csstel

AN-861310

RS-485 Modbus Device Discovery

Introduction

ComView provides two RS-485 ports to support up to 64 Modbus devices that are addressable by their Modbus device IDs/addresses.

Modbus is a commonly used client-server messaging protocol that is implemented in a wide range of devices for data communication. To support Modbus, the device manufacturers/developers implement a Modbus register map and Modbus function codes specific to their own devices. Such information is provided to the users so that specific Modbus drivers can be developed to communicate and to read/write data with the device. Therefore, to support a Modbus device, customized software development is typically required.

Discover RS-485 Modbus Devices is a utility that implements Modbus function code/register pairing technique so that users can easily define to read/write with the Modbus device. This pairing technique is also the base implementation used by RS-485 application software module and therefore it effectively eliminates the need for any specific Modbus driver.

Discover RS-485 Modbus Devices helps users discover Modbus devices on an RS-485 network and troubleshoot issues with interactive read/write functions with Modbus devices.

This application note is intended to show users how to use Discover RS-485 Modbus Devices utility to read a device ID and to troubleshoot RS-485 networking issues.

This application note does not provide detailed description of how to use ComView, its connectivity and configuration, and other supporting information, as these are beyond the scope of this document. Refer to other resources for more details.
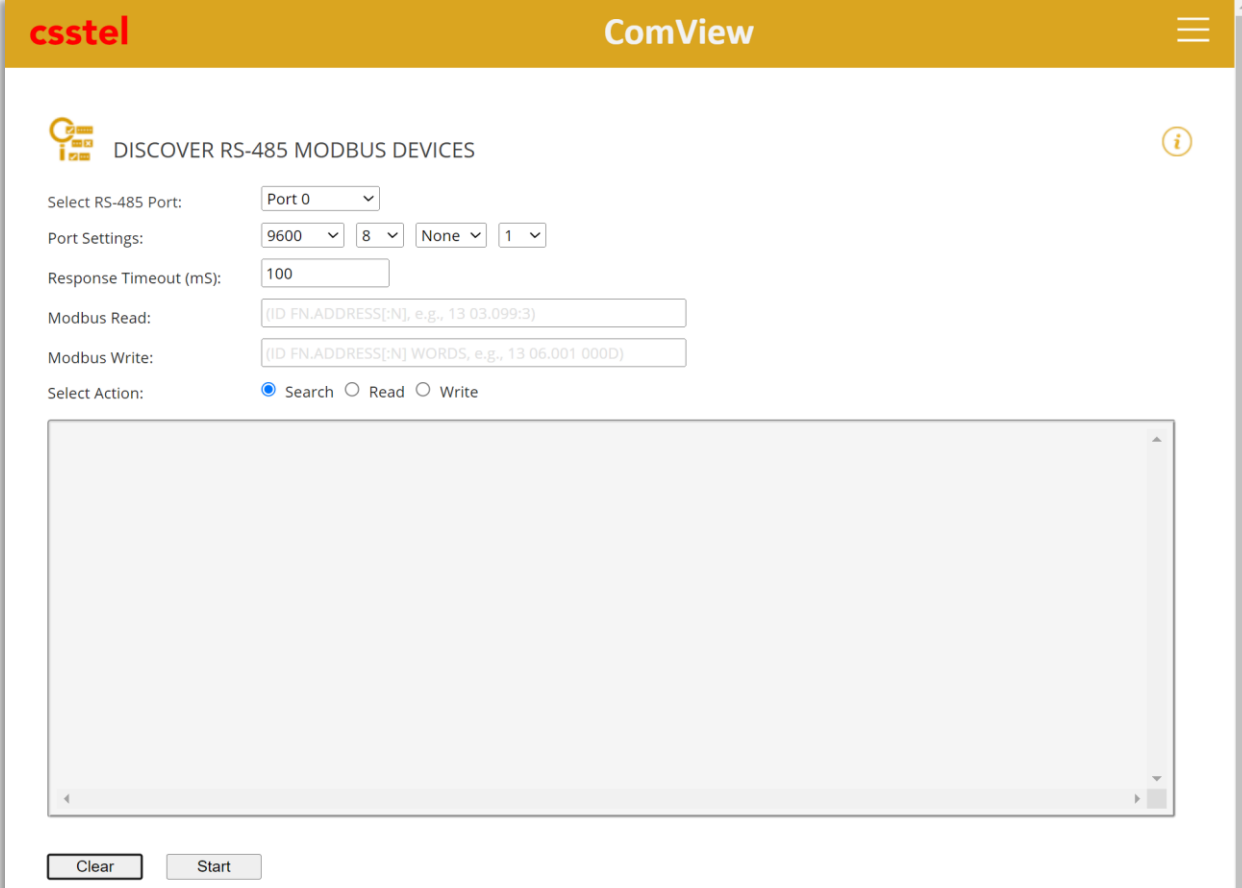

References:

[1]. ComView - User Guide

[2]. Modbus Specifications - https://modbus.org/specs.php

Discover RS-485 Modbus Devices Utility

Users can access Discover RS-485 Modbus Devices utility by navigating the ComView web interface to UTILITIES -> DISCOVER MODBUS DEVICES.

Discover RS-485 Modbus Devices web page is shown below:

Discover RS-485 Modbus Devices utility offers users 3 functions that they can select from 'Select Action' – Search, Read, and Write.

Click 'Clear' to clear the display and click 'Start' to start the selected action.

Modbus Device Search

ComView discovers Modbus devices on an RS-485 network by implementing commonly available Modbus read function codes 0x01, 0x02, 0x03, 0x04. It uses these function codes to probe each Modbus address from 1 to 247 for any response. If a response is received, a Modus device is considered present.

To discover Modbus devices:

- Select RS-485 port from dropdown list [Port 0, Port1]
- Set Port Settings (e.g., 9600,8,N,1 as commonly used)
- Set Response Timeout (default to 100mS) – the time to wait for a response after each function code is issued
- Select 'Search' function and click 'Start'

Results will be displayed after approximately 2 minutes. When a device is found, the display shows the device Modbus address followed by 'device present'. When no device at an address, the display shows the progress bars, the Modbus address, and completion percentage. Scroll the display to review the search results.

Users can also use Search function as above to retrieve Modbus device address and port settings from a device, as follows:

- Disconnect any connection to the RS-485 port, if present
- Connect the target Modbus device to one of the ports, e.g., port 0
- On the web page, select RS-485 port
- Set Port Settings
- Click 'Start' to probe
- Review the result to see if the device is detected

If detected, log the Modbus address and port settings. If not detected, reset port settings, and click 'Search' again. Repeat the above with combinations of port settings available from the dropdown lists. Increase the Response Time from 100mS if all fail.

Use Search function to verify an RS-485 network buildout by installing and checking one Modbus device at a time.

Modbus Device Read

Discover RS-485 Modbus Devices lets users interactively read registers from a Modbus device by entering the Modbus register/function code pair.

Users can use this Read function to verify the register/function code definition prior to entering it in RS-485 app configuration or use it as a diagnostic tool in troubleshooting the network.

To read from a Modbus device:

- Select RS-485 port from dropdown list [Port 0, Port1]
- Set Port Settings (e.g., 9600,8,N,1 as commonly used)
- Set Response Timeout (default to 100mS) – the time to wait for a response after each function code is issued
- Enter Modbus register/function code pair in the format below in the Modbus Read input field:

  'ID FC.RegN:c'
  - ID: Modbus device address (e.g., 13, use Search if not known)
  - FC: Modbus function code number in hex value (e.g., '03', function code 03 to read holding register)
  - RegN:c: Modbus register number N, followed by a total number of registers (c) to read inclusive of register N (e.g., 99:3 reads register 99, 100, 101)

  Example: 13 03.99:3

- Select 'Read' and click 'Start'

Results will be displayed as below with sample values.

From the above,

- Register 99 = 0x0000
- Register 100 = 0x00E6
- Register 101 = 0x0170

Modbus Device Write

Discover RS-485 Modbus Devices lets users interactively write to registers of a Modbus device by entering the Modbus register/function code pair and register value. It implements Modbus function codes 0x05, 0x06, 0x0F, and 0x10 that users can use to write to the Modbus device to configure it.

To write to a Modbus device:

- Select RS-485 port from dropdown list [Port 0, Port1]
- Set Port Settings (e.g., 9600,8,N,1 as commonly used)
- Set Response Timeout (default to 100mS) – the time to wait for a response after each function code is issued
- Enter Modbus register/function code pair and register value in the format below in the Modbus Write input field:

  'ID FC.RegN Value'
  - ID: Modbus device address (e.g., 13, use Search if not known)
  - FC: Modbus function code number in hex value (e.g., '06', function code 06 to write to a holding register)
  - RegN: Modbus register number N (e.g., 001)
  - Value: 2-byte hexadecimal value to write to a register

  Example: 13 06.001 000D

- Select 'Write' and click 'Start'

Sample screenshot is shown below:

LIMITATIONS:

➢ This utility provides Read/Write capability based on limited Modbus function codes implemented in the software and that they may not be sufficient to support devices that use other function codes
➢ During the execution of Search, Read, and Write function, RS-485 application is suspended as the RS-485 bus is being used by the utility
➢ Certain device implements write protection using double writes with the first as time window setup for the second to write. This utility does not implement this time-sensitive write and therefore does not support such device.

Summary

This application note illustrates how ComView Discover RS-485 Modbus Devices utility helps users quickly and conveniently discover Modbus device ID, what devices are visible on the network, and interactively read/write with a device. It is a productivity tool that can save users time in deploying and troubleshooting Modbus devices on an RS-485 network.

About CSSTEL

CSSTEL is a privately held developer and manufacturer of ComView hardware and software solutions for secure, remote infrastructure site management since 1997 with installations in over 30 countries around the world.

We offer ComView solutions that are scalable and customizable to monitor and manage virtually the entire spectrum of remote site infrastructure and site conditions.

We help telecom service providers, carriers, financial institutions, healthcare providers, government agencies, utilities, and other public and private sector organizations maintain constant visibility and control over their remote site infrastructure.

Revision History

Revision	Date	Description
1.00	2023-01-08	Initial release

*** End of document ***