value of writable attributes in the scanner. See *page A-4* for the schema for attributeSettings. This function is an exact mapping of the ATTR_GET method in the Scanner SDK.
UpdateFirmware	[OUT] string filePath	Integer 0 = Success Non-zero=Failure	Update firmware on scanner devices. The firmware file must reside on the computer to which the scanner is connected, and the file path must be fully qualified. This function supports concurrent firmware update of multiple scanner devices. A return value of 0 indicates the successful start of the firmware update, but does not guarantee overall firmware update success.
StartNewFirmware		Integer 0 = Success Non-zero=Failure	Reboots the scanner with the updated firmware activated.

Table 3-2 *Methods Descriptions (Continued)*

Name	Parameters	Return Values	Description
UpdateAttribMetaFile	[OUT] string filePath	Integer 0 = Success Non-zero=Failure	Updates the metafile that defines the names of the attributes. File path:Fully qualified path to the new meta-file.
ScanDisable		Integer 0 = Success Non-zero=Failure	Disables the scanner.
ScanEnable		Integer 0 = Success Non-zero=Failure	Enables the scanner.

Table 3-3 *Return Values for WMI Methods Invocations*

Return Value	Description
0	Method succeeded.
104	Connection already opened
106	File path invalid (file not found).
108	Firmware update failure.
109	Invalid DAT file.
110	Resident firmware.
112	Invalid scanner.
114	Input parameter invalid.
118	Another firmware update already in progress on the scanner.
122	Driver response empty.
123	Request failed in the driver.
124	Request failed in the scanner.

Events

The Zebra scanner WMI provider implements the events in *Table 3-4*. The events are defined in the scanner MOF file.

Table 3-4 *Events Descriptions*

Name	Description
SymbScnrFirmwareUpdateEvent	Occurs at different stages of firmware update activity. The following values define the *Type* of event. 1 - Session start 2 - Download start 3 - Download progress 11 - Session end 12 - Download end 100 - Error
SymbScnrDiscoveryEvent	Occurs when a scanner is connected or disconnected from the host and are indicated using the following *Status* values in the event. 0 - Device lost 1 - Device found

Zebra Driver WMI MOF File

The Zebra Driver WMI schema is defined using Managed Object Format (MOF) in the file *RSMDriverProvider.mof* located in the directory *\Zebra Technologies\Barcode Scanners\Common*. The *RSMDriverProvider.mof* describes and lists the properties, methods, and events exposed by the instance/method provider. If a specific device or class of device does not support a property, its property value is defined as null.

Properties Exposed by the Instance/Method Provider

Table 3-5 *Properties Exposed by the Instance/Method Provider*

Name	Type	Access Allowed	Description	Valid Values
HostAutoSwitchingEnabled	Boolean	R/W	If enabled, driver temporarily switches Non-RSM mode scanners to RSM mode, every time the scanner is attached or re-booted	TRUE, FALSE

Methods Exposed by the Instance/Method Provider

Table 3-6 *Methods Exposed by the Instance/Method Provider*

Name	Parameters	Return Values	Description
GetDeviceTopology	[OUT] string DeviceTopology	Integer 0 = Success Non-zero= Failure	Get the Device Topology.
SwitchHostMode	[IN] string ScannerIdentity, [IN] string TargetHostMode, [IN] boolean IsSilentSwitch, [IN] boolean IsPermanentChange	Integer 0 = Success Non-zero= Failure	Switch the Host Mode of the scanner.
RebootScanner	[IN] string ScannerIdentity	Integer 0 = Success Non-zero=Failure	Reboot the given scanner.
UpdateAttributeMetaFile	[IN] string AttributeMetaFilePath	Integer 0 = Success Non-zero=Failure	Update Attribute MetaFile.

Events Exposed by the Instance/Method Provider

Table 3-7 *Events Exposed by the Instance/Method Provider*

Name	Description
ScannerPNPEvent	This event occurs when a Zebra scanner is attached or detached on the host computer. Attach = 0 Detach= 1

CHAPTER 4 TEST UTILITIES AND SOURCE CODE

Overview

The Zebra WMI provider includes C# sample applications that perform queries of the scanner properties and invoke methods. These sample applications, which include source code, demonstrate subscription for scanner discovery events and firmware update events.

The Driver WMI Sample Application demonstrates an application communicating with the Zebra Scanner WMI Driver. The Scanner WMI Sample Application enables you to display management data received from the scanner through the Zebra Scanner SDK Driver.

Test Utilities Provided in the SDK

The Zebra WMI provider includes the following test utilities:

- Scanner WMI C# Sample Application
- Driver WMI C# Sample Application.

Each test utility demonstrates the main functionalities of the Zebra WMI provider. You can gain an understanding of the Zebra WMI provider using these test utilities. This chapter also describes how to use the test utilities' functionality.

NOTE Microsoft®.Net Framework v2.0 or later may need to be installed to execute C#.Net sample applications. If so, Microsoft detects and informs the user of this requirement.

Scanner WMI C# Sample Application

The Zebra Scanner WMI C#.Net sample application enables you to simulate an application which communicates with the Zebra Scanner WMI provider. The utility demonstrates the functionality of the Scanner WMI provider. It includes C#.Net source code and its solution, and project files for further reference.

The Scanner WMI C# Sample Application is included with the standard installation of the Scanner SDK, or when the Scanner WMI Provider Sample Application option of the custom Scanner SDK installation is selected.

To access this window, go to the *Programs* menu under *Zebra Scanner* > *WMI* > *Remote Mgmt - WMI - Scanner Provide Sample App*.

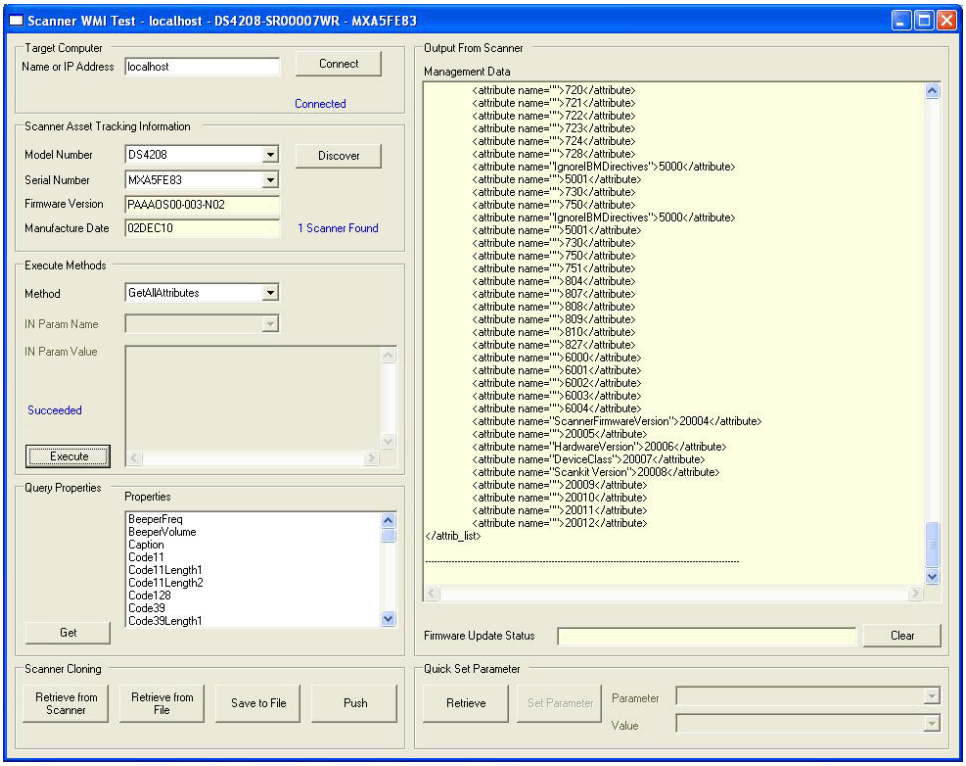


Figure 4-1 *Scanner WMI Test Window*

Table 4-1 *Scanner WMI Test Utility - Button/Field Functionality*

Button or Field	Description
(Host) Name or IP Address	Specifies the name or IP address of the computer to connect. The default is localhost.
Connect	Connects to the host specified in the Name or IP Address field, populates Method and Property lists, and registers to receive scanner discovery events and firmware update events.
Discover	Discovers scanners connected to the host device.
Model Number	Extracted from the part number of all discovered scanners.
Serial Number	The serial numbers of the scanners under the model selected from the Model Number drop-down list.
Firmware Version	The firmware version of the selected scanner.
Manufacture Date	The manufacture date of the selected scanner.
Method	Drop-down list containing the following items: • GetAllAttributes: Gets all attribute identities in an XML string and displays them in the output box. • GetAttributes: Gets detailed attribute information of attribute numbers specified in the parameter input box, and displays them in the output box. • ScanDisable: Disables scanner. • ScanEnable: Enables scanner. • SetAttributes: Sets the list of attribute values specified in the parameter input box. These values are volatile, and are discarded after a device reboot. • StartNewFirmware: Starts the scanner with newly downloaded firmware. • StoreAttributes: Stores the list of attribute values specified in the parameter input box. These values are non-volatile, and persist after a device reboot. • UpdateAttribMetaFile: Updates attribute meta data with contents of the file specified in the parameter input box. • UpdateFirmware: Displays an Open window for selecting the firmware file.
IN Param Name	Name of the input parameter of the item selected in the Method drop-down list, if applicable.
IN Param Value	Text field to enter the value of the input parameter required for the selected method, if applicable.
Execute	Invokes the method selected in the Method drop-down list. If the method requires an input parameter value, enter it in the text box.
Query Properties	List of properties that can be queried. This list is not comprehensive. Use the GetAttributes method to discover additional scanner attribute values.
Get	Queries one or more properties selected in the list box and display results in the output text area. You can select multiple items in the list box at a time.
Management Data	Displays the results of a method execution or property query.
Firmware Update Status	Displays the firmware update status received from *Firmware Update Events*.

Table 4-1 *Scanner WMI Test Utility - Button/Field Functionality (Continued)*

Button or Field	Description
Clear	Clears text in the data output areas.
Retrieve from Scanner	Retrieves all storable attributes from the scanner and stores them in the clipboard.
Retrieve from File	Opens a window to read in an .xml file containing attribute settings to the clipboard.
Save to File	Save clipboard contents to a file. Provides a Save as window to select the filename.
Push	Opens the Cloning window that you can use to push the clipboard contents to selected scanners.
Retrieve	Retrieves all storable attributes from the scanner and populates the Parameters drop-down list with the attributes. When you select an attribute in the list, the *Value* drop-down list changes to match its content (*True* / *False* or text box). The Value list also displays the current value.
Set Parameter	Stores the current value of the selected attribute.

Driver WMI C# Sample Application

The Zebra Driver WMI C#.Net sample application enables you to simulate an application that communicates with the Zebra Driver WMI provider. The utility demonstrates the functionality of the Driver WMI provider. It includes C#.Net source code and its solution and project files for further reference.

The Driver WMI C# Sample Application is included with the standard installation of the Scanner SDK, or when the Driver WMI Provider Sample Application option of the custom Scanner SDK installation is selected.

To access this window select the *Programs* menu under *Zebra Scanner > WMI > Remote Mgmt - WMI - Driver Provide Sample App.*

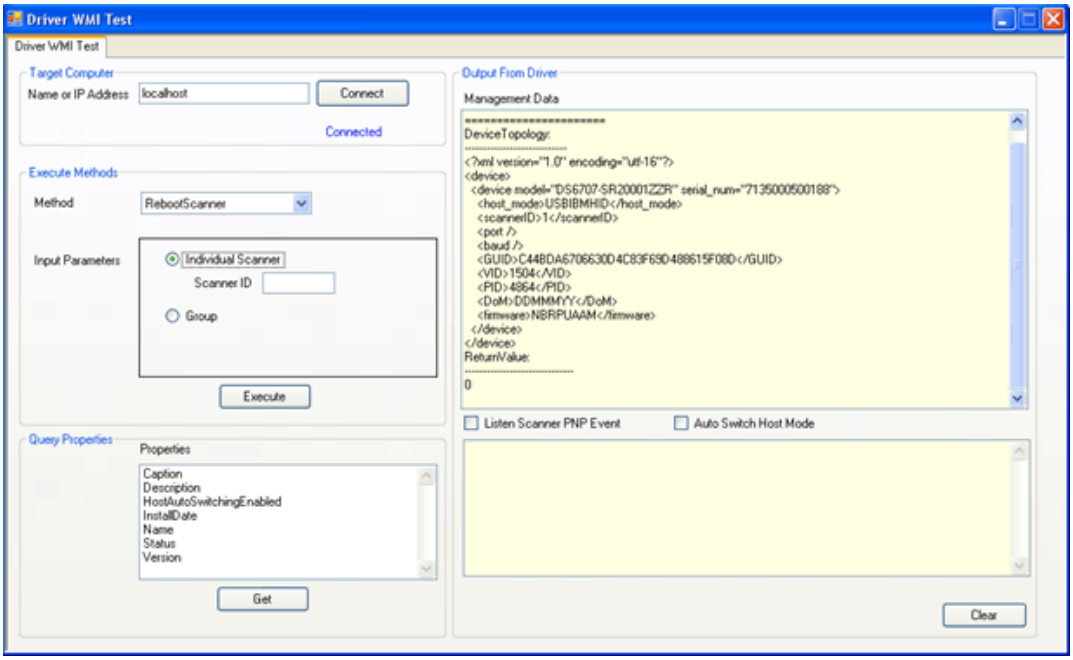


Figure 4-2 *Driver WMI Test Window*

Table 4-2 *Driver WMI Test Utility - Button/Field Functionality*

Button or Field	Description
(Host) Name or IP Address	Specifies the name or IP address of the computer to connect. The default is localhost.
Connect	Connects to the host specified in the Name or IP Address field, populates Method and Property lists, and registers to receive scanner discovery events and firmware update events.
Method	Drop-down list containing the following items: • GetDeviceTopology: Get the topology that devices are connected to the specified computer. • RebootScanner: Reboot a specified scanner or all scanners connected. • SwitchHostMode: Switch the USB communication protocol of a specified scanner. Permanent change and silent switch parameters can be set as input parameters. • UpdateAttribMetaFile: Updates attribute metadata with contents of the file specified in the *File Path* text box.

Table 4-2 *Driver WMI Test Utility - Button/Field Functionality (Continued)*

Button or Field	Description
Input Parameters	Name of the input parameter of the item selected in the Method drop-down list, if applicable.
Execute	Invokes the method selected in the *Method* drop-down list. If the method requires an input parameter value, enter it in the text box.
Query Properties	List of properties that can be queried.
Get	Queries a property selected in the list box and display results in the Management Data text area.
Management Data	Displays the results of a method execution or property query.
Listen Scanner PNP Event	Listen to the scanner attach and detach events and display the results in the text area.
Autoswitch Host Mode	Automatically switch the HID Keyboard scanners to IBM Hand-held scanners.
Clear	Clears the output.

APPENDIX A XML SCHEMAS

Overview

This appendix provides the XML schemas which Zebra Scanner WMI interfaces use to communicate with an RSM-ready scanner.

Table A-1 *XML Schemas*

GetAllAttributes

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="attrib_list">
    <xs:complexType>
      <xs:sequence>
        <xs:element maxOccurs="unbounded" name="attribute">
          <xs:complexType>
            <xs:simpleContent>
              <xs:extension base="xs:unsignedShort">
                <xs:attribute name="name" type="xs:string" use="required" />
              </xs:extension>
            </xs:simpleContent>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

GetAttributes

Schema for AttNumberList

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="attrib_list" type="xs:string" />
</xs:schema>
```

Schema for AttValueList

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="attrib_list">
    <xs:complexType>
      <xs:sequence>
        <xs:element maxOccurs="unbounded" name="attribute">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="id" type="xs:unsignedShort" />
              <xs:element name="name" />
              <xs:element name="datatype" type="xs:string" />
              <xs:element name="permission" type="xs:string" />
              <xs:element name="value" type="xs:string" />
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

SetAttributes and StoreAttributes

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="attrib_list">
    <xs:complexType>
      <xs:sequence>
        <xs:element maxOccurs="unbounded" name="attribute">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="id" type="xs:unsignedByte" />
              <xs:element name="datatype" type="xs:string" />
              <xs:element name="value" type="xs:string" />
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

GetDeviceTopology

```
<?xml version="1.0" encoding="utf-16"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="device">
    <xs:complexType>
      <xs:sequence>
        <xs:element maxOccurs="unbounded" name="device">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="host_mode" type="xs:string" />
              <xs:element name="scannerID" type="xs:positiveInteger" />
              <xs:element name="port" />
              <xs:element name="baud" />
              <xs:element name="GUID" type="xs:string" />
              <xs:element name="VID" type="xs:unsignedShort" />
              <xs:element name="PID" type="xs:unsignedShort" />
              <xs:element name="DoM" type="xs:string" />
              <xs:element name="firmware" type="xs:string" />
              <xs:element minOccurs="0" maxOccurs="unbounded" name="device">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element name="host_mode" type="xs:string" />
                    <xs:element name="scannerID" type="xs:positiveInteger" />
                    <xs:element name="port" />
                    <xs:element name="baud" />
                    <xs:element name="GUID" />
                    <xs:element name="VID" />
                    <xs:element name="PID" />
                    <xs:element name="DoM" type="xs:string" />
                    <xs:element name="firmware" type="xs:string" />
                  </xs:sequence>
                  <xs:attribute name="model" type="xs:string" use="required" />
                  <xs:attribute name="serial_num" type="xs:string" use="required" />
                </xs:complexType>
              </xs:element>
            </xs:sequence>
            <xs:attribute name="model" type="xs:string" use="required" />
            <xs:attribute name="serial_num" type="xs:string" use="required" />
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

SymbScnrFirmwareUpdateEvent

Session Start

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="sess_start">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="modelnumber" type="xs:string" />
        <xs:element name="serialnumber" type="xs:unsignedLong" />
        <xs:element name="GUID" type="xs:string" />
        <xs:element name="maxcount" type="xs:unsignedShort" />
        <xs:element name="status" type="xs:unsignedByte" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

Download Start

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="dl_start">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="modelnumber" type="xs:string" />
        <xs:element name="serialnumber" type="xs:unsignedLong" />
        <xs:element name="GUID" type="xs:string" />
        <xs:element name="software_component" type="xs:unsignedByte" />
        <xs:element name="status" type="xs:unsignedByte" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

Download Progress

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="dl_progress">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="modelnumber" type="xs:string" />
        <xs:element name="serialnumber" type="xs:unsignedLong" />
        <xs:element name="GUID" type="xs:string" />
        <xs:element name="software_component" type="xs:unsignedByte" />
        <xs:element name="progress" type="xs:unsignedByte" />
        <xs:element name="status" type="xs:unsignedByte" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

Session End

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="sess_end">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="modelnumber" type="xs:string" />
        <xs:element name="serialnumber" type="xs:unsignedLong" />
        <xs:element name="GUID" type="xs:string" />
        <xs:element name="status" type="xs:unsignedByte" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

Download End

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="dl_end">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="modelnumber" type="xs:string" />
        <xs:element name="serialnumber" type="xs:unsignedLong" />
        <xs:element name="GUID" type="xs:string" />
        <xs:element name="software_component" type="xs:unsignedByte" />
        <xs:element name="size" type="xs:unsignedByte" />
        <xs:element name="status" type="xs:unsignedByte" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

Error

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="sess_info">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="modelnumber" type="xs:string" />
        <xs:element name="serialnumber" type="xs:unsignedLong" />
        <xs:element name="GUID" type="xs:string" />
        <xs:element name="status" type="xs:unsignedShort" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

SymbScnrDiscoveryEvent

Corded Scanner

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="scanners">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="scanner">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="scannerID" type="xs:unsignedByte" />
              <xs:element name="modelnumber" type="xs:string" />
              <xs:element name="serialnumber" type="xs:unsignedLong" />
              <xs:element name="GUID" type="xs:string" />
            </xs:sequence>
            <xs:attribute name="type" type="xs:string" use="required" />
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

Cordless Scanner

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="scanners">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="scanner">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="scannerID" type="xs:unsignedByte" />
              <xs:element name="modelnumber" type="xs:string" />
              <xs:element name="serialnumber" type="xs:string" />
              <xs:element name="GUID" type="xs:string" />
              <xs:element name="pnp" type="xs:unsignedByte" />
              <xs:element name="scanner">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element name="scannerID" type="xs:unsignedByte" />
                    <xs:element name="modelnumber" type="xs:string" />
                    <xs:element name="serialnumber" type="xs:unsignedLong" />
                    <xs:element name="GUID" />
                    <xs:element name="pnp" type="xs:unsignedByte" />
                  </xs:sequence>
                  <xs:attribute name="type" type="xs:string" use="required" />
                </xs:complexType>
              </xs:element>
            </xs:sequence>
            <xs:attribute name="type" type="xs:string" use="required" />
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

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GLOSSARY

A

API. An interface by means of which one software component communicates with or controls another. Usually used to refer to services provided by one software component to another, usually via software interrupts or function calls

Aperture. The opening in an optical system defined by a lens or baffle that establishes the field of view.

Application Programming Interface. See **API**.

ANSI Terminal. A display terminal that follows commands in the ANSI standard terminal language. For example, it uses escape sequences to control the cursor, clear the screen and set colors. Communications programs support the ANSI terminal mode and often default to this terminal emulation for dial-up connections to online services.

ASCII. American Standard Code for Information Interchange. A 7 bit-plus-parity code representing 128 letters, numerals, punctuation marks and control characters. It is a standard data transmission code in the U.S.

Autodiscrimination. The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content is decoded.

B

Bar. The dark element in a printed bar code symbol.

Bar Code. A pattern of variable-width bars and spaces which represents numeric or alphanumeric data in machine-readable form. The general format of a bar code symbol consists of a leading margin, start character, data or message character, check character (if any), stop character, and trailing margin. Within this framework, each recognizable symbology uses its own unique format. See **Symbology**.

Bar Code Density. The number of characters represented per unit of measurement (e.g., characters per inch).

Bar Height. The dimension of a bar measured perpendicular to the bar width.

Bar Width. Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.

BIOS. Basic Input Output System. A collection of ROM-based code with a standard API used to interface with standard PC hardware.

Bit. Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

Bits per Second (bps). Bits transmitted or received.

Bit. Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

bps. See **Bits Per Second**.

Byte. On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory is used to store one ASCII character.

BOOTP. A protocol for remote booting of diskless devices. Assigns an IP address to a machine and may specify a boot file. The client sends a bootp request as a broadcast to the bootp server port (67) and the bootp server responds using the bootp client port (68). The bootp server must have a table of all devices, associated MAC addresses and IP addresses.

boot or boot-up. The process a computer goes through when it starts. During boot-up, the computer can run self-diagnostic tests and configure hardware and software.

Zebra Technologies Corporation
Lincolnshire, IL U.S.A.
http://www.zebra.com

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