Port Message Viewer v6+

User's Guide

for Microchip Evaluation Boards

Supporting

MOST®

Media Oriented Systems Transport

JULY 2013

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Preface

NOTICE TO CUSTOMERS

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Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "DSXXXXXA", where "XXXXX" is the document number and "A" is the revision level of the document.

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INTRODUCTION

This chapter contains general information that will be useful to know before using the *Port Message Viewer v6+*. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- Warranty Registration
- The Microchip Website
- Customer Change Notification Service
- Customer Support
- Recommended Reading
- Document Revision History

DOCUMENT LAYOUT

This user's guide describes how to use the *Port Message Viewer v6+*. The document is organized as follows:

- **Chapter 1. "Introduction"** – This chapter introduces the *Port Message Viewer v6+* and provides an overview of various features.
- **Chapter 2. "Installation"** – This chapter describes the installation process.
- **Chapter 3. "Navigation through the Main Window"** – This chapter describes how to access and use the *Port Message Viewer v6+* and gives examples of the available functionality.

CONVENTIONS USED IN THIS GUIDE

Within this manual, the following abbreviations and symbols are used to improve readability.

Example	Description
BIT	Name of a single bit within a field
FIELD.BIT	Name of a single bit (BIT) in FIELD
x…y	Range from x to y, inclusive
BITS[m:n]	Groups of bits from m to n, inclusive
PIN	Pin Name
SIGNAL	Signal Name
msb, lsb	Most significant bit, least significant bit
MSB, LSB	Most significant byte, least significant byte
zzzzb	Binary number (value zzzz)
0xzzz	Hexadecimal number (value zzz)
zzh	Hexadecimal number (value zz)
rsvd	Reserved memory location. Must write 0, read value indeterminate
code	Instruction code, or API function or parameter
Multi Word Name	Used for multiple words that are considered a single unit, such as: *Resource Allocate* message, or *Connection Label*, or *Decrement Stack Pointer* instruction.
Section Name	Emphasis, Reference, Section or Document name.
$\overline{\text{VAL}}$	Over-bar indicates active low pin or register bit
x	Don't care
<Parameter>	<> indicate a Parameter is optional or is only used under some conditions
{,Parameter}	Braces indicate Parameter(s) that repeat one or more times.
[Parameter]	Brackets indicate a nested Parameter. This Parameter is not real and actually decodes into one or more real parameters.

WARRANTY REGISTRATION

Please complete and mail the Warranty Registration Card that was enclosed with the development board. Sending in the registration card entitles you to receive new product updates. Interim software releases are available at the Microchip web site.

THE MICROCHIP WEBSITE

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- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
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- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

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Technical support is available through the web site at: http://microchip.com/support

RECOMMENDED READING

This user's guide describes how to use *Port Message Viewer v6+*. Other useful documents are listed below. The following Microchip documents are available and recommended as supplemental reference resources.

[1] OS81092 MOST ToGo Evaluation Board Hardware Data Sheet

DS60001222A: 2013. www.microchip.com.

DOCUMENT REVISION HISTORY

Revision A: DS60001219A (07/2013)

Initial release of Port Message Viewer v6+ User Guide for Microchip Automotive Infotainment Systems Evaluation Boards.

Revision d6 (04/2007)

Draft release.

Chapter 1. Introduction

In a MOST® device, the communication between the INIC and the local controller (the External Host Controller or EHC) is done via a protocol called the Port Message Protocol. This protocol is defined in the respective API User Manual for the INIC. In Microchip evaluation boards, the EHC firmware provides a spy functionality for Port Messages such that they are sent out a Serial Port, either an RS232 port or a USB port running a CDC Class Serial Port Emulation, along with a time stamp in an ASCII format as shown below:

```
000:00:00:717> s40.00.07.01.14.50.20.00.01.01p
```

These messages along with other informative debug output text, such as from the Net-Services Trace Module, error messages, and general program flow messages are sent out the Serial Port of the Evaluation board. Any terminal program such as HyperTerminal or TeraTerm can be used to view the output.

Port Message Viewer v6+ is a specialized terminal program that can interpret the port messages and show them in a more human-readable format. *Port Message Viewer v6+* uses an XML MOST function catalog to interpret the messages, just like the Optolyzer Suite software. In fact, it uses the same Optolyzer Suite component to interpret the messages. Now the above message, when interpreted is:

```
000:00:00:717> s40.00.07.01.14.50.20.00.01.01p
000:00:00:717> EHC--->INIC.00.DeviceMode.Set.DeviceMode=Master
```

Now we can see that the above Port Message was a command to INIC to set its DeviceMode to Master. In addition to just interpreting the Port Messages, Port Message Viewer provides utilities to filter messages, save the raw and/or formatted (interpreted) output to a file. Also, a saved raw file can be reopened and 'played back' as if it were coming from a live session.

The Port Message spy functionality of the Evaluation boards comes from the Microchip I^2C driver itself. Since customer's may choose not to implement this functionality in their driver, *Port Message Viewer v6+* can also interpret the output of a third party I^2C spy tool, that being the Beagle™ from *TotalPhase* (www.totalphase.com).

This document provides *Port Message Viewer v6+* users with information about:

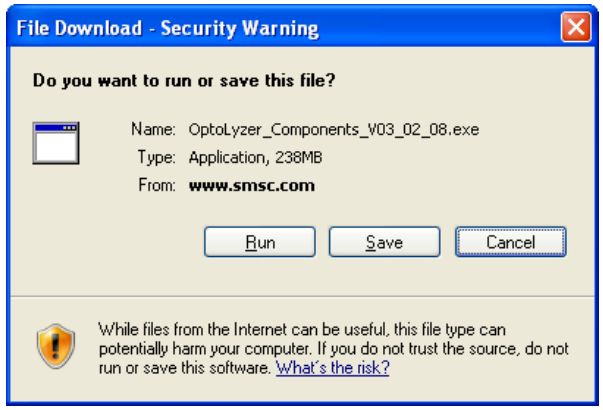
- Installation
- Navigating through the main window
- Reading decoded Port Messages
- Filtering specific Port Messages
- Loading a *Protocol Syntax File*
- Loading I^2C device setup file

When starting *Port Message Viewer v6+*, it is assumed the user has properly installed the software and an appropriate target board is connected to the PC.

Chapter 2. Installation

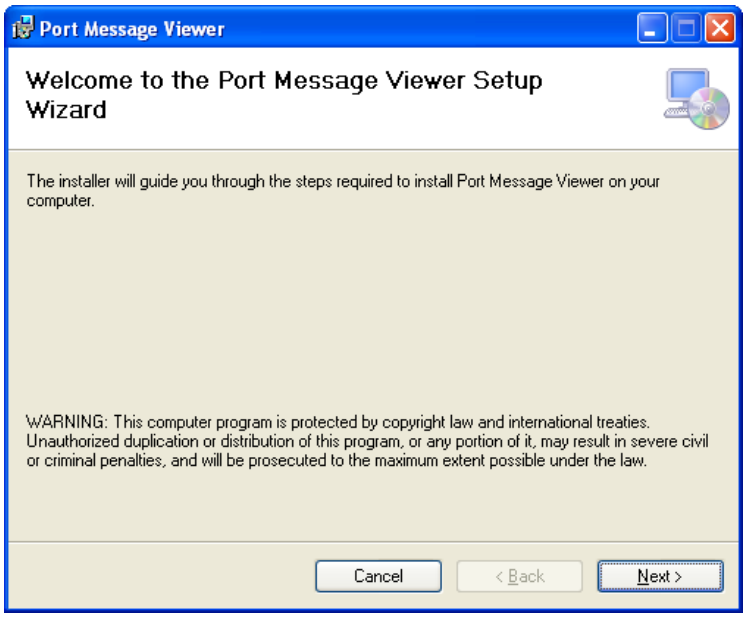
1. Before using *Port Message Viewer v6+*, The *OptoLyzer Components* software must be installed. This software has been provided within the files directory. Click here on Optolyzer_Components_V03_02_09.exe then follow instructions to install as shown in Figure 2-1 below:

FIGURE 2-1: OPTOLYZER FILE DOWNLOAD



2. Now install *Port Message Viewer v6+* by clicking here on setup.exe then follow instruction to install as shown in shown in Figure 2-2:

FIGURE 2-2: PORT MESSAGE VIEWER V6+ SETUP



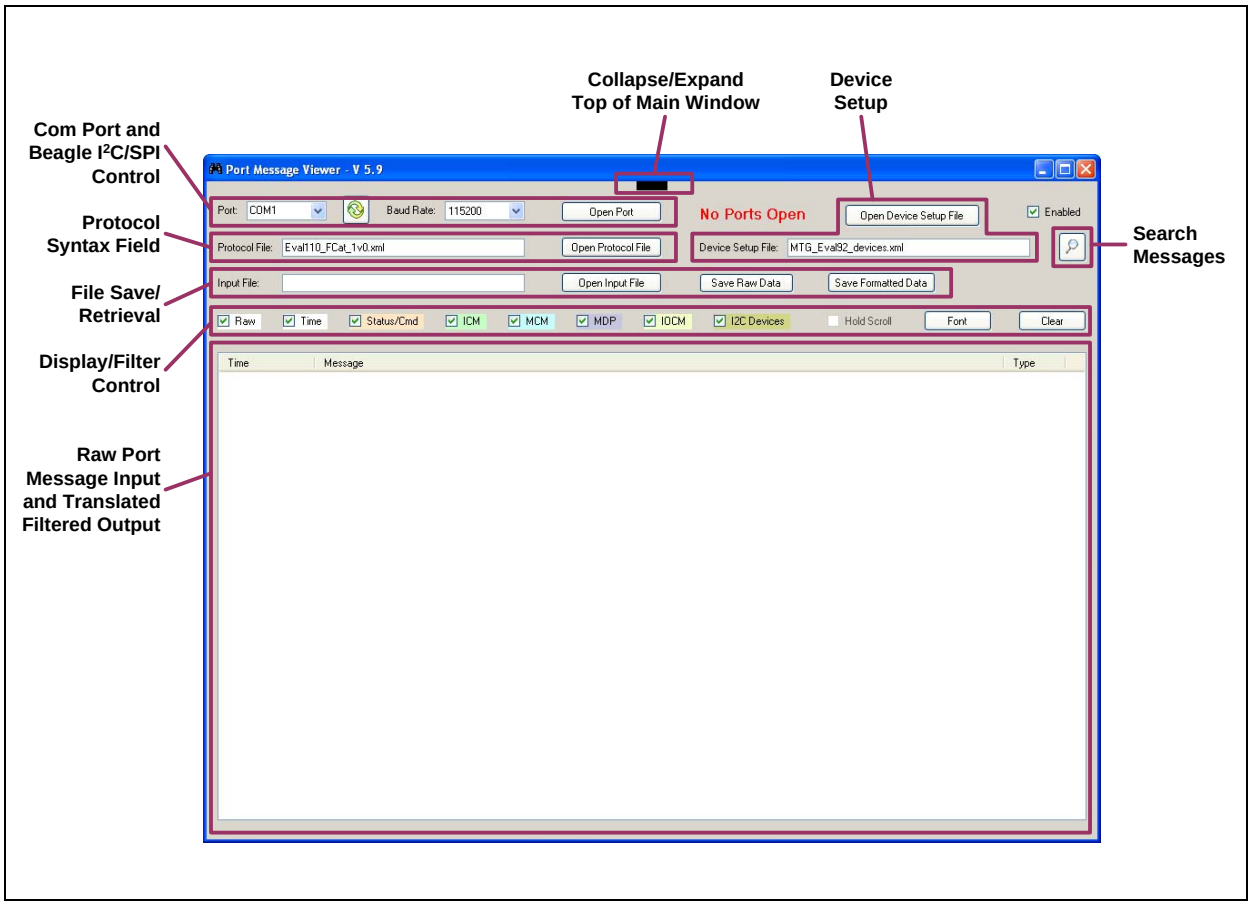
Chapter 3. Navigation through the Main Window

The main window of the *Port Message Viewer v6+* is divided into seven primary sections, including:

- Com Port and/or Beagle selection
- Protocol Syntax
- File Save/Retrieval
- Display/Filter Control
- Raw Port Message Input and Translated / Filtered Output
- Device Setup
- Search Messages

Figure 3-3 illustrates the main window and outlines the primary sections of the *Port Message Viewer v6+*. The window may be stretched horizontally and/or vertically to increase the visible portion of messages without the use of scroll bars.

FIGURE 3-3: MAIN WINDOW

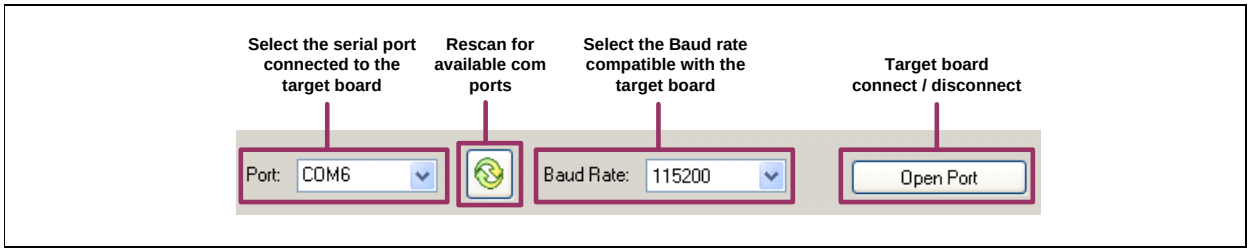


3.1 COM PORT AND BEAGLE I²C/SPI CONTROL FIELD

The Com Port and Beagle Control Field in the Port Message Viewer main window provides a drop-down menu which shows all available PC serial ports and Total Phase Beagle I²C/SPI devices. Figure 3-4 shows each part of the Com Port and Beagle Control Field. The user must select the com port or Beagle device which is connected to the target INIC board. The com port baud rate must also be selected and must match the target board baud rate. The Beagle device must be connected to the INIC Control SDA, SCL and Ground pins. Once the appropriate com port and baud rate or Beagle device are selected, connection to the target board is achieved by selecting the *Open Port* button.

Note: To support communication between software and hardware, the baud rate of the target board and *Port Message Viewer v6+* must be the same. With a Serial Port connection, 115 kbaud is typically the highest rate supported, using a direct RS232 com port. For higher speeds, a USB-to-RS232 converter is required.

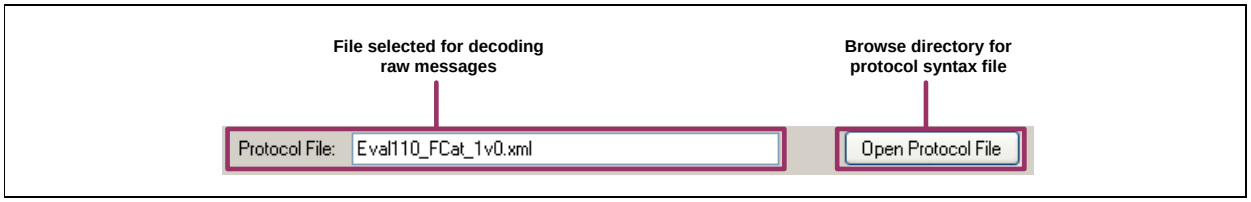
FIGURE 3-4: COM PORT AND BEAGLE CONTROL FIELD



3.1.1 Protocol Syntax Field

The Protocol Syntax field in the Port Message Viewer main window allows the user to select the desired protocol syntax file for the application. These files are standard MOST Function Catalog XML formatted files and are used by *Port Message Viewer v6+* to translate the raw messages into readable output. Select the *Open Protocol File* button to browse a directory for a particular protocol syntax file. Figure 3-5 shows the Protocol Syntax Field.

FIGURE 3-5: PROTOCOL SYNTAX FILE



Note: Protocol syntax files are provided with Microchip boards and will be located in the application directory.

3.1.2 File Save/Retrieval

Current contents of the display window can be saved at any time to a text file by clicking on either the *Save Raw Data* or *Save Formatted Data* buttons and specifying a filename.

Raw data captured from a target board and saved in a text file can be retrieved using *Open Input File*. Once the file is opened, the raw data is displayed and translated in this window using the selected protocol syntax file. This feature allows *Port Message Viewer v6+* to be useful when offline (not connected to a target board). Figure 3-6 shows the Port Message display window. The formatted data file is useful for cutting and pasting sections into email or documentation. Other programs like HyperTerminal can be used to save raw format text files, and those can be opened and interpreted with Port Message Viewer v6+, but the following header must be added to the text file:

```
//- Device Raw Data Header Row - Do Not Modify/Delete -\\
```

FIGURE 3-6: PORT MESSAGE DISPLAY WINDOW

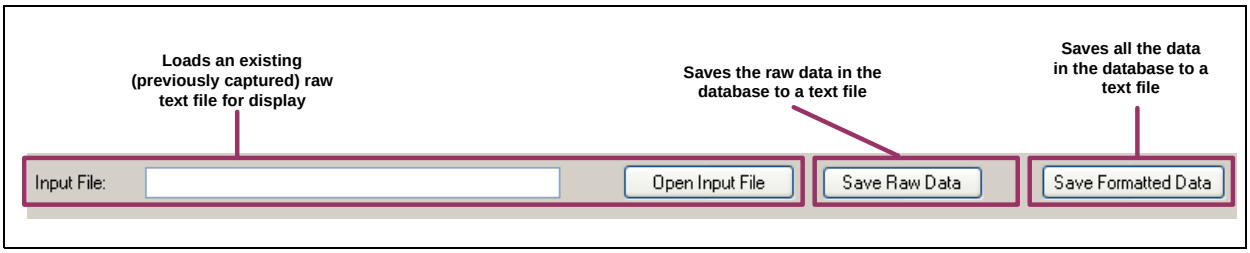
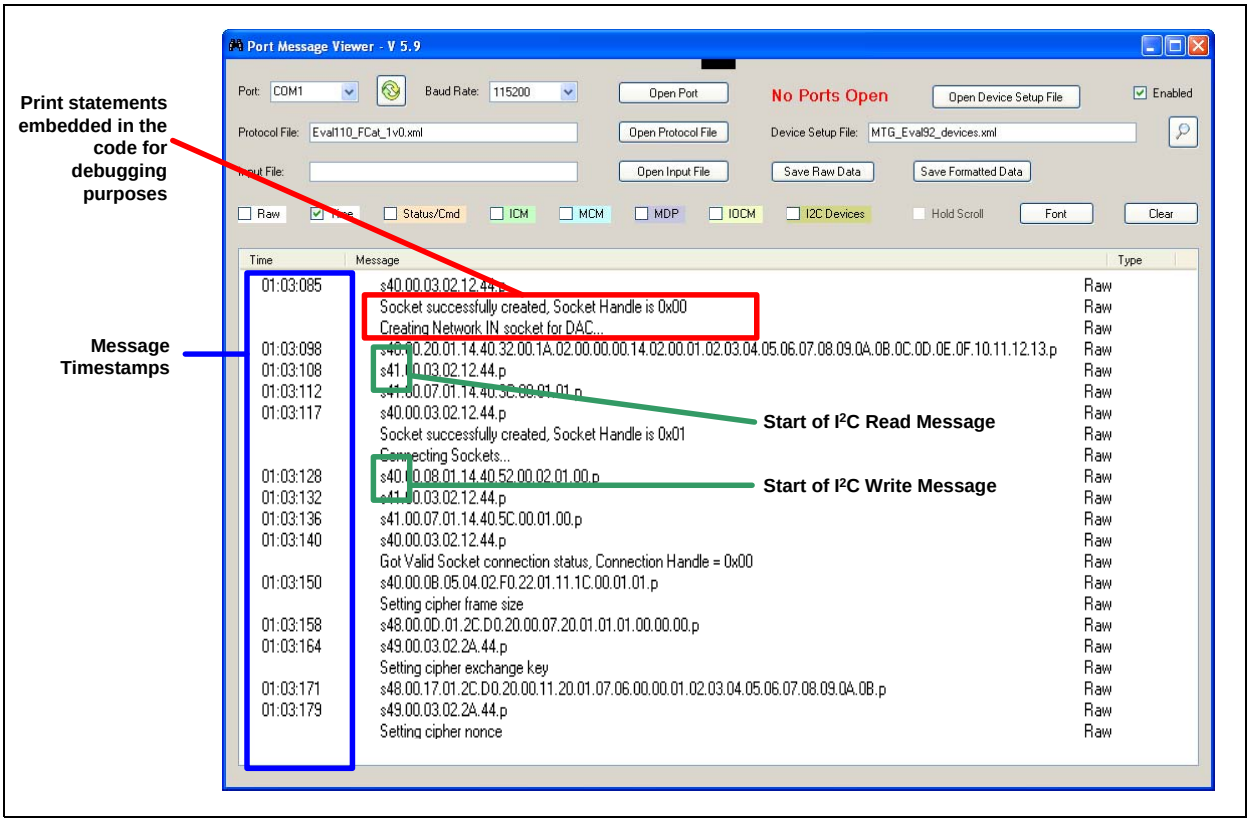


Figure 3-7 shows an example of raw information output displayed in the display window from an Evaluation board with no interpretation. This is the output that would be seen on a general purpose terminal program such as HyperTerminal. This is also the format of the data saved to a file in Raw Data format. This window is also where decoded messages are displayed. The selected protocol syntax file (in the *Protocol Syntax Field*) is used to translate raw messages into readable text.

FIGURE 3-7: RAW MESSAGE EXAMPLE



The user can also filter Port Messages of interest in this window by selecting/deselecting the corresponding Port Message type, as shown in Figure 3-8.

FIGURE 3-8: DISPLAY WINDOW WITH ONLY ICM AND MCM FILTERS

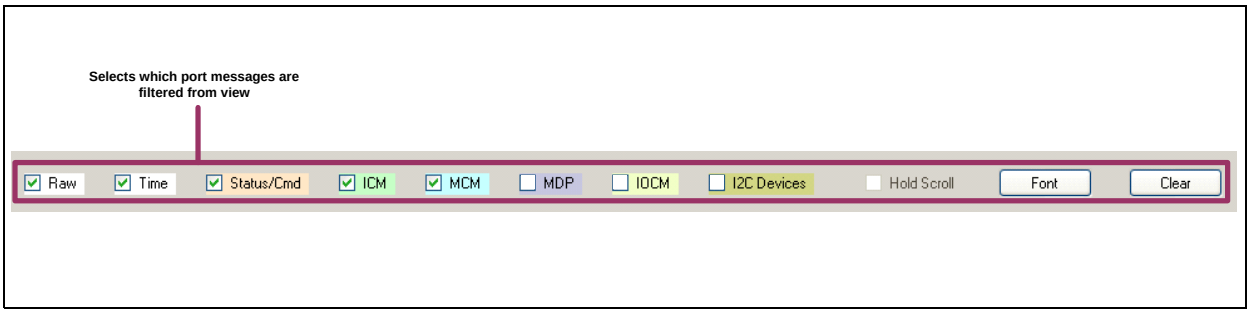
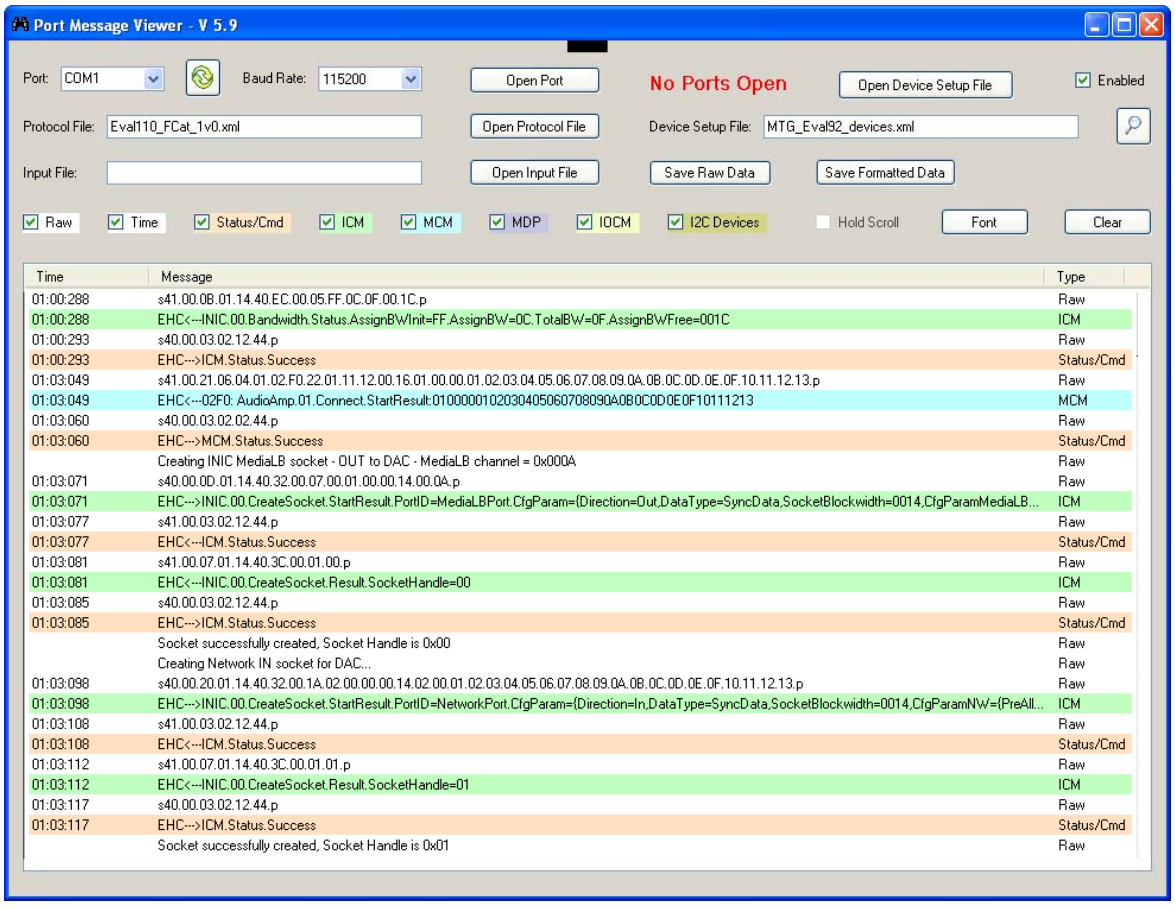


Figure 3-9 shows the raw and interpreted output from an Evaluation board. This output highlights each type of Port Message that has been selected (as shown in Figure 3-8 above).

FIGURE 3-9: RAW AND INTERPRETED OUTPUT EXAMPLE



3.1.3 Display Filter and Control

As the ASCII data comes in to *Port Message Viewer v6+*, each line is saved in an internal database. If the line is a port message, then the message is interpreted via the Function Catalog and saved in the database along with the raw text data. In addition to translating the message, *Port Message Viewer v6+* also categorizes the message according to its source / destination FIFO, based on data in the header of the message. The filter section allows the user to select which data from the database is shown in the display section. There are additional general controls here for controlling the display, such as clearing or freezing the screen. In order to capture new Port Messages, the *Enabled* check box must be selected.

Filter and viewer options include (see Figure 3-8 for image of selectable filters):

- *Raw* - When selected all of the ASCII data coming in the Serial port will be shown. If not selected, the raw data is not shown, and only the enabled translated Port Messages will be seen.
- *Status/Cmd* - When selected the FIFO Status and Command messages between the EHC and INIC will be shown. These messages are used for flow control by the low level drivers and are useful for debugging. Once the low level drivers are working correctly, these messages become 'noise' in the output stream as they don't convey any application information. Thus it is useful to be able to disable these translated messages in the display.
- *ICM* - ICMs (or INIC Control Messages) are messages between the EHC and INIC, specifically messages to or from the local FBlock INIC.
- *IOC* - IO Control Messages are messages to or from an IO Companion device, specifically its IOC FBlock.
- *MCM* - MOST Control Messages (MCMs) are messages to or from other FBlocks on the network. Most of these messages are sent across the network, but could also be to application FBlocks on the local device as well.
- *MDP* - MOST Data Packets (MDPs) are asynchronous data packets such as those sent by MOST High Protocol on the single asynchronous channel on the network.
- *Time* - When selected, timestamps will be displayed with the captured messages if timestamps are available.
- *I^2C Devices* - Allows user to call-out and view other I^2C devices on the same I^2C bus as INIC such as the Codec, Power Management Control or EEPROM. I^2C device descriptions are described in Section 3.1.4.

For example, in Figure 3-8, only ICM and MCM Port Messages will be displayed in the window. All other Port Messages will be filtered from view.

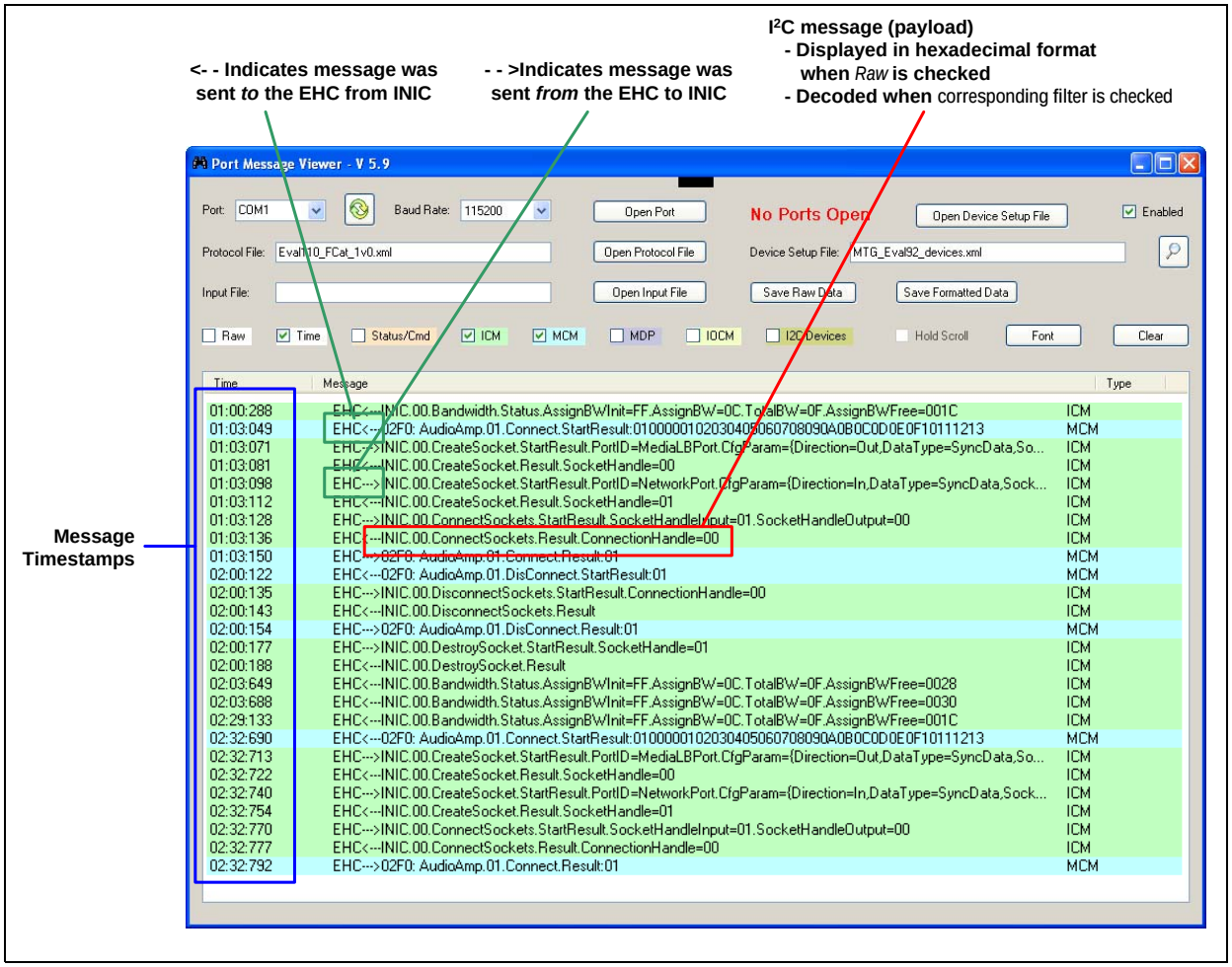
For I^2C write messages shown (e.g. *s40*), the window displays the decoded messages (Figure 3-9) with a right arrow to indicate the message was sent to INIC from the EHC. For I^2C read messages (e.g. *s41*), the decoded message is displayed with a left arrow to indicate the message was sent from INIC to the EHC.

Current contents of the database can be saved at any time to a text file by clicking on either the *Save Raw Data* or *Save Formatted Data* buttons and specifying a filename. The *Save Raw Data* option only saves the original ASCII data from the database. These files can later be opened with the Input File function. The *Save Formatted Data* option saves data according to the currently selected filters. The *Clear* button is used to clear the display window of all Port Messages which clears the local data-

base as well. In order to capture new Port Messages, *Enabled* must be selected. Selecting the *Hold Scroll* option keeps the display from moving as new data comes in and is added to the bottom of the screen.

Figure 3-10 shows when filters are set so only ICM and MCM Port Messages are decoded and displayed in the display window. All other messages will be filtered from view.

FIGURE 3-10: EXAMPLE OF DECODED MESSAGE IN DISPLAY



3.1.4 I²C Interpretation

Figure 3-11 shows Codec traffic with I²C interpretation.

FIGURE 3-11: CODEC TRAFFIC WITH I²C INTERPRETATION

Time	Message	Type
000:00:00:898	898 MIS: RX of Local.INIC.00.NIState.Status (len = 1 bytes)	Raw
000:00:00:902	NS CB: Device Class is 0	Raw
000:00:00:904	s40.00.03.02.12.44p	Raw
000:00:00:906	s41.00.09.01.14.50.5C.00.03.03.00.00p	Raw
000:00:00:908	TASK MOST: NetServices Supervisor State: MSVAL_S_ON	Raw
000:00:00:911	TASK MOST: Network has reached state NetOn!	Raw
000:00:00:914	TASK MOST: Hardware Version is 0x10	Raw
000:00:00:916	TASK MOST: Product Version is 1. 6. 4	Raw
000:00:00:919	s51.74.51.00p	Raw
000:00:00:919	EHC<---RightTouch.LEDOutputControl	I2CDevice
000:00:00:920	s50.74.10p	Raw
000:00:00:920	EHC--->RightTouch.LEDOutputControl	I2CDevice
000:00:00:921	Opening the Codec	Raw
000:00:00:924	s30.00.0F.02p	Raw
000:00:00:924	EHC--->CODEC.ClockSettings	I2CDevice
000:00:00:925	s30.01.00.00p	Raw
000:00:00:925	EHC--->CODEC.I2S_Settings	I2CDevice
000:00:00:926	s30.02.A5.DFp	Raw
000:00:00:926	EHC--->CODEC.Power_Settings	I2CDevice
000:00:00:927	s30.03.3F.3Fp	Raw
000:00:00:927	EHC--->CODEC.AnalogMixer	I2CDevice
000:00:00:929	s30.04.02.02p	Raw
000:00:00:929	EHC--->CODEC.HeadphoneAmp	I2CDevice
000:00:00:930	s30.10.00.00p	Raw
000:00:00:930	EHC--->CODEC.AnalogMixer	I2CDevice
000:00:00:931	s30.11.00.00p	Raw
000:00:00:931	EHC--->CODEC.MixerVolume	I2CDevice
000:00:00:933	s30.12.00.00p	Raw
000:00:00:933	EHC--->CODEC.Tone	I2CDevice
000:00:00:934	s30.13.00.00p	Raw
000:00:00:934	EHC--->CODEC.Mute	I2CDevice
000:00:00:935	s30.14.00.00p	Raw
000:00:00:935	EHC--->CODEC.Mixer	I2CDevice
000:00:00:937	s30.20.00.00p	Raw
000:00:00:937	EHC--->CODEC.Volume	I2CDevice
000:00:00:938	s30.21.00.00p	Raw
000:00:00:938	EHC--->CODEC.PGA_Settings	I2CDevice
000:00:00:939	s30.22.00.00p	Raw
000:00:00:939	EHC--->CODEC.ADC_Setup	I2CDevice
000:00:00:940	s30.23.00.00p	Raw
000:00:00:940	EHC--->CODEC.AGC_Settings	I2CDevice
000:00:00:942	Codec opened OK	Raw
	Initializing amp	Raw
000:00:00:944	s31.13.31.00.00p	Raw
000:00:00:944	EHC<---CODEC.Mute	I2CDevice

3.1.4.1 I²C DEVICE SETUP

The device setup file is an XML file that can assign names to I²C devices at specific addresses. At a minimum the INIC I²C address needs to be specified. Other I²C devices such as EEPROM and Codecs can be added to the file so their names show up in the translated output. In addition, many such devices have a register address as the first parameter. These registers can also be named and will show up in the output. An example of the XML device setup file, shown in Example 3-1 , provides a means for the user to specify the addresses and registers of the devices they are interested in decoding.

Messages containing the addresses of any devices listed in the device setup XML file in use will be decoded and in its place the device name and register name (if any) will be shown in the message display window.

EXAMPLE 3-1: XML DEVICE SETUP FILE

```
<devices>
  <device>
    <dev_addr>40</dev_addr>
    <dev_name>INIC</dev_name>
    <registers>
    </registers>
  </device>

  <device>
    <dev_addr>48</dev_addr>
    <dev_name>IOC</dev_name>
    <registers>
    </registers>
  </device>

  <device>
    <dev_addr>30</dev_addr>
    <dev_name>CODEC</dev_name>
    <registers>
      <reg_addr>00</reg_addr>
      <reg_name>ClockSettings</reg_name>

      <reg_addr>01</reg_addr>
      <reg_name>I2S_Settings</reg_name>

      <reg_addr>02</reg_addr>
      <reg_name>Power_Settings</reg_name>

      .
      .
      .

      <reg_addr>7F</reg_addr>
      <reg_name>Reset</reg_name>

    </registers>
  </device>

  <device>
    <dev_addr>A0</dev_addr>
    <dev_name>EEPROM</dev_name>
    <registers>
    </registers>
  </device>

</devices>
```

3.1.5 Search Messages

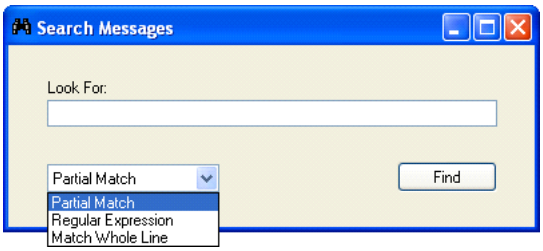
The Search Messages dialog box as shown in Figure 3-12 allows the user of *Port Message Viewer v6+* to search the messages shown in the display window. When text is input into *Look For* field, criteria is selected from the drop down list box then the *Find* button is selected, the *Message* column will be searched.

The following lists the options under the pull-down criteria menu.

- Partial Match: any portion of the value in the Message column matching the *Look For* text box text will be found.
- Regular Expression: the value in the Message column will be searched for the pattern specified in the *Look For* text box.
- Match Whole Line: the entire value in the Message column must match the *Look For* text box text.

Searches are not case sensitive. Patterns for regular expressions are those used by the *Microsoft .Net Framework*. Select the *Find* button again to look for the next entry.

FIGURE 3-12: SEARCH MESSAGES DIALOG



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