CC-Link Analysis using the CC-Link ComProbe with the NetDecoder Software

Features and User Guide

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1 Introduction

This document covers Frontline's new CC-Link ComProbe. The CC-Link ComProbe is an addition to Frontline's NetDecoder software. Using the new ComProbe, you can now capture and analyze CC-Link protocol messages.

The CC-Link ComProbe has a 5-pin screw terminal connector to connect to the CC-Link network (Figure 1). It uses a USB 2.0 port to interface with the analysis PC.

Figure 1

What we are going to do in this guide is show you how to load the ComProbe drivers, configure the Hardware Settings, and we will also explain what you will see on the CC-Link Dashboard.

2 Driver Installation

The first thing you have to do is load the **CC-Link ComProbe** device drivers.

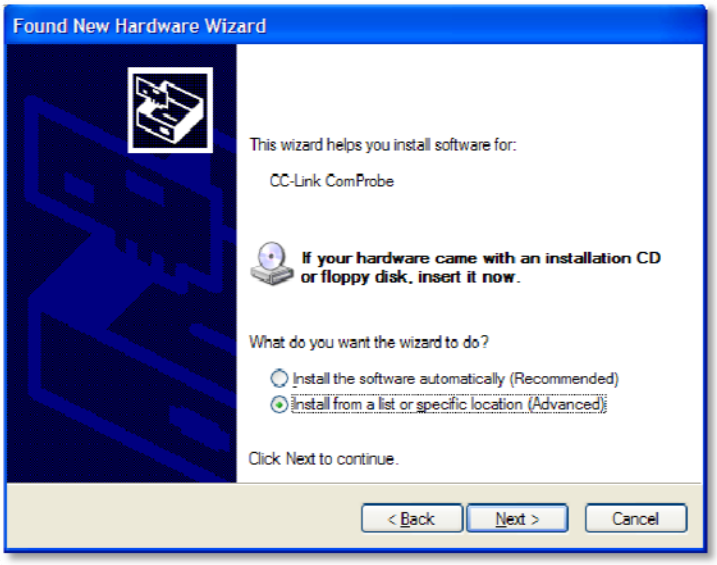
1. Plug the ComProbe into the PC.

2. On the first dialog select “No, not this time” and “Next” (Figure 2).

Figure 2

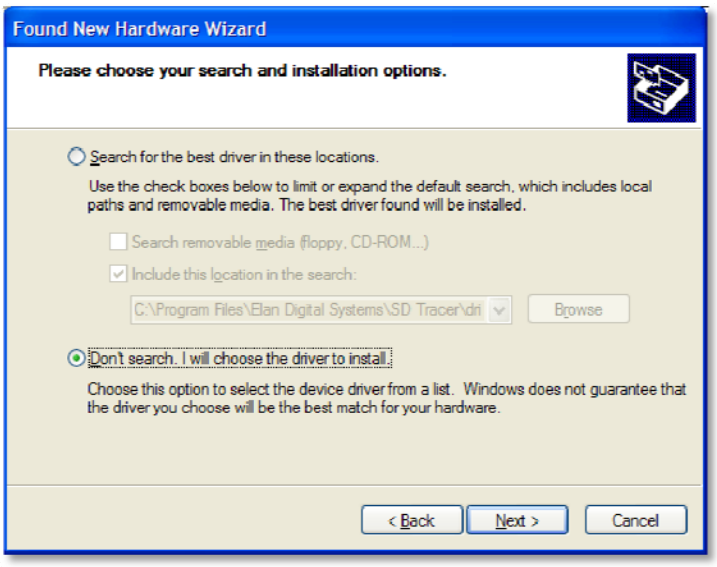
3. Choose “Install from a list or specific location (Advanced)” (Figure 3).

Figure 3



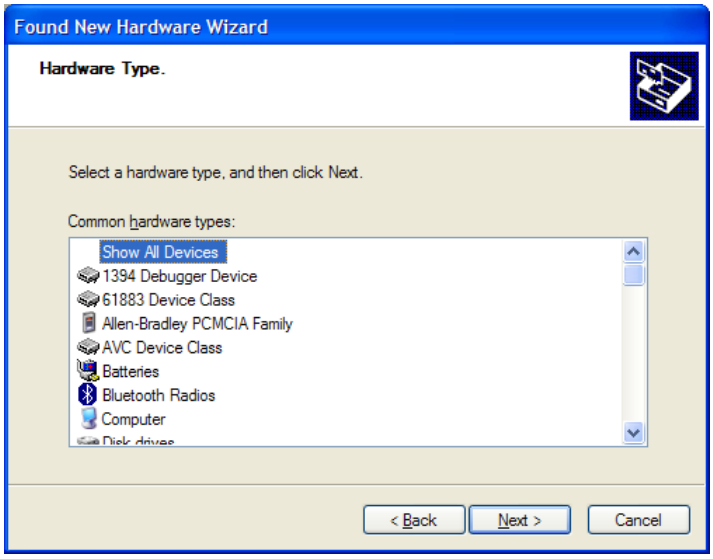
4. Select "Don't search. I will choose the driver to install." and "Next"(Figure 4).

Figure 4



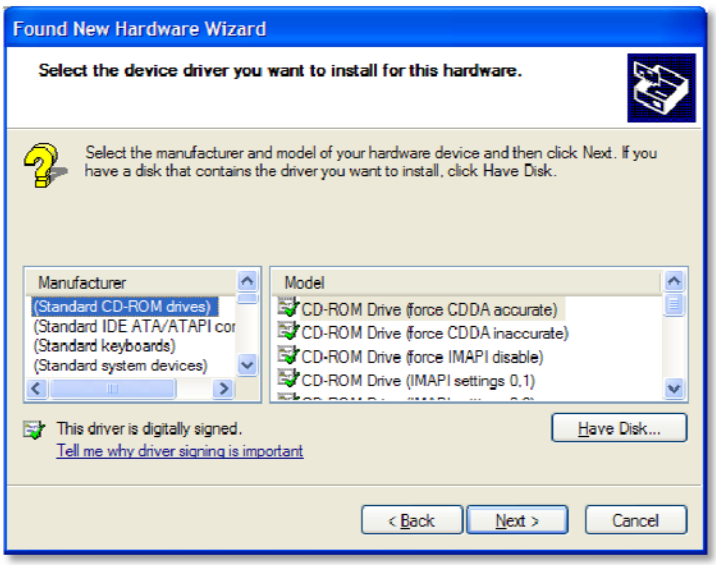
5. Select "Next" (Figure 5).

Figure 5



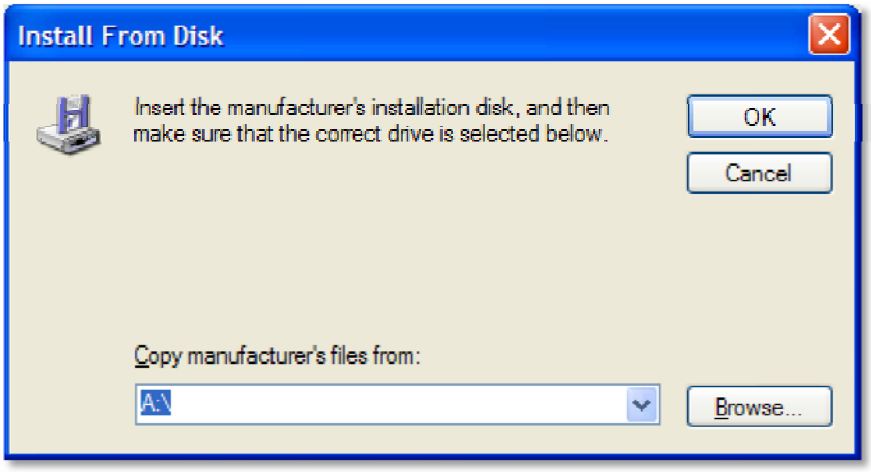
6. Select “Have Disk” (Figure 6).

Figure 6



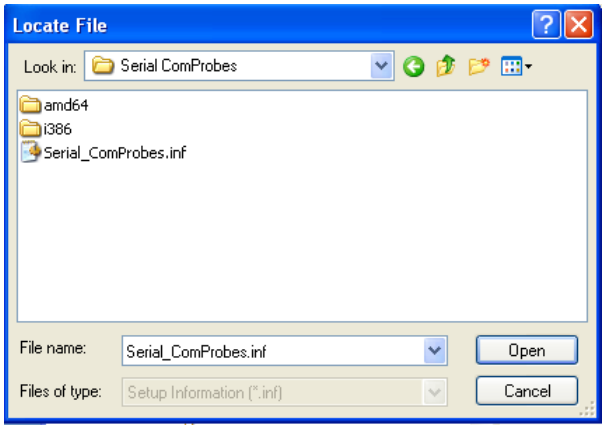
7. Click on “Browse” (Figure 7).

Figure 7



8. Locate the “Serial_ComProbes.inf” located at C:\Program Files\Frontline Test System II\Frontline NetDecoder ####\Drivers\Serial ComProbes (Figure 8).

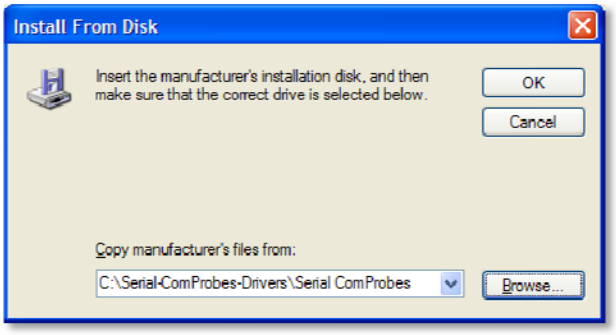
Figure 8



9. Select “Serial_ComProbes.inf” and “Open” (Figure 8).

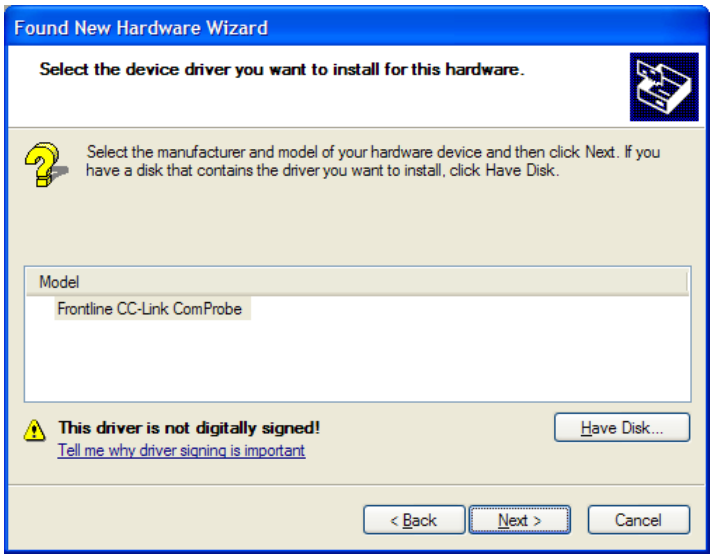
10. Then select “OK” (Figure 9).

Figure 9



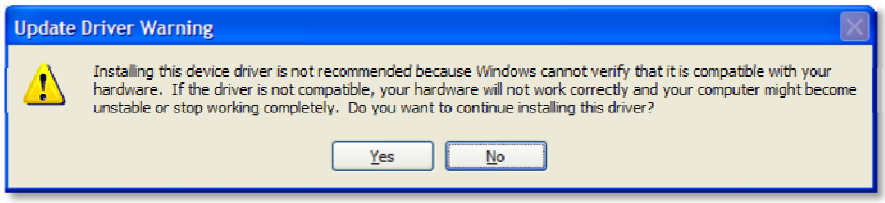
11. Select “Next” (Figure 10).

Figure 10



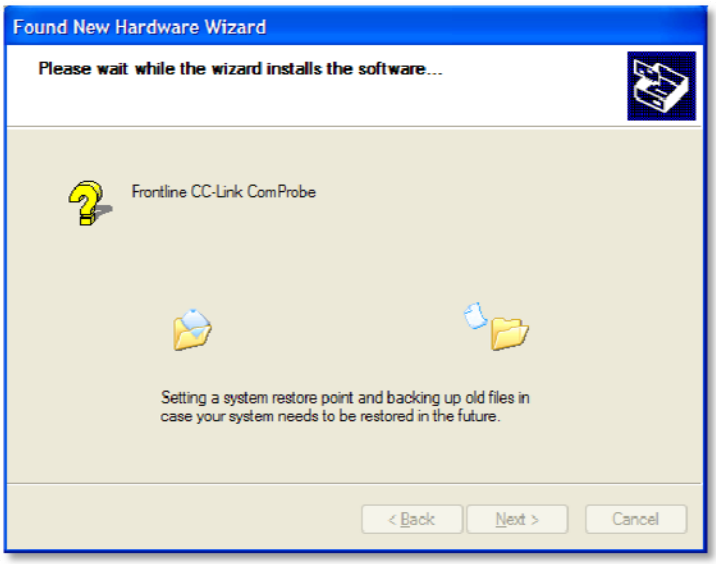
12. If you see a system warning, ignore and select “Yes” (Figure 11).

Figure 11



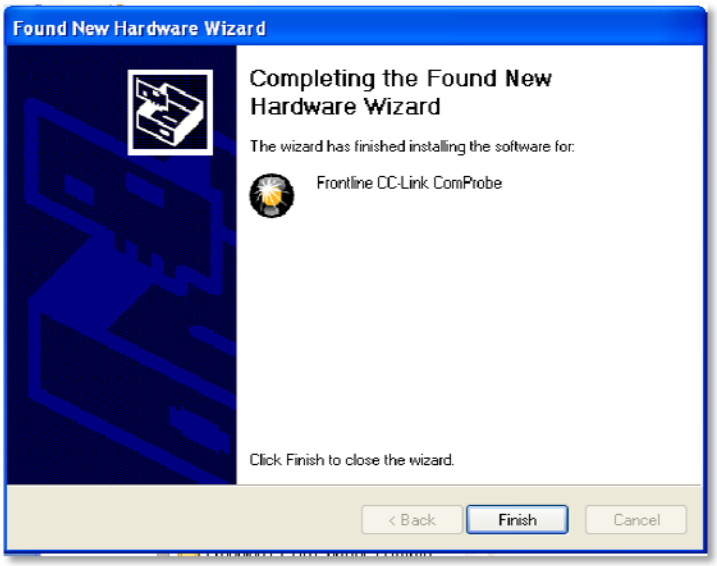
The ComProbe drivers will be installed (Figure 12).

Figure 12



13. Select “Finish” on the final dialog (Figure 13).

Figure 13



The first dialog will appear again (Figure 14).

Figure 14

You have to go through the entire process again to load the second device driver.

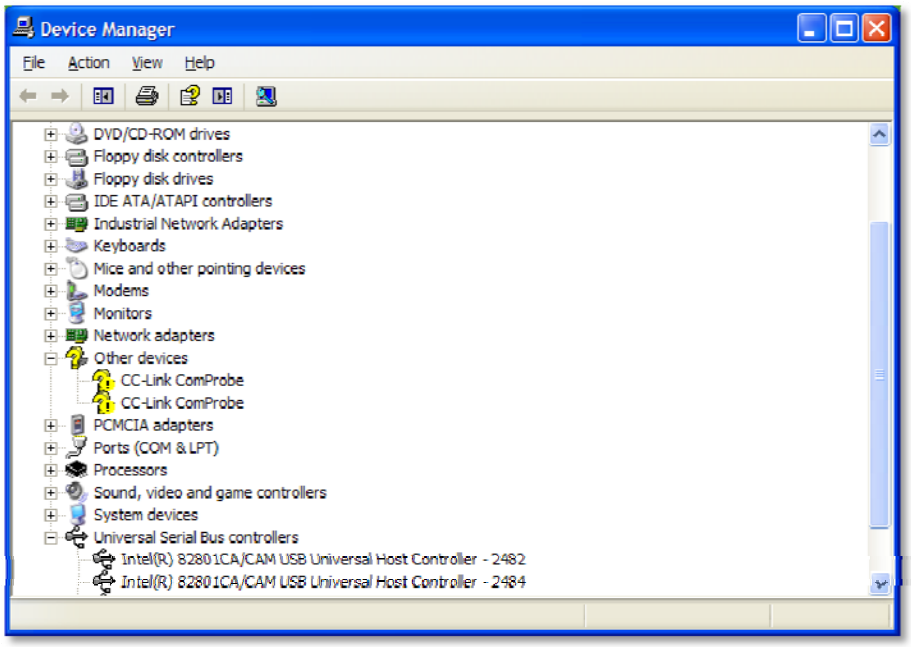
Important Note:

If you do not load the drivers for the CC-Link ComProbe the first time you insert it in the PC, the next time you plug it in, the "*Found New Hardware Wizard*" WILL NOT APPEAR. But you still have to load the ComProbe drivers.

To do so you have to:

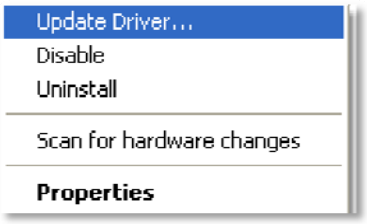
1. Open Device Manager, select the "CC-Link ComProbe" under Other Devices (Figure 15).

Figure 15



2. Right click and select "Update Driver" (Figure 16).

Figure 16



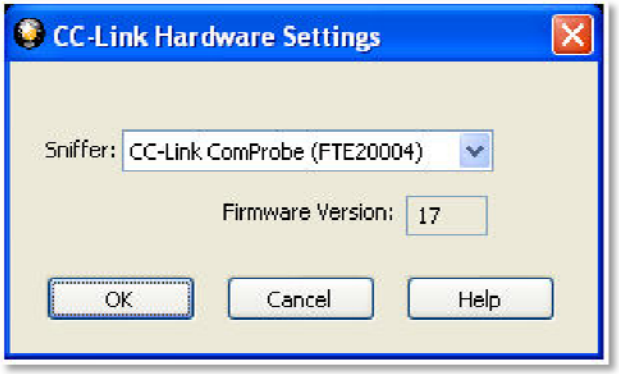
Then the Hardware Wizard will appear and you can proceed with the driver installation.

3 Hardware Settings

When establishing CC-Link settings, if you have multiple ComProbes you must select which device to sniff. You do that with Hardware Settings.

Note: we do not recommend running more than one CC-Link sniffing session at a time on the same PC. CC-Link runs at a maximum baud rate of 10 Mbps. At that rate the PC will have significant performance issues while trying to capture data from multiple CC-Link ComProbes.

1. Connect the CC-Link ComProbe to an available USB port.
2. Start the analyzer.
3. Select Hardware Settings from Options menu on the Control Window.



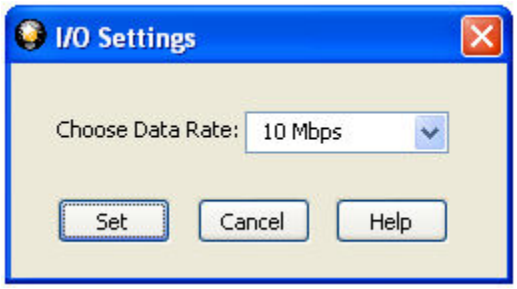
4. Choose a ComProbe device to use from the drop-down list. If you have only one ComProbe connected to your PC, that device is used automatically and you don't need to select it.

5. Select “OK” to save the settings, “Cancel” to close the dialog without saving the settings, or “Help” to access the electronic help file.

4 I/O Settings

The I/O Settings dialog is used to set the data rate for a CC-Link device.

1. Connect the CC-Link ComProbe to an available USB port.
2. Start the analyzer.
3. Select “I/O Settings” from the Options menu on the Control Window.



4. Select a “data rate” from the drop-down list.

The options conform to standard CC-Link Baud Rates and include:

- 156 Kbps
- 625 Kbps
- 2.5 Mbps
- 5 Mbps
- 10 Mbps

5. Select “Set” to save the rate, “Cancel” to close the dialog without saving the rate, or “Help” to access the electronic help file.

5 Overview of CC-Link Dashboard in the NetDecoder Analyzer

The CC-Link Dashboard Dialog contains two main features:

1. An Active Device Grid
2. An Error Log

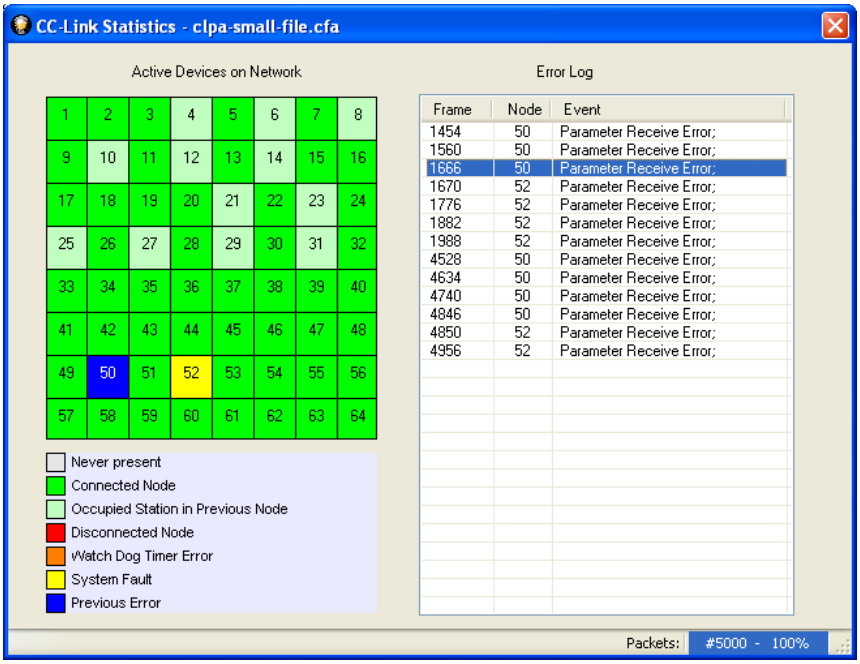


Figure 17: Overview of CC-Link Dashboard

5.1 Active Devices Grid

The device grid shows all 64 nodes on a CC-Link network with each node represented by a numbered square on the grid. The squares are color coded to indicate the state of the node.

1. Grey: Node Not Present on the network
2. Green: A Connected Node operating normally without errors
3. Light Green: An Occupied Station within a Previous Node.
4. Red: Disconnected Node
5. Orange: Node with a Watch Dog Timer Error
6. Yellow: Node with a System Fault
7. Blue: Node operating correctly but had a previous error

5.1.1 Nodes Not Present on the Network

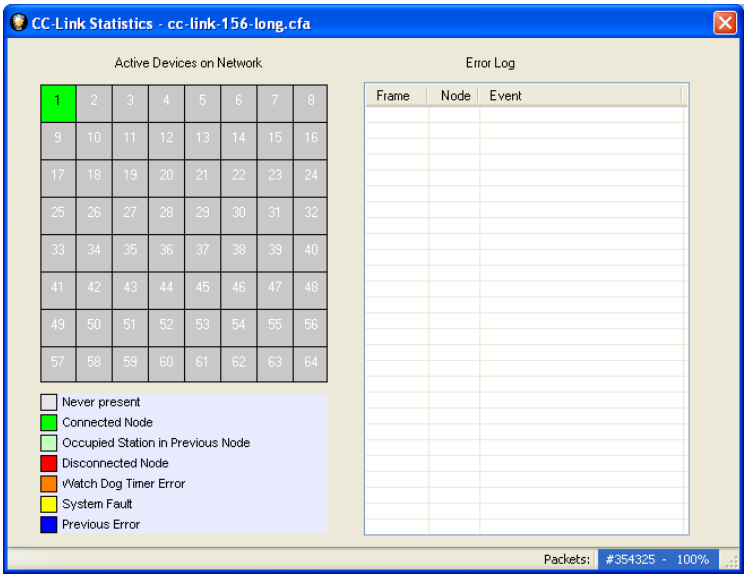


Figure 18: Network with Only One Node

In Figure 18 above, we see that there is only one node and all other nodes are grayed out to show that they are absent on the network.

5.1.2 Connected Nodes Operating Normally without Errors

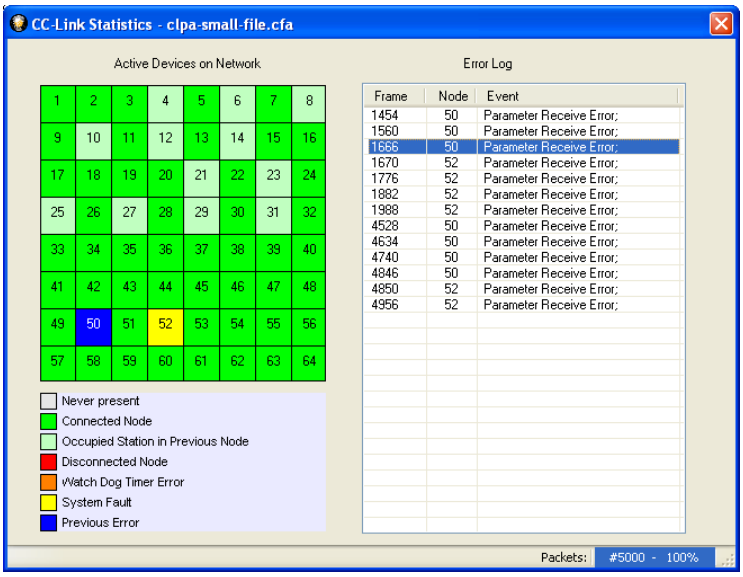


Figure 19: Grid with Connected Nodes and Occupied Stations

Figure 19 shows a fully loaded CC-Link network with all 64 nodes present. All the nodes in green color indicate nodes operating normally without any errors.

5.1.3 Occupied Station within a Previous Node

CC-Link supports the concept of Occupied Stations, in which a single node on the network can be considered to have multiple stations. Once again referring to Figure 19 above, we see that Node 4 is an Occupied Station. This means that Node 3 is configured to have two occupied stations: Node 3 and Node 4. Similarly, Nodes 5, 7, 9, 11, 13, 20, 22, 24, 26, 28, and 30 have two occupied Stations. This information is also conveyed in Frame Display.

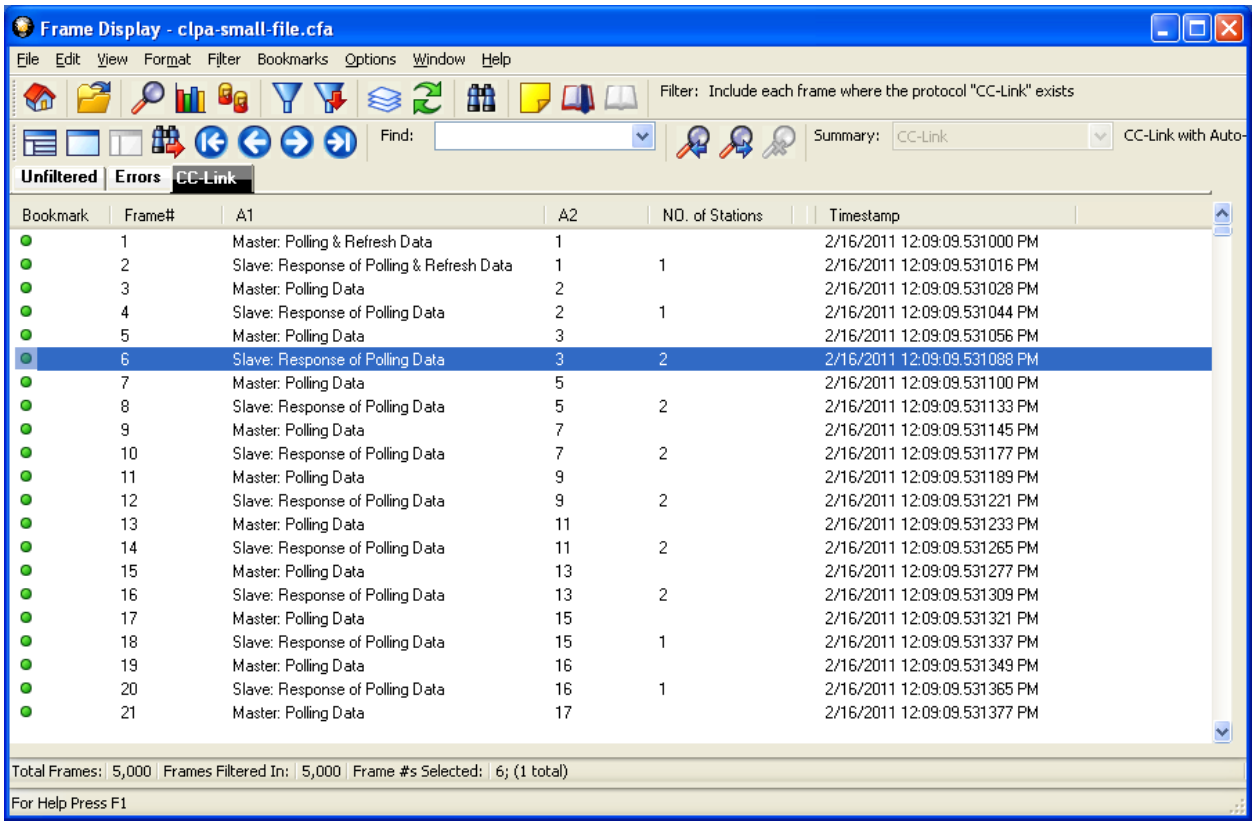


Figure 20: Frame Display Showing Number of Occupied Stations

In Figure 20, we can see in Frame 6 that Node 3 has two occupied stations. This means that node 4 is actually an occupied station in node 3. Therefore, after a response from Node 3 in Frame 6, the Master then polls Node 5 and Not node 4. In Frame 8, Node 5 responds and there is information that it also occupies two stations. This implies that node 6 is an occupied station.

5.1.4 Disconnected Node

If a properly working node gets disconnected for any reason, then the Dashboard shows the node marked in red.

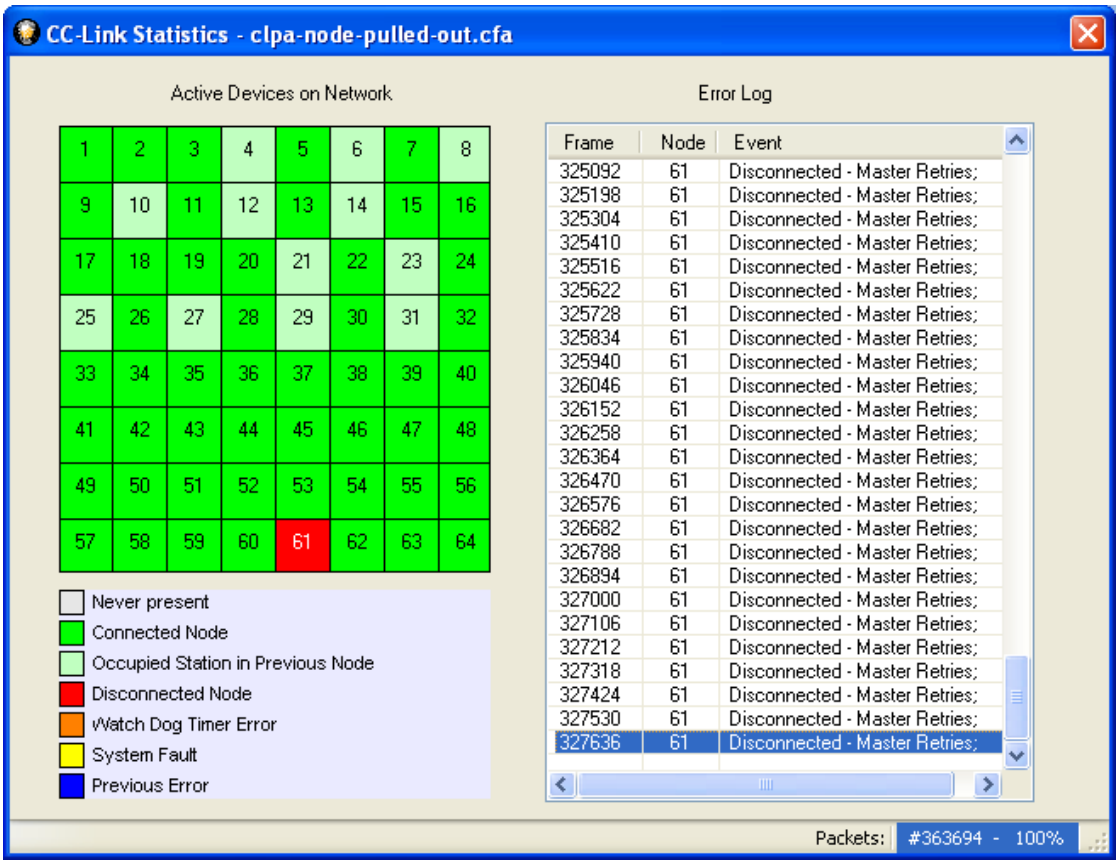


Figure 21: Node Disconnected and Master Retries

Figure 21 shows a network in which Node 61 was pulled out of the network. The Dashboard marks the node in red and the Error Log shows the exact Frame number at which the Master is retrying to poll the node 61. The Error Log shows the Frame number, the node, and the error event that happened on that frame.

In Frame Display, we can see consecutive Master Poll frames. In Figure 22 below we can see Frames 327635 and 327636 are consecutive attempts by the Master to reestablish connection with Node 61. When the Master does not get a response, the Dashboard marks a Disconnected node.

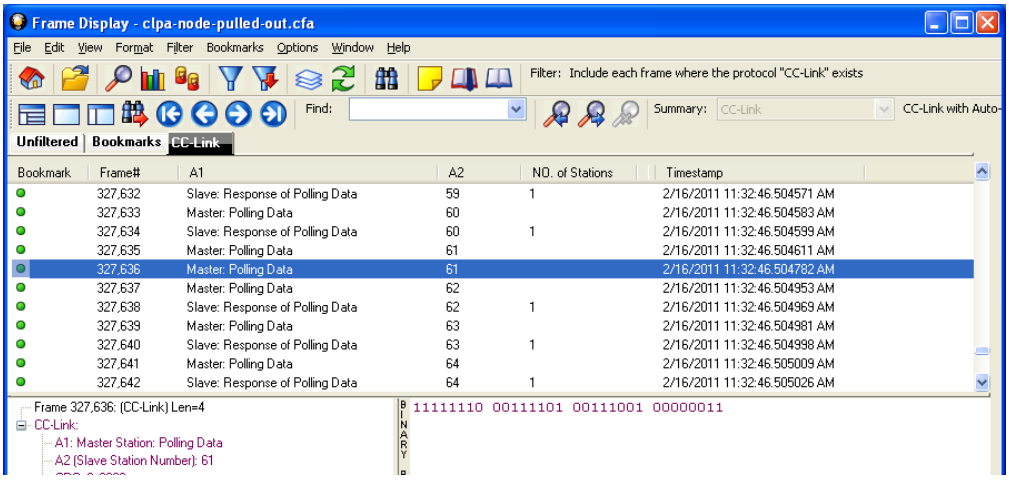


Figure 22: Frame Display showing consecutive Master Poll Data Frames

5.1.5 Node with a Watch Dog Timer Error

When a Slave node responds to a Master's Poll request, the response frame contains a Station Information (ST1) byte. The first bit of the ST1 byte indicates a Watchdog Timer error. If a node sends a frame with this bit set, then the node is marked in orange and error is logged in the error list.

5.1.6 Node with System Fault

When a Slave node responds to a Master's Poll request, the response frame contains a Station Information (ST1) byte. Apart from the Watchdog Timer bit and the Cyclic Transmission flag, this field contains 5 bits that provide information on the node's status. These fields include:

1. Switch Change Detection
2. Parameter Receive
3. Refresh Receive
4. Unit Error/Invalid Number of Points
5. Fuse Status

If any of these 5 flag bits are enabled, then the node is flagged as having a System Fault.

In this screen shot below, we see a Frame 20 from Node 16, in which all the ST1 bits are without any error:

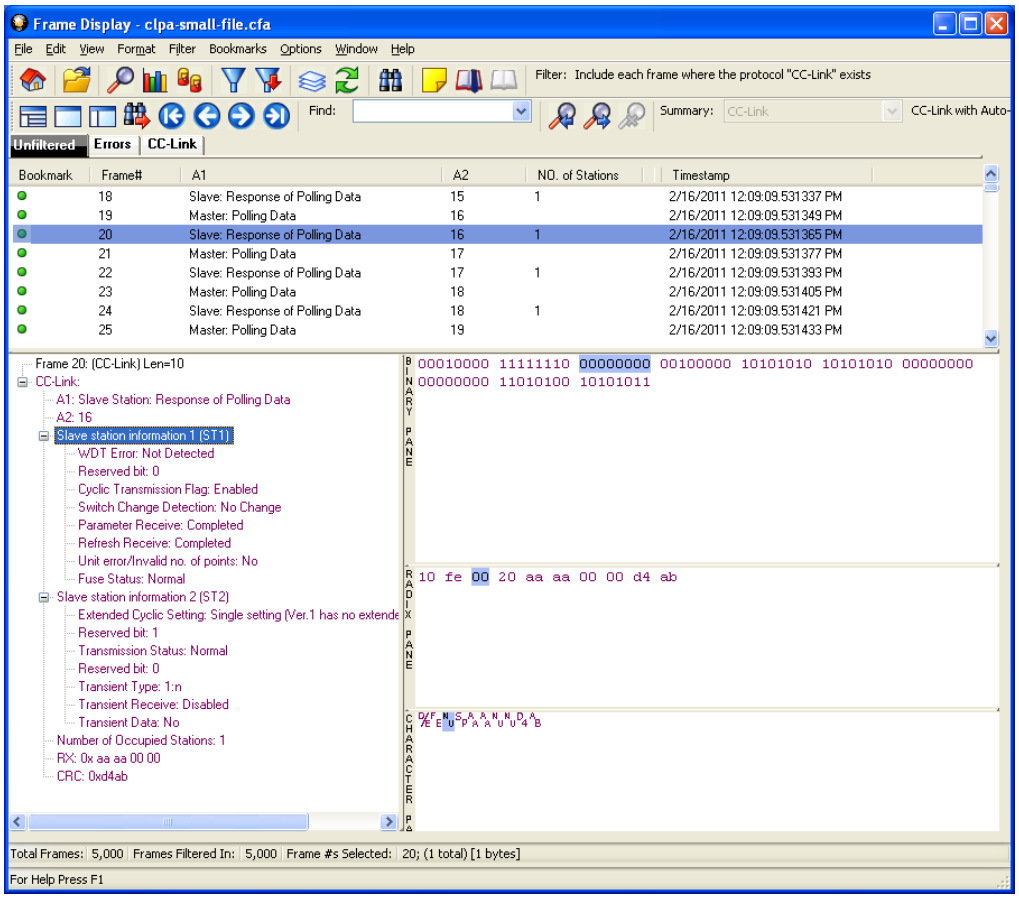


Figure 23: Node 16 without any System Faults

Figure 24 below shows a dashboard screenshot with Nodes 50 and 52 in System Fault. The Error Log also lists the exact frame number that has the error and the actual error. In this case, both Nodes 50 and Node 52 were responding with a 'Parameter Receive' error.

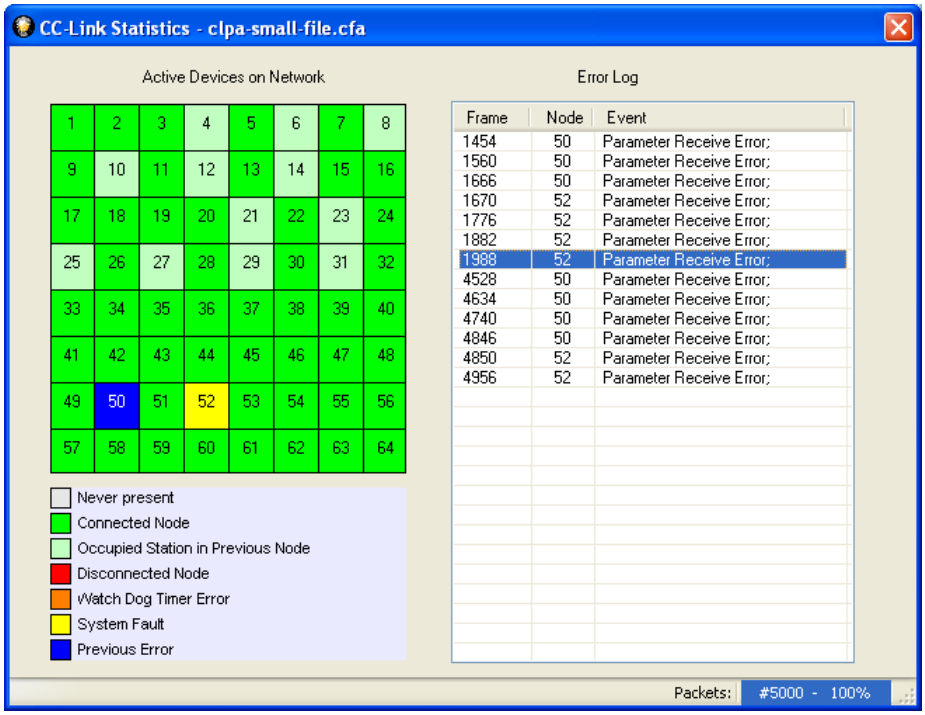


Figure 24: Node 50 and Node 52 with System Fault

To dig deeper into this System Fault, we can see the actual frames in Frame Display.

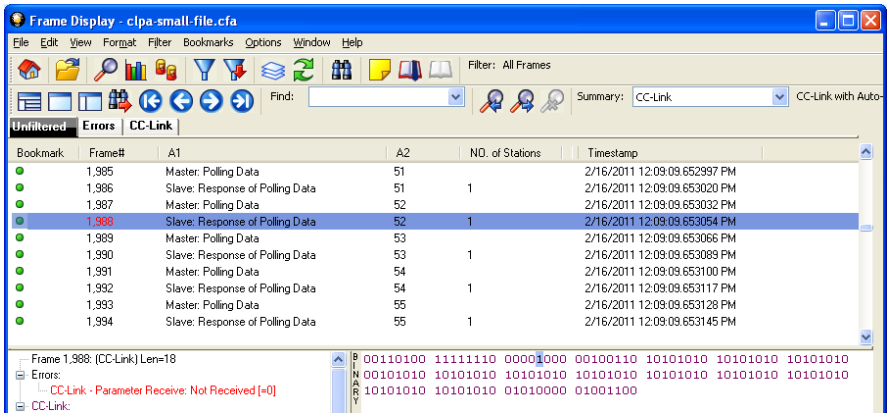


Figure 25: Node 52 with Parameter Receive Error

Frame 1988 (which is listed in the Error Log) shows that the “Parameter Receive” bit in the ST1 field is set to “Not Received”. Therefore, Node 52 is tagged as having a System Fault.

5.1.7 Node with a Previous Error

Sometimes a node can have an error and then recover. If this occurs, the correctly operating node is first displayed in Green. When it has a System Fault, it goes to Yellow state. When the node recovers, it goes to Blue state. Taking the same example of Figure 26, we see the Node 50 is tagged in blue as having a 'Previous Error'.

We can examine Frame Display for more details. The Error Log shows frame 4886 as the last frame where node 50 had a Parameter Error.

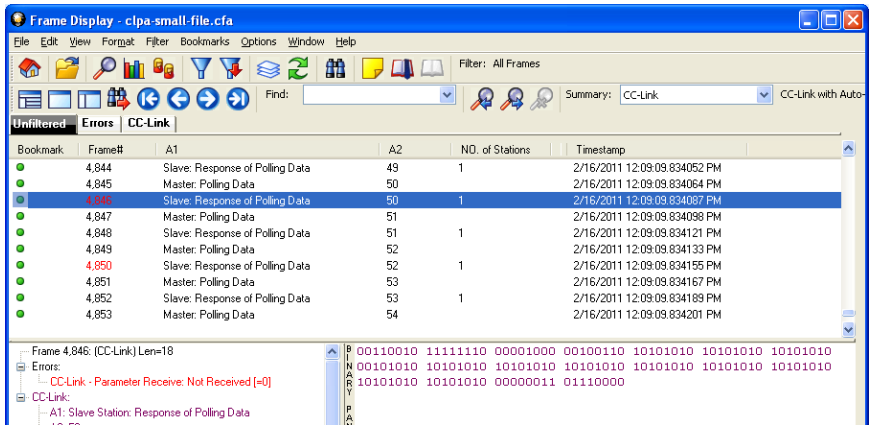


Figure 26: Node 50 with Last parameter Error

Following Node 50 in Frame Display, we see that in the next transmission cycle, in Frame 4952, it shows that its Parameter Receive status as "Completed" and it has no other errors in the ST1 field. This is show below in Figure 27.

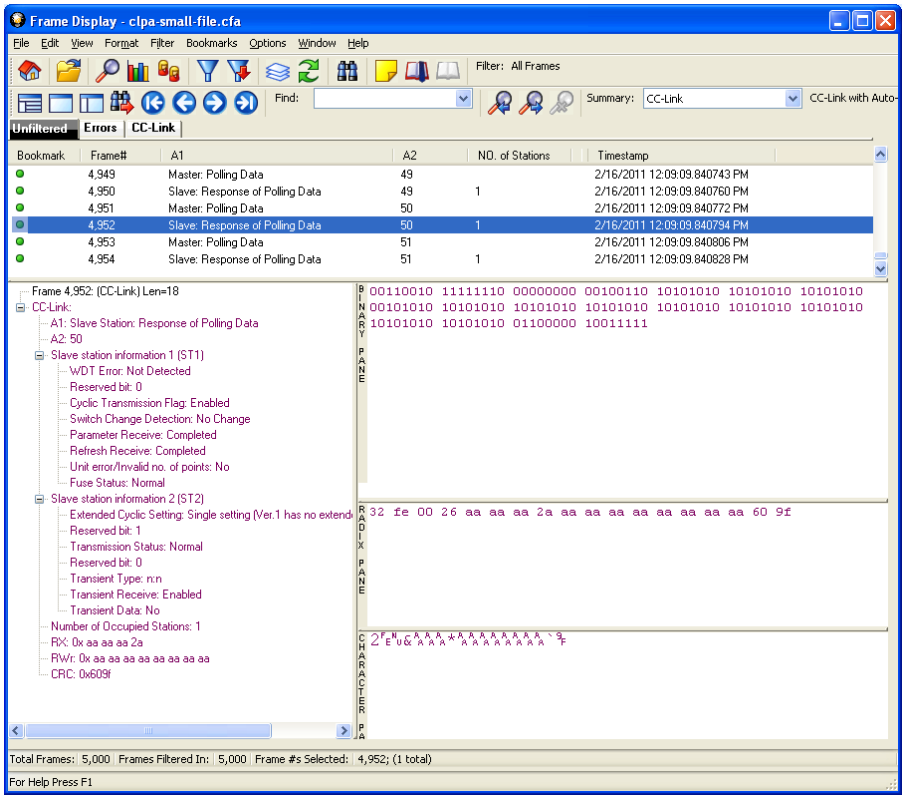


Figure 27: Node 50 recovered from System Fault

5.2 Error Log

As seen in the dashboard screenshots above, the Error log shows a list of all errors along with the Node that caused the error and the frame number in which the error was found. The errors listed in the "Events" column include:

- Watch Dog Timer errors
- Disconnected Error
- Switch Change Detection Error
- Parameter Receive Error
- Refresh Receive Error
- Unit Errors
- Fuse Status Error

A single frame can have multiple errors. In such cases, all the events are concatenated into a single string separated by semi-colons.

6 System Requirements

- PC with Windows XP 32 bit, (Service Pack 2 or higher), Windows 7 (32 and 64 bit).
- Intel Core 2 Duo 2.2 GHz Processor or Higher
- RAM Requirements: 1 GB minimum, 2 GB recommended
- 50 MB free Hard Disk Space (capture file size is limited only by disk size)
- One USB 2.0 High Speed enabled port

7 Technical Support

Technical support is available in several ways. The online help system provides answers to many user related questions. Frontline's website has documentation on common problems, as well as software upgrades and utilities to use with our products.

Web: http://www.fte.com, click **Support**

Email: tech_support@fte.com

If you need to talk to a technical support representative, support is available between 9am and 5pm, U.S. Eastern time, Monday through Friday. Technical support is not available on U.S. national holidays.

Phone: +1 (434) 984-4500

Fax: +1 (434) 984-4505