AVEVA™ Communication Drivers Pack – Standards – SNMP Driver

User Guide

Publication date: Tuesday, May 9, 2023

Publication ID: 868899

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Chapter 1

Getting Started with the SNMP Communication Driver

This document describes the technical specifications and configuration options for the Simple Network Management Protocol (SNMP) Communication Driver.

About the SNMP Communication Driver

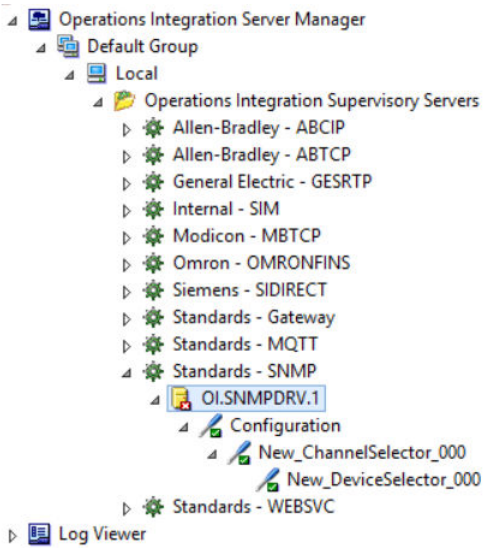
Use the SNMP Communication Driver to monitor and manage devices on IP networks. You can add and configure channels and the devices to be monitored and managed using your choice of Management Information Base (MIB) browser.

Note: This Communication Driver is hosted by the OI Server Manager, a Microsoft Management Console (MMC) snap-in, which is a part of the Operations Control Management Console (OCMC) suite of utilities. Many high-level functions and user-interface elements of the OI Server Manager are universal to all Communication Drivers, and only the documentation for the OI Server Manager (also known as Communication Drivers Pack) contains descriptions of those universal functions/UI elements. Therefore, reading the documentation for both the MMC and the OI Server Manager is critical to understanding this user's guide. To read the documentation about the MMC and OI Server Manager, right-click the OI Server Manager icon and select the Help menu. Both the MMC Help and the OI Server Manager Help are displayed.

An SNMP agent must be installed and configured on each device managed by the SNMP Communication Driver. For information about installing and configuring an SNMP in Windows, see Configuring an SNMP Agent in Windows.

Determining the Hierarchical Structure

Determine the hierarchical structure of the networked devices environment to which you plan to connect. The SNMP Communication Driver is configured in a two-tier hierarchy, with Channel Selector object and associated Device Selector objects.



Note: This device hierarchy is different and separate from the hierarchical namespace containing Object Identifiers and associated variables visible and manageable through a Management Information Base (MIB) browser.

Working with a Basic Hierarchy

You can create more than one Channel Selector object, but a basic configuration calls for a single Channel Selector object with child Device Selector objects representing individual devices. This typical configuration is common for the following reasons:

- Traps are received from the port specified in the Channel Selector settings, with port 162 as the default. To receive traps correctly, only one Channel Selector can be bound to the specified port. If multiple channel selectors share the same port, only one of them will receive traps.
- In real world applications, traps are sent to port 162 by default when using SNMP Windows Agents or devices (PLCs routers, printers etc. that support SNMP). You can specify any valid port, but in most cases when talking to real devices with SNMP, the port 162 is used. Hence, the default value for the TRAP port has been configured to 162.

  However, in some cases you can change the default trap port that the device or machine can send traps to.
- The same conditions, guidelines, and recommendations apply if you want to clone multiple instances of the SNMP Communication Driver on the same machine. Traps will function only in the first activated instance of any SNMP Communication Driver running on the same machine. Any subsequent instances of the SNMP server will not receive any trap packets.

Configuring More than One Channel Selector

Use the Channel Selector for the Trap Port setting, but also to set the number of Simultaneous Requests you want to make to your managed devices.

- With multiple simultaneous requests configured, tests have shown an improvement in throughput and performance.
- Even without multiple simultaneous requests, using the default setting (1), a new thread is created for each new Channel Selector. Multiple threads instead of single one, will also improve performance.

If you observe performance issues in your SNMP configuration, we recommend the following hierarchy:

1. Create one Channel Selector for the devices from which you want to receive traps.
2. Create additional Channel Selectors to improve performance of the Communication Driver and to use simultaneous connections for devices from which you don't want to receive traps, but from which you want to process values for greater numbers of OIDs.

Note: A limitation of multiple Channel Selectors or a channel selector with enabled simultaneous requests is that these configurations will show higher memory and CPU usage by the Communication Driver.

Building the Hierarchical Structure in the Operations Control Management Console (OCMC)

To build the hierarchical structure

1. Configure the new SNMP Communication Driver.
   a. In the console tree, right-click **Configuration** and then click **Add ChannelSelector Connection**.
   b. Edit the object name to appropriately describe components of your specific hardware environment. If you do not rename the object at this time, a numeric sequencing system is applied. You can rename the hierarchy entry later.
2. Right-click the New_ChannelSelector_000 object you created in the tree and then click **Add DeviceSelector Connection** to create a Device Selector object.
3. Optionally create device groups for each logical end-point object.

Important: When the Communication Driver or any of its configuration views are selected and you open multiple instances of the OI Server Manager, the OI Server Manager places the configuration views from the subsequent instances of the same Communication Driver into read-only mode. Access to the second instance of the Communication Driver resumes after the first one has been deselected or closed. Likewise, access to the Communication Driver configuration will be unlocked for the next instance in this order.

Chapter 2

Configuring the SNMP Communication Driver

Setting Up an SNMP Communication Driver for the First Time

If you are setting up an Communication Driver for the first time, perform the following tasks in the order listed:

1. Locate the Communication Driver in the Operations Control Management Console (OCMC). In the OI Server Manager tree, under the Local node, the Communication Driver base instance name is OI.SNMPDIR.1.
2. Configure the global parameters. See "Configuring Global Parameters" in the Communication Drivers Pack help.
3. Add one or more channel selector connections. See Adding and Configuring Channel Selector Objects.
4. Add one or more device selector connections. See Adding and Configuring Device Selector Objects.
5. Add one more device groups. See Device Group Definitions.
6. Add device items. See Device Item Definitions.
7. Activate the Communication Driver. See "Activating/Deactivating the OI Server" in the Communication Drivers Pack help.
8. Troubleshoot any problems. See Troubleshooting the SNMP Communication Driver.

Note: (Optional) You can also use any commercially available MIB browser to find the OIDs to use as item references on the Communication Driver.

Adding and Configuring Channel Selector Objects

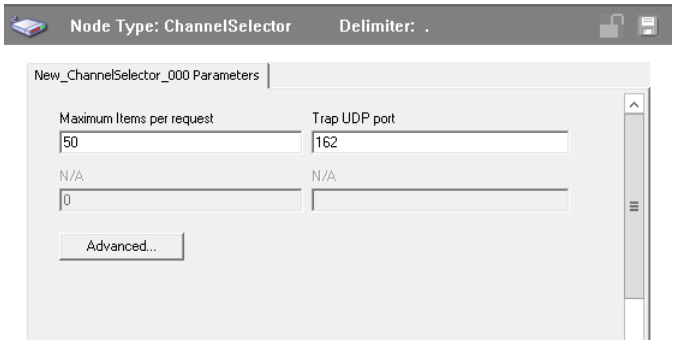
The server-specific configuration portion of the SNMP Communication Driver hierarchy tree under the OI Server Manager starts at the Channel Selector object. This object lets you set server parameters for communication with agents (devices) in the hierarchy tree.

See Determining the Hierarchical Structure for more information about setting up your device hierarchy.

To add a Channel Selector object to your SNMP hierarchy

1. In the console tree, right-click **Configuration** and then click **Add Channel Selector Connection**.

   The "New_ChannelSelector_000" Parameters view is displayed.



   Edit the object name to appropriately describe components of your specific hardware environment. If you do not rename the object at this time, a numeric sequencing system is applied. You can rename the hierarchy entry later.

To configure the Channel Object

The **New_ChannelSelector_000 Parameters** configuration view has two configurable parameters:

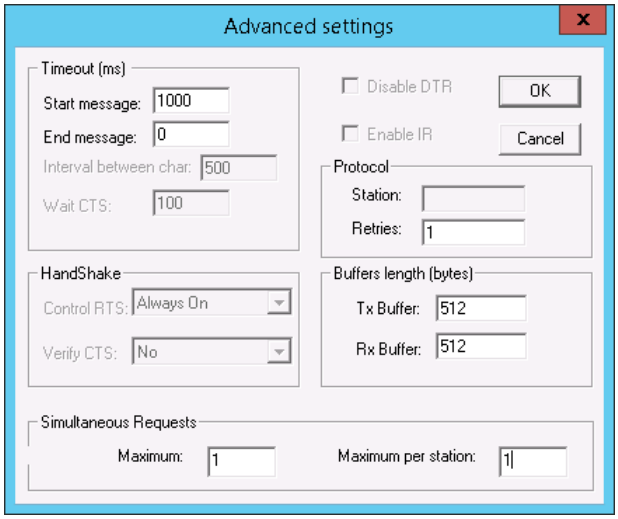
1. **Maximum Items per request:** Specify the maximum number of OID per network request. This limit can vary depending on the capability of the remote devices.

   Default value is 50, and the range is between 1 to 200.

2. **Trap UDP Port**: Specify the UDP port number to receive traps.The default value is 162.

3. Click **Advanced**. The **Advanced settings** dialog appears.

   The SNMP Communication Driver will function with the advanced settings defaults. It is unnecessary to change the default settings to complete your SNMP Communication Driver connectivity.



The following parameters are configurable in the **Advanced settings** of the SNMP Communication Driver:

Parameter	**Default**	**Description**
Timeout: Start message	1000 ms	Specify the timeout for the message start.
Protocol: Retries	1	Enter value to specify the number of attempts to execute the same communication before considering a communication error for this command.
Simultaneous Requests: Maximum	1	Specify the maximum number of requests that can be sent simultaneously to all connected devices. If you plan to listen to traps sent by different devices (which are configured as device selector stations), leave the maximum and minimum at 1.
Simultaneous Requests: Maximum per station	1	Specify the maximum number of requests that may be sent simultaneously to a single device. If you do not plan to listen to traps sent by different devices, you can set maximum and minimum values higher than 1.

The following parameters are not applicable in the SNMP Communication Driver, or are pre-set and are not configurable in the SNMP Communication Driver. Descriptions are provided here for information purposes:

Parameter	**Description**
Timeout: End message	Reserved. Do not modify.
Timeout: Interval between char	Specifies the timeout between each character.

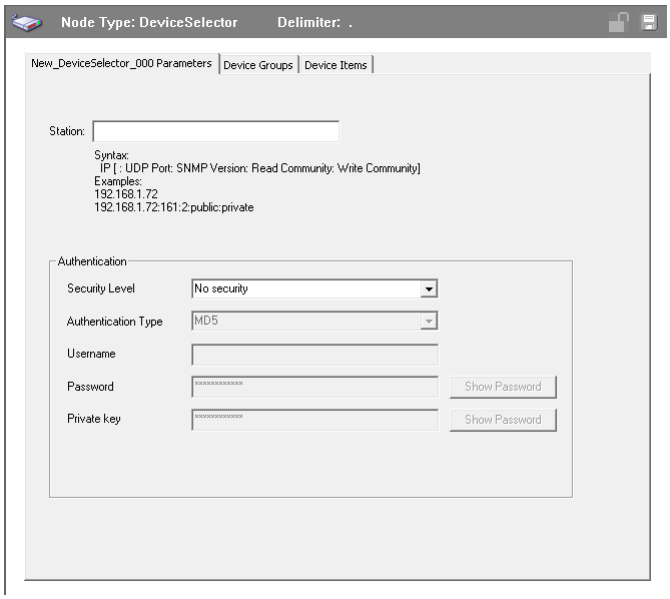
Timeout: Wait CTS	Specifies the timeout for the Clear to Send wait.
Handshake: Control RTS	Specifies whether to use the Request to Send control.
Handshake: Verify CTS	Specifies whether to use the Clear to Send verification type.
Disable DTR	When disabled, no DTR signal is sent before starting a communication.
Enable IR	Available only on Windows Embedded target systems. Enables use of Infrared interface (COM2 port) rather than a standard serial port to communicate with devices.
Protocol: Station	Used to specify a slave address where required.
Buffers length: Tx Buffer	Reserves memory for data transmission to the SNMP devices. **Reserved. Do not modify.**
Buffers length: Rx Buffer	Reserves memory for data received from the SNMP devices. **Reserved. Do not modify.**

Adding and Configuring Device Selector Objects

The SNMP Communication Driver can connect to different Windows agents, PLCs, and other data sources. These connections are modeled in the hierarchy by means of Device Selector objects, each of which models the end-point of the communications path.

To add a Device Selector connection to your SNMP hierarchy

1. In the console tree, right-click the **ChannelSelector** object, and then click **Add DeviceSelector Connection**. The **New_DeviceSelector_000** object and associated **Parameters** configuration view appear.



2. Rename the object as needed to reflect the connection.

Configuring the Device Selector Object

Configuring the Device Selector comprises of two steps:

1. Configuring the Station ID
2. Authenticating the Connection

Configuring the Station ID

To configure the Station ID

- Configure the **Station**.

The Station field cannot be empty. The syntax of the Station depends on the SNMP version.

- For SNMP version 1 and version 2, use the following syntax:
  ```
  <IP Address>:<Port>:<SNMP Version>:<ReadCommunity>:<WriteCommunity>
  ```
- For SNMP version 3, use the following syntax:
  ```
  <IP Address>:<Port>:3
  ```

The IP address is required. Other syntax elements are optional.

Parameter	Default Value	Description
IP Address	none	The IP network address of the target device where the agent is configured. **Required**.

Port	161	The port number used by the driver for performing GET and SET operations to the OIDs. **Optional**. If not specified, the default value is used.
Version	1	The version of SNMP used. Possible values are 1, 2 or 3, for SNMP versions 1, 2 or 3 respectively. **Optional**. If not specified, the default value is used.
Read Community	public	The read community name. Case sensitive. **Optional**. If not specified, the default value is used.
Write Community	public	The write and read community name. Case sensitive. **Optional**. If not specified, the default value is used.

Communities configured in the OCMC must match the communities configured in the SNMP agent. Typically, the PLC will have the settings. Refer to your PLC documentation for SNMP configuration in the specific PLC.

Examples:

192.186.0.1

192.186.0.1:161

192.186.0.1:161:1

192.186.0.1:161:3

192.186.0.1:166:2:public:private

Many PLCs support SNMP version 1. By default the Read and Read/Write communities are public. You can use this configuration if you want to test if your PLC or device supports SNMP. If it doesn't work, contact your device manufacturer. For a sample list of PLCs that support SNMP, see Supported Software Environments and Devices.

Note: The minimum required parameter in the **Station** field is the IP address. If only IP address is specified, the other parameters will use the following default values: However, we recommend specifying all parameters as in the example **192.186.0.1:161:2:public:private**.

Connection Tips

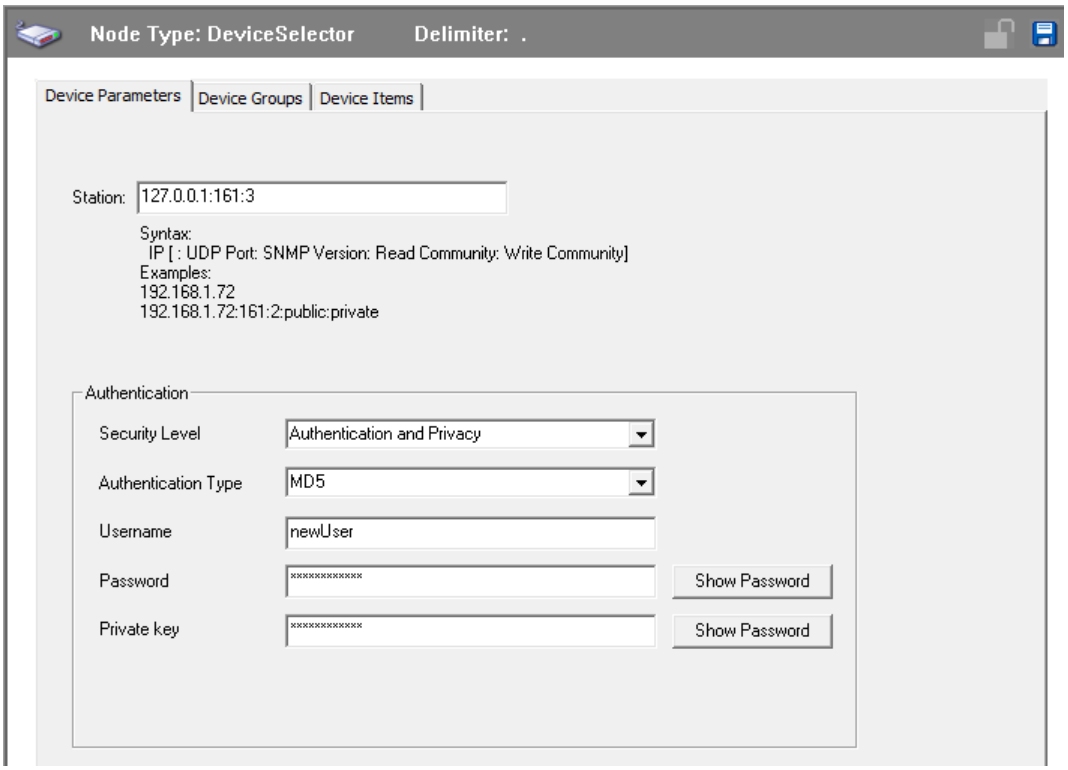
1. The minimum entry parameter is the <IP Address>. If only IP address is specified, the other parameters will use the following default values: <IP Address>:161:1:Public:Public. You must ensure these parameters match the device that you are connecting to.
2. The connection port specified for regular connection to SNMP devices is different than the trap port used. The typical port for read/write operations is 161.

Authenticating the Connection

The SNMP Communication Driver supports authentication only for SNMP v3. If the station is configured to communicate using SNMP versions 1 or 2, the authentication settings are ignored and not used.

To Authenticate the Connection

The **Authentication** section allows you to configure the security settings for every station.



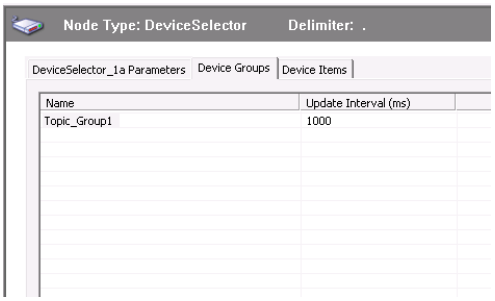
1. **Security Level**: Set the security level used for SNMP v3 messages. From the **Security Level** list, select one of the options:
   a. **No security**: Select this security level if no authentication is required.
   b. **Authentication only**: This enables the **Authentication Type**, **Username** and **Password** fields.
   c. **Authentication and Privacy**: In addition to the above, this enables the **Private key** field also.
2. **Authentication Type**: Set the authentication protocol (**MD5** or **SHA**) used for authenticated SNMP v3 messages.
3. **Username**: Set the security name used for authenticated SNMP v3 messages
4. **Password**: Set the authentication pass phrase used for authenticated SNMP v3 messages.

   Note: The **Username** and **Password** must be provided when using any security level higher than **No security.**
5. **Private key**: Set the privacy pass phrase used for encrypted SNMP v3 messages. The **Privacy key** is enabled and is mandatory only when using security level of **Authentication and Privacy.**

Note: The SNMP Communication Driver supports only DES encryption.

Device Group Definitions

Use the Device Groups dialog box, which appears by clicking the **Device Groups** tab in the Device Selector configuration editor to create, add, delete, and define device groups. You can also configure default update intervals for the objects and edit update intervals in this dialog box.



Note: When you select another part of the Communication Driver tree hierarchy, you are prompted to save the modifications to the configuration set.

To create or add device groups

1. Right-click in the **Device Groups** box and click **Add**.
2. Enter a unique name up to 32 characters long for the device group.

To delete device groups

- Right-click on the device group to be deleted from the list and select **Delete**.

To configure default update intervals

- To configure a default update interval for the object, right-click in the **Device Groups** box and then click **Config Default Update Interval**.

To edit update intervals

- To edit the update interval for an object, double-click its value in the **Update Interval** column and make the edits.

  or

- Right-click its value in the **Update Interval** column and then click **Modify Update Interval**.

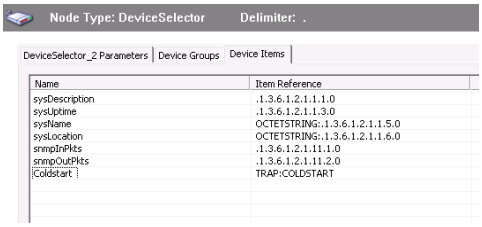
  The update interval is the frequency, in milliseconds, that the SNMP Communication Driver acquires data from the topics associated with that device group.

  Different topics can be polled at different rates from a PLC by defining multiple device group names for the same PLC and setting a different update interval for each device group.

Device Item Definitions

Device item configuration is optional, but is strongly recommended.

You may want to use the Device Item Definition table to create more user friendly names by associating the OID with an alias or name similar to its definition as seen in the MIB file. Once the device items are so configured, you can browse by name or by item reference.



After you configure item names, the SNMP can perform GET and SET operations. Item names and references must follow these syntax guidelines:

- The **Name** is the SNMP Communication Driver property or object name, or a user-defined alias.
- The **Item Reference** must be the full OID, all decimals and digits.
- When using the OID as the item reference, the **Item Reference** must start with a decimal point, same as the OID.
- Alternatively, the Item Reference can incorporate the datatype as a prefix with the full OID.

  Use `<datatype>:OID` in the **Item Reference** in order to use device item names in reads/writes.
- Most operations with SNMP devices are read operations. The `<datatype>:OID` syntax is required to perform write/SET operations to an item.

  In the illustration, two item references are configured with this syntax, **sysName** and **sysLocation**. These items permit read/write access. The datatype prefix allows writes to the item name.

  For more information, see Common SNMP Item References and Data Types.
- You can specify a trap using the following syntax: `<TRAP>:<TRAPTYPE>.`

  The TrapType can be a type of trap like COLDSTART or an OID when it is an Enterprise type trap.

The illustration shows a device item trap named "COLDSTART" with an item reference "TRAP:COLDSTART".

In this example, you could provide an OID in place of the type of trap, such as: TRAP:.1.3.6.1.6.3.1.1.5.4.

For more information, see Using Traps.

To create or add device items

1. Right-click in the **Device Items** box and click **Add**.
2. In the **Name** column, type a unique item name. The maximum is 32 characters. For example, "snmpInTraps.0."
3. Double-click the line in the **Item Reference** column and enter the correlated item reference for the name you created. For SNMP, this is the OID.

To rename device items

- Right-click the device item to be renamed and click Rename. Make the changes.

To delete device items

- Right-click the device item to be deleted from the list and click Delete.

To clear all device items

- Right-click in the **Device Items** box and click **Clear All**. All the device items listed are cleared after you confirm their deletion.

NOTE: You can import a .csv file containing your item definitions to help streamline configuration. See "Exporting and Importing CSV Files" in the Communication Drivers Pack Help.

Configuring SNMP Redundancy

The OI Server Manager supports device redundancy. However, setting up redundant devices in the SNMP hierarchy is not recommended.

- Redundancy is not supported for traps.
- The redundant device requires a Ping Item, which for SNMP is a specific OID.

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Chapter 3

SNMP Communication Driver References

Supported Software Environments and Devices

The SNMP Communication Driver supports SNMP protocol versions 1 and 2c, and all SNMP-enabled devices.

I/O Address Syntax

OID Address

Both Application Server and InTouch HMI can read and write to items in devices using either a reference name or the item's OID. Specify the address of the OID (used for GET and SET operations) with the following syntax:

```
Datatype:OID
```

- OID is the object identifier of the variable (when performing GET and SET operations). This parameter is required.
- The Datatype parameter is required for SET (write) actions to the OIDs, but is optional for GET (read) actions.

Examples of valid addresses when performing GET and SET operations:

- OCTETSTRING:.1.3.6.1.2.1.1.1.0

  In this example, you can use OCTETSTRING:.1.3.6.1.2.1.1.1.0 or .1.3.6.1.2.1.1.1.0 when performing GET operations.

  In this example, to perform a SET the OID should support Write actions and the item reference must be configured as INT:.1.3.6.1.2.1.1.1.0.
- OCTETSTRING:.1.3.6.1.2.1.1.1.2
- COUNTER32:.1.3.6.1.2.1.1.1.7
- TIMETICKS:.1.3.6.1.2.1.1.1.8

Data Types

When performing GET and SET operations, Datatype is the data type of the OID. This parameter is optional when performing GET operations, and it is required when performing SET operations.

The supported values for Datatype are shown in the following table:

Value	Description
INT	When performing read and write operations with integers.
OCTETSTRING	When performing read and write operations with octet strings.
OCTETSTRINGHEX	When performing read and write operations with octet strings.Sometimes the values are reading hexadecimal, use this header to change to string.
OID	When performing read and write operations with OID values.
IPADDRESS	When performing read and write operations with IP address datatypes.
COUNTER32	When performing read and write operations with 32-bit counter datatypes.
GAUGE	When performing read and write operations with gauge datatypes.
TIMETICKS	When performing read and write operations with timeticks datatypes.
OPAQUE	When performing read and write operations with opaque datatypes.
COUNTER64	When performing read and write operations with 64-bit counter datatypes.
UINT	When performing read and write operations with unsigned integers datatypes.

SNMP Tables

The SNMP Communication Driver supports SNMP table. To advise items in the SNMP table, specify the OID which is unique to each cell in the SNMP table. The OID of the table is a combination of the column number and row index. The OID of each cell in the table is the combination of the OID of the table, along with the column index and the row index value.

Example

Consider a table with three rows R1, R2, and R3, and two columns C1 and C2. The OID of the table:'.1.2.3.1.2'. The row index and the OIDs for the cells in columns 1 and 2 are depicted in the grid.

	Row Index	C1	C2

R1	0.0.0.0	OID: .1.2.3.1.2.1.0.0.0.0	OID: .1.2.3.1.2.2.0.0.0.0
R2	127.0.0.1	OID: .1.2.3.1.2.1.127.0.0.1	OID: .1.2.3.1.2.2.127.0.0.1
R3	127.1.2.3	OID: .1.2.3.1.2.1.127.1.2.3	OID: .1.2.3.1.2.2.127.1.2.3

The OIDs follow the syntax below:

Column 1:

```
.1.2.3.1.2.1[1] and .1.2.3.1.2.1[2]
```

Column 2:

```
.1.2.3.1.2.2[1] and .1.2.3.1.2.2[2]
```

where,

[1] and [2] are the row numbers.

If you are not aware of the index value of the row, you can use the row number. The SNMP Communication Driver translates and performs a GET and SET accordingly. The row number always starts with 1. If you enter an invalid row number, the item returns a bad quality.

Using Traps

About Traps

SNMP traps are alerts or events generated by agents on a managed device. Traps typically contain statistical or status information relating to a component of the device sending the trap.

SNMP managers - including the SNMP Communication Driver - listen for traps on port 162 by default.

Note: The SNMP OI Server supports traps received in SNMP v1 and v2 only. The traps received in SNMP v3 are not supported. The SNMP Communication Driver supports SNMP Trap data as polled read requests. It does not support unsolicited messaging for any other SNMP data type.

Trap Syntax

Specify the address of the trap with the following syntax:

```
TRAP:OID/Variable Binding
```

When using traps, the OID can be either the object identifier of a specific trap, including enterprise traps, or it can be referenced as one of the following generic traps:

COLDSTART	The SNMP agent on the managed device reinitialized its configuration tables.
WARMSTART	
LINKDOWN	A network interface card (NIC) on the managed device either fails or reinitializes.
LINKUP	
AUTHFAIL	The SNMP agent on a managed device receives a request from an unrecognized community name.
EGPLOSS	The SNMP agent on a managed device cannot communicate with its EGP (Exterior Gateway Protocol) peer.

An enterprise trap contains vendor-specific error conditions and error codes, specific to the managed device. This type of trap is usually received with a Trap OID.

Variable Binding

Variable Binding is the binding for the particular trap OID that is specified in the OID parameter. This parameter is optional, and is used only for traps.

If Variable Binding is specified, the item reference associated with the address will receive the value of the trap. If Variable Binding is not specified, the value of the associated item will be incremented each time a trap is received.

Trap Address Examples

Following are examples of valid addresses when using traps. Use addresses as illustrated here as item references when configuring device items. For more information, see Device Item Definitions.

- TRAP:.1.3.6.1.6.3.1.1.5.4
- TRAP:COLDSTART
- TRAP:WARMSTART
- TRAP:LINKDOWN/.1.3.6.1.2.1.2.2.1.1.19
- TRAP:LINKUP/.1.3.6.1.2.1.2.2.1.1.11
- TRAP:AUTHFAIL
- TRAP:EGPLOSS
- TRAP:LINKUP
- TRAP:LINKDOWN

Common SNMP Item References

The following table provides a list of the most commonly used attributes and associated item references, read/write access, and datatype. To get OIDs for attributes specific to a managed device, see the device documentation, or use a commercially available MIB browser.

Attribute	Item Reference	Access	Datatype
sysDescription	.1.3.6.1.2.1.1.1.0	Read-only	OCTETSTRING
sysUptime	.1.3.6.1.2.1.1.3.0	Read-only	TIMETICKS
sysObjectID	.1.3.6.1.2.1.1.2.0	Read-only	OID
sysContact	.1.3.6.1.2.1.1.4.0	Read/Write	OCTETSTRING
sysName	.1.3.6.1.2.1.1.5.0	Read/Write	OCTETSTRING
sysLocation	.1.3.6.1.2.1.1.6.0	Read/Write	OCTETSTRING
sysServices	.1.3.6.1.2.1.1.7.0	Read-only	INTEGER
snmpInPkts	.1.3.6.1.2.1.11.1.0	Read-only	COUNTER32

snmpOutPkts	.1.3.6.1.2.1.11.2.0	Read-only	COUNTER32
snmpInBadVersions	.1.3.6.1.2.1.11.3.0	Read-only	COUNTER32
snmpInBadCommunityNames	.1.3.6.1.2.1.11.4.0	Read-only	COUNTER32
snmpInBadCommunityUses	.1.3.6.1.2.1.11.5.0	Read-only	COUNTER32
snmpInASNParseErrs	.1.3.6.1.2.1.11.6.0	Read-only	COUNTER32
snmpInTooBigs	.1.3.6.1.2.1.11.8.0	Read-only	COUNTER32
snmpInNoSuchNames	.1.3.6.1.2.1.11.9.0	Read-only	COUNTER32
snmpInBadValues	.1.3.6.1.2.1.11.10.0	Read-only	COUNTER32
snmpInReadOnlys	.1.3.6.1.2.1.11.11.0	Read-only	COUNTER32
snmpInGenErrs	.1.3.6.1.2.1.11.12.0	Read-only	COUNTER32
snmpInTotalReqVars	.1.3.6.1.2.1.11.13.0	Read-only	COUNTER32
snmpInTotalSetVars	.1.3.6.1.2.1.11.14.0	Read-only	COUNTER32
snmpInGetRequests	.1.3.6.1.2.1.11.15.0	Read-only	COUNTER32
snmpInGetNexts	.1.3.6.1.2.1.11.16.0	Read-only	COUNTER32
snmpInSetRequests	.1.3.6.1.2.1.11.17.0	Read-only	COUNTER32
snmpInGetResponses	.1.3.6.1.2.1.11.18.0	Read-only	COUNTER32
snmpInTraps	.1.3.6.1.2.1.11.19.0	Read-only	COUNTER32
snmpOutTooBigs	.1.3.6.1.2.1.11.20.0	Read-only	COUNTER32
snmpOutNoSuchNames	.1.3.6.1.2.1.11.21.0	Read-only	COUNTER32
snmpOutBadValues	.1.3.6.1.2.1.11.22.0	Read-only	COUNTER32
snmpOutGenErrs	.1.3.6.1.2.1.11.24.0	Read-only	COUNTER32
snmpOutGetRequests	.1.3.6.1.2.1.11.25.0	Read-only	COUNTER32
snmpOutGetNexts	.1.3.6.1.2.1.11.26.0	Read-only	COUNTER32
snmpOutSetRequests	.1.3.6.1.2.1.11.27.0	Read-only	COUNTER32
snmpOutGetResponses	.1.3.6.1.2.1.11.28.0	Read-only	COUNTER32
snmpOutTraps	.1.3.6.1.2.1.11.29.0	Read-only	COUNTER32
snmpEnableAuthenTraps	.1.3.6.1.2.1.11.30.0	Read/Write	INTEGER
hostSysUptime	.1.3.6.1.2.1.25.1.1.0	Read-only	TIMETICKS
SysDate	.1.3.6.1.2.1.25.1.2.0	Read/Write	DATEANDTIME

sysFreeSpace (on drives 1,2,3…)	.1.3.6.1.2.1.25.2.3.1.6. (1,2,3 …)	Read-only	INTEGER (kb)

Configuring an SNMP Agent in Windows

The SNMP Communication Driver runs on the manager - the node hosting the network management station (NMS). This manager computer monitors and manages a group of managed devices. Each managed device runs an SNMP agent, which receives instructions from and reports information to the manager.

The manager - the machine hosting the SNMP Communication Driver - does not need an SNMP agent installed, nor SNMP Windows services enabled.

Each managed device must have an SNMP agent installed and configured. The following procedures apply with minor variations to different Windows operating systems to enable and configure the Windows SNMP service which can act as an SNMP agent to act as a target device for the Communication Driver to manage.

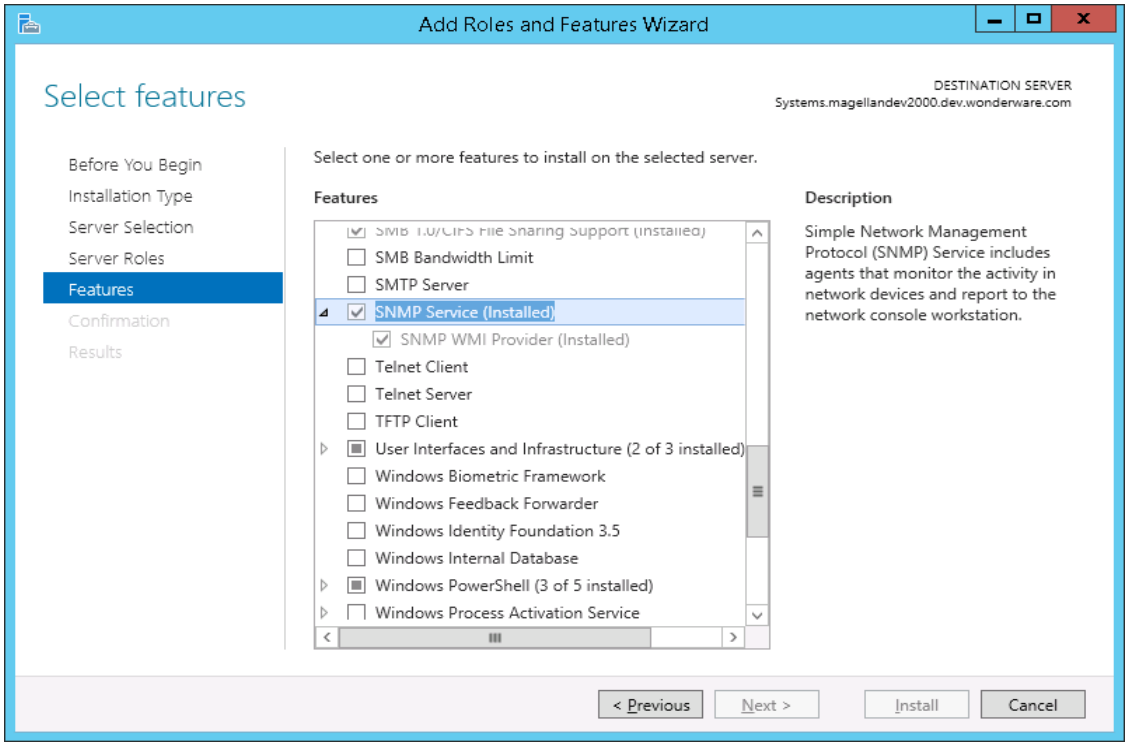
A Windows 2012 server operating system is used for illustration purposes.

To install an SNMP agent

1. Open Windows **Control Panel**, then **Programs and Features**.

   On a Windows server OS, you can use **Server Manager** to open and run the **Add Roles and Features Wizard**.

2. In the Windows features window, select **Simple Network Management Protocol (SNMP)**. Optionally, you can also select its child feature, **SNMP WMI Provider**.



3. Click **OK**. Windows installs the SNMP agent components.

To configure an SNMP agent

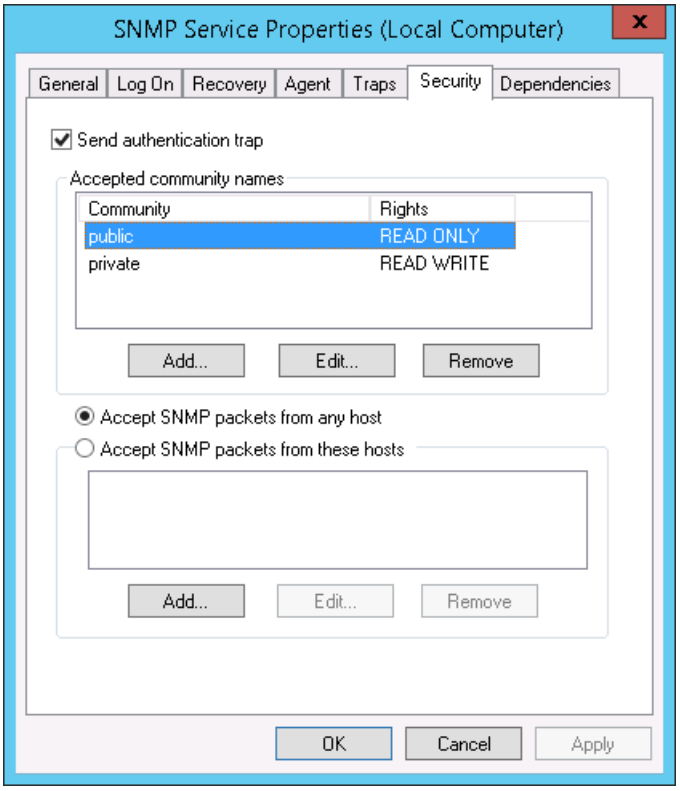
1. Open **Control Panel**, then **Administrative Tools**, then **Computer Management**.

   On a Windows server OS, open the **Server Manager** then select **Tools**, then **Computer Management**.

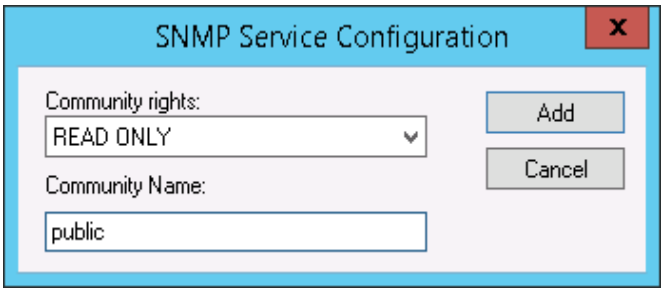
2. In the left pane, click **Services and Applications** then **Services**. The **Services** list appears.
3. In the list, right click **SNMP Services** and select **Properties** in the context menu. The **SNMP Service Properties** dialog appears.

   The minimum configuration required to perform SET and GET to windows agents are:

   - Add a Read Only community
   - Select Accept SNMP packets from any host.



4. Click the **Security** tab.
   a. Select **Send authentication trap** if you want the managed device to send a trap message when authentication fails.
   b. Under Accepted community names, click **Add**. The **SNMP Service Configuration** dialog appears.



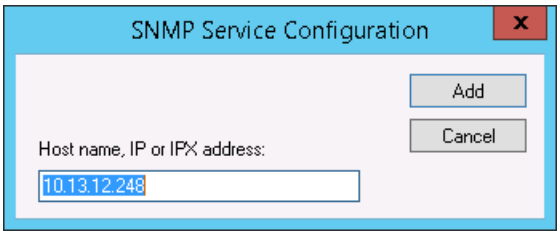
c. Under **Community rights**, select a permission level from the list box for this node to handle SNMP requests from the selected community.

d. Under **Community name**, enter a community name and click **Add**. The community name is case-sensitive.

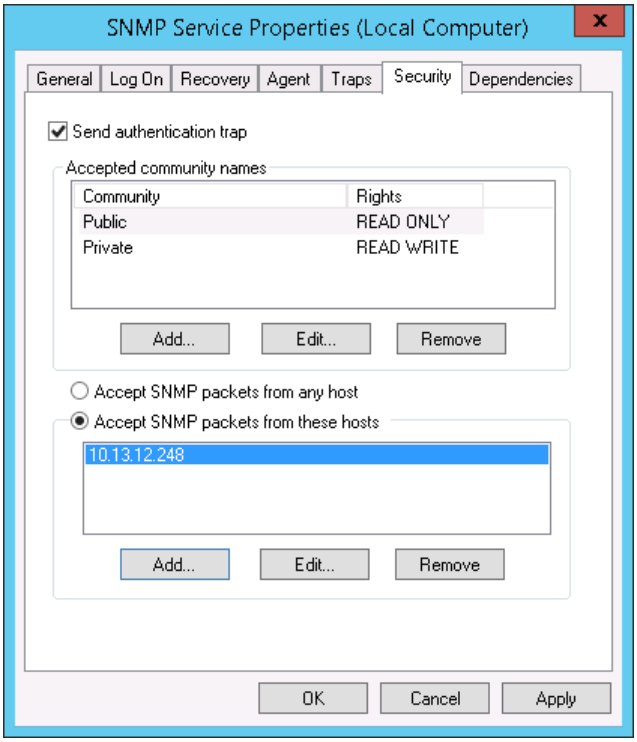
e. Choose to accept SNMP packets from any host by selecting the **Accept SNMP packets from any host** radio button.

f. Alternatively, you can choose to accept SNMP packets from specific hosts by selecting the **Accept SNMP packets from these hosts** radio button, click **Add** to add a host address.

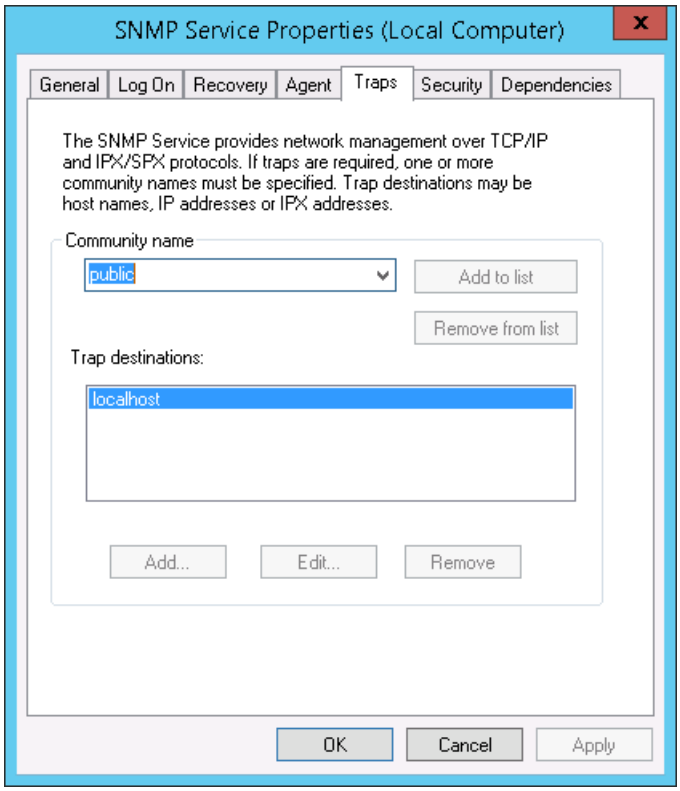
   The SNMP Service Configuration, Host address dialog appears. Enter the host name or address and click **Add**.



   The host name or address appears in the SNMP Service Properties dialog.

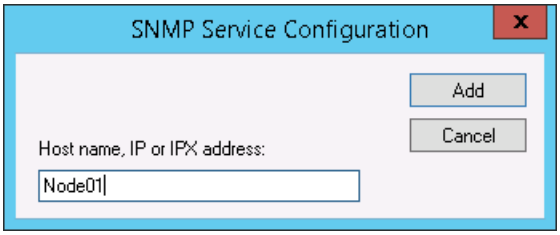


5. If you want to enable traps, click the **Traps** tab.

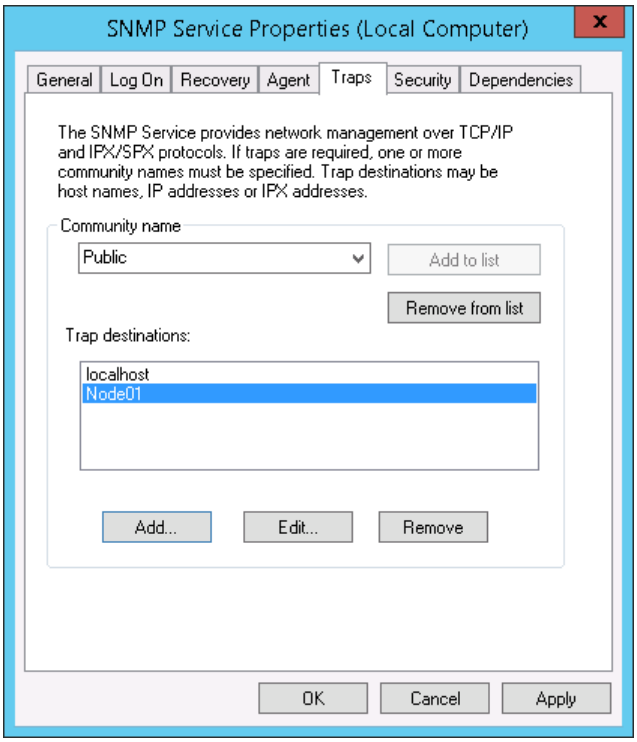


a. Select or enter a community name in the **Community name** list box and click **Add to list**.

b. Click **Add** under the **Trap destinations** text box. Enter the destination name or address in the address dialog.



Click **Add**. The destination name or address appears in the **Traps destination** list.



6. Click **OK** or **Apply** to accept the properties configuration.

Chapter 4

Troubleshooting the SNMP Communication Driver

Connectivity Issues

OID Cannot be Found

If the object identifier (OID) is incorrectly formatted or truncated, connection to the object will fail as the OID cannot be found.

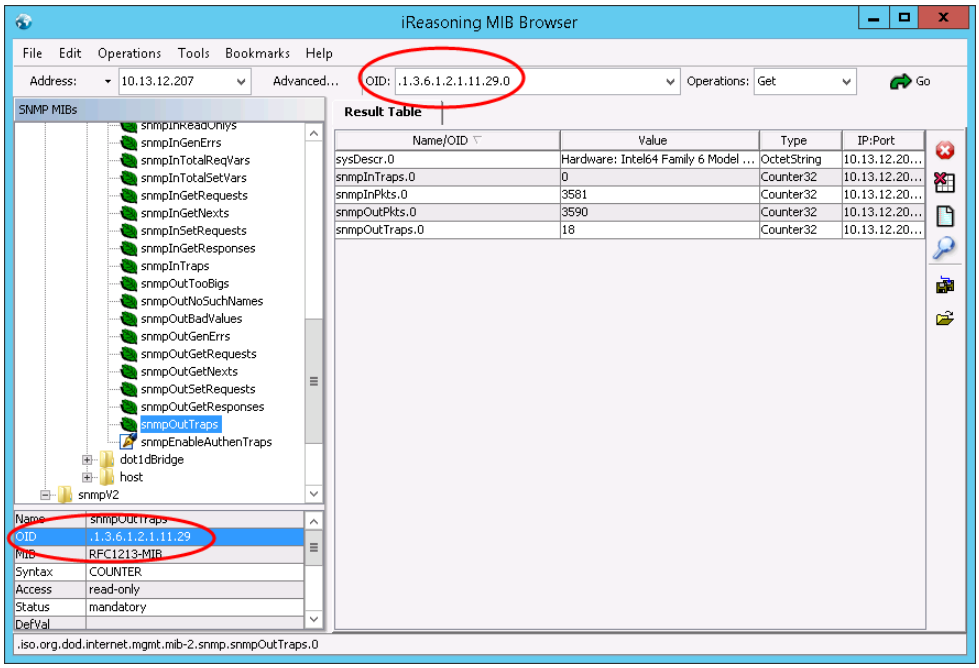
The OID is an object identifier consisting of integers separated by decimals indicating a node in a hierarchically organized namespace. The OID structure allows for precise referencing of a data attribute.

For a list of common item references, see Common SNMP Item References. You can also leverage commercially available SNMP browsers to find specific OID devices.

For connectivity failures, check the following:

- Is the first character the OID a decimal? A correctly formatted OID begins with a decimal.
- Is the last character of the OID a 0 (zero)? A final .0 digit indicates a leaf node, typical of most attributes. Some MIB browsers leave this off. Add .0 if connection fails.

  In the following example, using a commonly available MIB browser for illustration purposes, the MIB browser might display the OID in two places. Use the complete OID as the item reference, otherwise reads and writes will fail.



Device Cannot be Reached

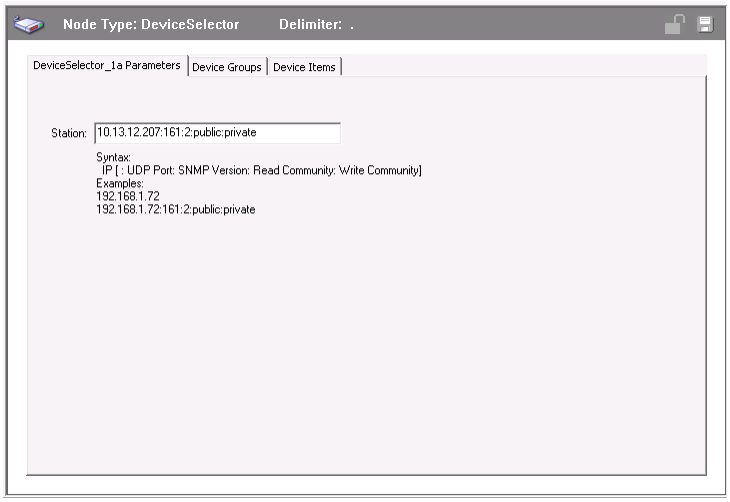
In an instance where a well-known device cannot be reached, check the following configuration elements:

1. IP address

   In the Device Selector object, **Station** parameter, check that the IP address is correct. You can also check the IP address in a commercially available MIB browser. If you are using an MIB browser, the IP address must be the same as that configured in the SNMP Communication Driver configuration.

2. SNMP protocol version. Some devices do not support SNMP v1, and other devices do not support SNMP v2. Adjust the version number in the Device Selector object, **Station** parameter. You might also need to adjust the version number in your MIB browser to match that configured in the SNMP Communication Driver configuration.

3. Read community and write community if configured. By default, most devices have "public" configured as the read community. Adjust your configuration to test the read community with "public" if not already so configured. If you are using an MIB browser, the communities must match those configured in the SNMP Communication Driver configuration.



Note: You can configure the **Station** parameter IP address only provided all other values are the defaults. However, we recommend explicitly providing the fully defined **Station** parameter. For example, SNMP v1 typically is the protocol version found in most PLCs. On Windows devices, however, SNMP v2 is more common.

Checking Status Codes

The OI Server Manager provides access to diagnostics and other statistical data. The Log Viewer provides access to event messages logged during the operation of the SNMP Communication Driver.

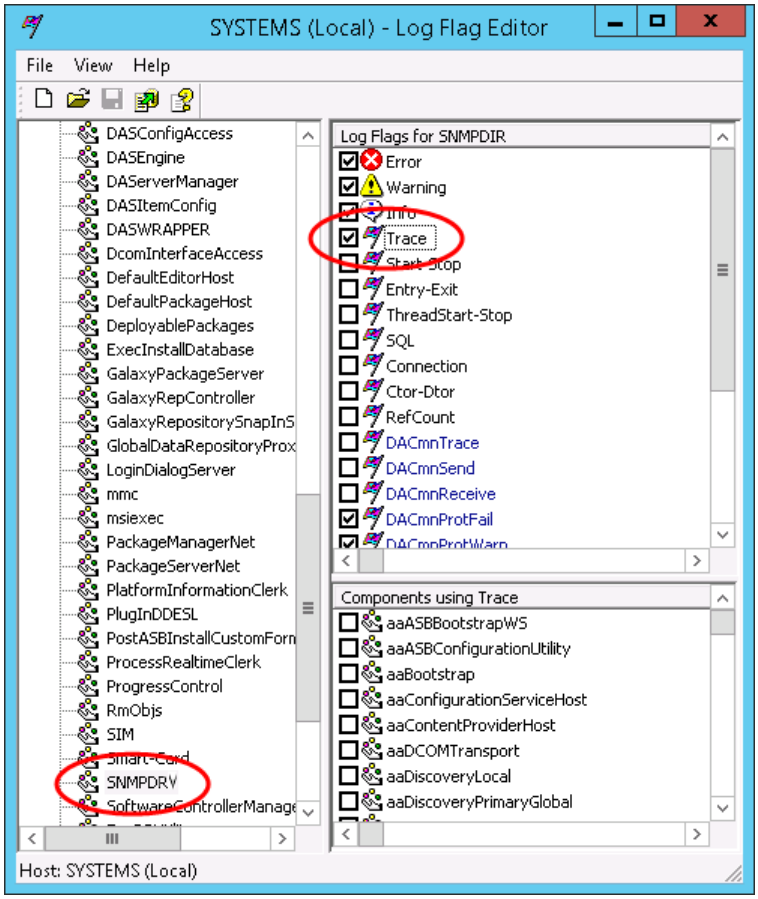
Each message sent to the Operations Control Management Console (OCMC) Logger by an installed component belongs to a specific message category. Each message category has an associated log flag.

The status of a log flag indicates whether messages that belong to the message category are logged or not. When a log flag is active, messages in the associated category are logged. An inactive log flag prevents messages in the associated category from being logged.

For troubleshooting purposes, we recommend setting the SNMP **Trace** log flag in the OCMC log flag editor. The **Trace** log flag determines if trace messages are logged. Trace messages for SNMP describe internal object states, variable values, and other low-level data from the SNMP Communication Driver.

To set the Trace log flag for SNMP

1. Select **SNMPDRV** from the Component List view. The Log Flags view shows the log flags for the component you selected.
2. In the Log Flags view, select the **Trace** check box.



3. On the **File** menu, click **Apply**.

Status Codes

The following table lists possible error codes, their corresponding descriptions, causes and the procedure to solve:

Error	Description	Possible Causes	Procedure To Solve
19	Invalid Address, please check the format of the address.	An invalid datatype or OID is used	Please refer to the correct address format supported on the Main Driver Sheet or the Standard driver sheet.
20	Invalid Station, please check the station format.	The station format is incorrect or the field is blank.	Please refer to the correct station format supported by the server in the sections above.
21	Failed to initialize the SNMP Library.	SNMP library failed to initialize.	Internal error, restart server. If issue persists please contact support

22	Connection Failure	Failed to make a connection with the agent	Check if the IP address of the station is valid. Check if the station port and SNMP version number are valid.
23	Invalid Write	Attempted to write to an OID (perform a SET operation) which does not support it.	Check if a SET operation can be performed on the OID. Check if the datatype of the OID is included in the address. Check that the datatype of the OID in the address is correct. Note: SET operation is not supported on traps so write to the OID is not supported when header TRAP is used in the address.
25	Invalid Port Number	The port number is not valid or is not available on the device.	Check the port number used. The default port for SNMP is 161 for SET and GET operations and is 162 for TRAPS.
26	Invalid Trap Session	The Trap session is not working as expected.	Check the Trap port number. Check to see if Traps are enabled on the device and if the IP address of the station is correct.Restart the server if changes are made to the Trap Port. Contact support if problem persists
27	SNMP version 3 is not supported	The station has the SNMP version number parameter configured as 3.	The server currently only supports SNMP versions 1 and 2. Check the device and see if communication can be successfully done with SNMP version 2.
28	Invalid SNMP version	The station has SNMP version number parameter configured as a value other than 1 or 2.	The server currently only supports SNMP versions 1 and 2. Check the device and see if communication can be successfully done with SNMP version 1 or 2.

29	Invalid port number	The port for the station or the trap is not available on the device.	Check the Trap port number. Check the port number used for SET and GET operations on the station. The default values for trap port and station port are 162 and 161 respectively. Restart the server if changes are made.
30	Request failed	The server is not able to successfully request data for the OIDs.	Check the station format and validity. Check that the device for which server requests data supports SNMP and that the SNMP agent is running on it. Check the OID format and validity for the request. Restart the server if changes are made. Contact Support if problem persists.
31	Response is too big	The server is not able to successfully receive data for the OIDs because the agent is not able to send the data successfully.	Check the block size of the OIDs in the request. Force a smaller block size by adding the OIDs to a Standard server sheet instead of the Main Server Sheet (maximum allowed = 50, so make the block size smaller than 50). Restart the server if changes are made.
32	No such name	The server is not able to successfully receive data for the OID requested.	Check if the OID exists in the device.
33	Bad value	The server is not able to successfully receive or write data for the OID requested.	Check if the OID has a datatype supported by the server. This usually occurs if a SET operation is performed with an incompatible type of data for the OID.
34	Read Only	The server tried to perform a SET operation on an OID that does not support it.	Check if the OID supports a SET operation. If it does, check that the datatype specified for the OID on the address is correct.

35	Response error	The server is not able to receive a response for the request.	Check the station format and validity. Check that the device for which server requests data supports SNMP. Check the OID format and validity for the request. Check that a SET operation is not being performed on an OID that doesn't support it. Restart the server if changes are made. Contact Support if problem persists.
36	Response timeout	The server is not able to receive a response for the request due to timeout with the agent.	Check the timeout settings on the server.Check the station format and validity. Check that the device for which server requests data supports SNMP. Check the OID format and validity for the request. Check that a SET operation is not being performed on an OID that doesn't support it. Restart the server if changes are made. Contact Support if problem persists.