FBVIEW

FIRST IN FIELDBUS



FOUNDATION

FIELDBUS NETWORK ANALYZER

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Bridge_FF.f	bv		
Number	Time	Frame	
1849	10.02 32 285	RT	
1850	10.02.32.271	PT dest: 12	5
1851	10.02:32.277	RT	
1852	10.02.32.284	PT dest: 11	
1853	10.02;32,288	RT	
1854	10.02.32.297	PN dest: 1C	
1855	10.02;32,330	PT dest: 11	
1858	10.02.32.335	RT	
1857	10.02;32:342	PT dest: 12	
1858	10.02.32.348	RT	
1859	10.02:32.354	PT dest: 11	
Bridge_804	02./bv		_101
Number	Time	Frame	1
1845	10.02.32.238	34	
1846	10.02 32 248	33 11 01 9E	
1847	10.02.32.253	34	
1848	10.02 32 259	33 11 01 9E	
1848	10.02.32.285	34	
1850	10.02;32.271	33 12 01 9E	
1851	10.02.32.277	34	
1852	10.02;32,284	33 11 01 9E	
1853	10.02.32.289	34	
1854	10.02 32 287	28 1C 01 00 00 0A 08 0C	
1855	10.02.32.330	33 11 01 9E	



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FRANCE

INTRODUCTION

FBView is a powerful tool for those who want to work with fieldbus devices.

FBView provides the user with the messages that pass through the fieldbus buses. **FBView** can capture, analyze and decode the messages, showing all information. The information reports the message type, the address of the device that sent the message, and the address of the receiver. It is also possible to decode the messages from each level of the *Fieldbus* protocol.

FBView is easy to use and runs on Windows 2000 and XP.

FBView captures the messages from the bus and sends it to the computer using Smar's DFI302.

Characteristics

- Captures messages from any fieldbus bus (ISP, FF, HSE and Profibus PA).
- The captured messages can be sent to the printer and/or saved to files.
- Decodes FF messages.
 - Recognizes the message type.
 - Identifies the addresses.
 - Identifies the data.
 - Splits the messages from each level from the protocol.
- The messages can also be displayed in hexadecimal format.
- Messages filters. It means that it captures only the desired messages.
- Search tools. This tool is useful to find a pattern in the captured messages.
- Time Measure.
 - Evaluates the final time of each message. This time can be absolute or relative to a specific message.
 - Evaluates the time interval between the ends of each consecutive message.
 - Evaluates the time interval that the bus had no messages (Idle Time).
- Counts the number of captured messages.
- Verifies the FCS of the messages to check that the message was received with no errors and point out the messages with errors.
- Calculates the percentage of invalid messages.

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1. INSTALLATION

1.1 System Requirements

1.1.1 Minimum

Operational System	\rightarrow	Windows 2000 - Service Pack 3
Processor	\rightarrow	Pentium 333 MHz
RAM	\rightarrow	64 MB
HD Free Space	\rightarrow	10 MB
Monitor	\rightarrow	1024x768 - 64 Kcolors
CD-ROM		

1.1.2 Recommended

Operational System	\rightarrow	Windows 2000 - Service Pack 3
Processor	\rightarrow	Pentium 1 GHz
RAM	\rightarrow	128 MB
HD Free Space	\rightarrow	10 MB
Monitor	\rightarrow	1280x1024 - True Color
CD-ROM		

1.2 Installing FBView

Place SYSTEM302 CD installation at the CD-ROM driver. The *Installation* dialog box will open automatically. Click the SYSTEM302 button.

Follow the instructions in the dialog boxes to complete the installation. **FBView** and other programs that compound *System302* will be installed.

To initialize **FBView**, click the Windows *Start* button, at the *Task Bar*, point the cursor to the item *Programs*. Select the item *System302* and click the *FBView* icon. See the following figure:

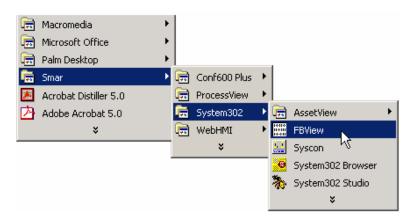


Figure 1.1. Running FBView

The FBV iew window will open:

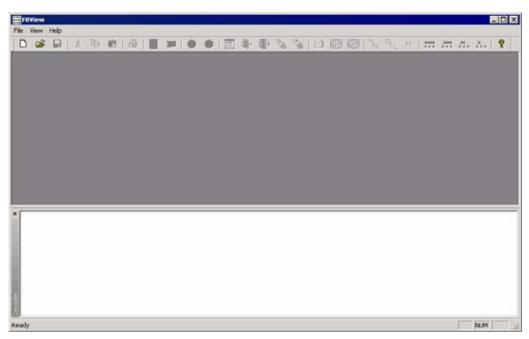


Figure 1.2. FBView Screen

2. OPERATION

FBView is easy to operate. It can be operated using the keyboard or selecting an icon on the toolbar or a menu option. The captured messages are stored in a buffer, named *Reception Buffer*. This buffer is fulfilled when **FBView** is on *Capture* mode. This buffer can also be loaded from a file. The messages stored in this buffer are displayed on the screen.

	Preferences W	Window P	and states												-			-	 		. 6
	山島	60	2 2		•	.0	E	1	1	.0	15	18	0	B	"E _X	DEC	PT.		 н.	Λ.,	8
Number	Tine		Fr	one																	
154	09:30:1	7.364	33	10	01	9E															
155	09:30:1	7.371	34																		
156	09:30:1	7.370	33	10	01	9E															
157	09:30:1	7.385	34																		
150	09:30:1			10	01	9E															
159	09:30:1	7.400	34																		
160	09:30:1	7 407	26	FE	01	11	00 0	0 40	8 10												
161	09:30:1		- 33	10	01	98	10														
162	09:30:1	7.449	34																		
163	09:30:1		33	10	01	9E															
164	09:30:1	7 463	34																		
165	09:30:1	7.470	33	10	01	9E															
166	09:30:1	7.478	- 34																		
167	09:30:1	7.485	33	10	01	9E															
CLECU class Improvement PT - 0x33 Frame Control Short Address Ox-addresses Dest: 10 Parameters Dest: 019E Date Date	s - Necessary R	ieturn Toki	en - Pri	ority :	Time	: Aval	lable														

Figure 2.1. FBView Screen

For some tasks, the user has to select a message in this buffer. For doing so, select the message with the mouse. The selected message is displayed in blue.

If the message is too long and it is not completely displayed, it can be read rolling the screen horizontally. Use the "left" and "right" arrows, or use the horizontal bar to roll the screen.

2.1 Toolbar



Creates a new file with an empty buffer. After clicking this button, the user must select the communication network: H1 or HSE. Refer to section "*Selecting the Communication*".



Click this button to fill the Reception Buffer with messages previously saved in a file.



The user can save the reception buffer to a file, to be used later. Click this button and a dialog box will open. Select the folder where the file will be saved and type the name for the new file. The files will be saved with the extension *.*fbv* for the H1 network and *.*ntv* for the HSE network.



Send the messages stored in the *Reception Buffer* to the printer. Uses the *Windows* default printer dialog box.



Initialize Communication

Start ou stop the communication with the interface. When clicking this button to initialize the communication, a dialog box will open to the user to select the interface.



Interface

Click this button to configure the interface that will capture the messages, according to the communication network selected.



Starts to fill the buffer with the messages captured in the bus. The captured messages are temporarily stored in the *Capture Buffer*. The messages will be captured until the user selects *Stop Capture* or until the *Capture Buffer* is completely full. The messages will be stored in the buffer until a new capture is initialized. During the capture, the messages can be displayed on the screen, or the *View* mode can be selected to display the statistic of the captured frames.



Stops the fulfillment of the *Reception Buffer*. When the capture is suspended, the user can verify the contents of the messages that were stored in the buffer. It is also possible to use or configure other software functions, such as filters and search tools.



Enable/Disable Frame Statistics

Change the visualization of the messages in the buffer. The user can view the frame statistics or the description of the messages.

20003020008:SMAR	DF51:950 Port: 1 - FBView1	_ 🗆 ×
Frame Statistic		<u> </u>
Messages	: 167 / 167	
CRC Errors	: 0 - (0.0000 %)	
Lost Messages	: 0 - (0.0000 %)	
		-

Figure 2.2. Statistics View

In the *Statistics View*, there are two counters for the item *Messages*. The first counter counts the number of messages that were captured after they passed through the filter. The second counter displays the number of total messages that passed through the bus. In this example, no filter was applied, therefore the number of filtered messages is equal to the number of messages sent through the bus.

The **CRC Errors** counter displays the amount of messages with errors after they passed through the filter.

The *Lost Messages* counter displays the amount of messages that were lost. That is, the number of messages that were sent to **FBView** by the interface but **FBView** did not received. If the computer or the interface is too slow this counter increases excessively.



Enable Filters

When this function is active, only the filtered messages are stored in the buffer. An important function of the filter is the ability to capture a specific frame and trigger the frame counting according to the user specifications. Once the frame counting reaches the specified number the program stops capturing all frames. This function is named *Filter Trigger* and can only be activated if the user is online.

Another filter functionality is the *Filter Profile*. With this filter, the user can save all filters configured with specific names related to their function. The user creates a library with configured filters, being able to add/remove one or all filters from the library.

Refer to section "Filters" in the FBView-H1 and FBView-HSE modes.



Disable Filter

This tool is used to disable all filters and restore all frames that were captured, if the frame analysis has been executed offline. If the user selects a frame after it has passed through the filter and then click this button, all filters will be disabled and the message will still be selected, displaying what happens after the message.



Click this button to search for a pattern in the buffer. The user can search for a default byte or a error message, specified by the user.

Find	
• BYTE	<u>F</u> ind
C CRC Error	Cancel

Figure 2.3. Find Dialog Box

To search for the first occurrence of a default byte, select the item **BYTE**, type the byte to be located and click **Find**.

To search for the first occurrence of an error message, select the item CRC Error and click Find.



Find Next

Click this button to repeat the last search, starting from the point where the last search stopped. Or press F3 on the keyboard.



Enable Schedule for Captured Frames

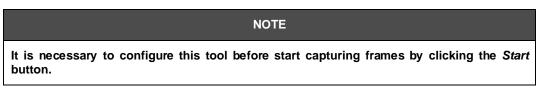
Click this button to define a cyclic time interval to store the captured messages. That is, if the user configures a 2-hour interval, for example, **FBView** will store in the *Capture Buffer* the messages captured in the last two hours, from the moment the user clicks the *Stop* button, overwriting old messages stored in the *Buffer*.

Click this button to open the configuration dialog box:



Figure 2.4. Defining the Schedule for Captured Messages

Select one of the pre-defined intervals or type the value in the Time box, and click Ok to conclude.





Disable Red Grid Lines

The vertical grid line is a graphical tool used to locate bytes in a message.

Click this button to remove all grid lines displaying in the message buffer.

See section 2.4 Grid Lines and Interval Lines.



Disable Blue Interval Lines

Interval lines are automatically drawn according to the interval defined by the user.

Click this button to remove all interval lines displaying in the message buffer.

See section 2.4 Grid Lines and Interval Lines.



Hexadecimal

Displays the message in the format that it was received, in hexadecimal. In this case, no decodification is made.



Decimal

Displays the message in the format that it was received, in decimal. In this case, no de-codification is made.



Fieldbus Foundation

Decodes and displays the messages according to the **Fieldbus Foundation** protocol. If the message does not suit the protocol, it will be displayed in hexadecimal format.



Absolute Time

Indicates the *Absolute Time* of the end of the message. The absolute time is measured according to the computer clock. When this button is active, the *Time* column indicates the absolute time for all stored messages.



Relative Time

Indicates the *Relative Time* of the end of the message. The relative time is calculated from the absolute time of each message related to the initial point, that is displayed as 0 (zero) in the *Time* column. When this button is active, the *Time* column displays the relative time for all messages and the message that is currently selected is considered the initial point (*Relative Time* equals to 0).

н.

Message Time

Measures the period of time between two consecutive message endings. When this button is active, the *Time* column displays the elapsed time from the end of one message until the end of the following message.



Measures the period of time that the bus has no activity between two consecutive messages. When this button is active, the *Time* column displays the *Idle Time* between two messages.



Open the dialog box with the information about the FBView version.

2.2 Preferences

2.2.1 Hiding Messages

When the interval to capture message is too long, the user can temporarily hide the messages being captured.

In the Preferences menu, select Hide Frames.

To display the messages being captured, go to the Preferences menu and select Show Frames.

2.2.2 Customizing the Buffer Window

The user can configure the *Reception Buffer*, changing colors. In the *Preferences* menu, click *Change Colors*. The dialog box to configure the colors will open:

Select a color.		-		OK
	Ŭ			Cancel
				Default Colors
			- Color Modes	
		Þ d	1 A	GCB
			Get Colors	SCV
				Font Color
				leader Color
				ckground Color
				t Selection
				ound Selection

Figure 2.5. Customizing the Buffer Window

Get Font Color	Change the color of the text font of unselected messages.
Get Header Color	Change the fill color of the header in the buffer window.
Get Background Color	Change the background color of the buffer window.
Font Selection	Change the color of the text font of the selected message.
Background Selection	Change the fill color of the line for the selected message.

To change the color:

- 1. in the Color Mode field, select the mode to display colors.
- 2. in the color scale, click the desired color.
- 3. Click the button related to the color that will be changed. (See the table above).
- 4. Click Ok to apply the changes or click Cancel to exit without altering the colors.

To return to the default color configuration, click the button Default Color in the Color dialog box.

2.3 Organizing Buffer Windows

Several buffer windows can be displayed in **FBView**.

To organize and arrange the windows, go to the Window menu and select:

Cascade: Arrange all non-minimised windows in cascade.

Tile Horizontally: arrange all non-minimised windows side by side horizontally.

Tile Vertically: arrange all non-minimised windows side by side vertically.

2.4 Grid Lines and Interval Lines

To add a grid line to the buffer, right-click the buffer screen in the desired location. To remove only one specific grid line, right-click the line in the buffer screen.

To remove all grid lines displaying in the message buffer, click the button **Repair**, in the toolbar.

To add interval lines to the buffer, press and hold the *<Ctrl>* key on the keyboard and right-click the buffer screen in the desired location. Define the period for the interval and press *<Enter>* to conclude:



Figure 2.6. Defining the Grid Interval

To remove all interval lines displaying in the message buffer, click the button *k*, in the toolbar.

2.5 Debugging

To create a message sequence to debug error messages, for example, follow the steps described below:

- 1. Select a message, clicking the corresponding message line.
- 2. Press < Ctrl > + F2 on the keyboard.
- 3. Repeat these steps to select other messages.

To unmark a message, click the message line to select the message and press < Ctrl > + F2 again.

To browse and debug the selected messages, press F2.

2.6 Selecting the Communication

To create a message file, go to the *File* menu and click the option *New*. The dialog box showed in the figure below will open:

New	×
New <mark>FieldBus H1</mark> FieldBus HSE	OK Cancel

Figure 2.7. Selecting the Communication

In this dialog box, the user must select the type of the communication network where the messages will be captured. For each type, H1 or HSE, different interfaces and filters will be available.

When selecting the H1 communication, the Ethernet and USB interfaces will be available, as showed in the figure below:

Choose Interface	×
H1	ОК
	Cancel
O USB (In Future)	
<u> </u>	

Figure 2.8. H1 Communication Interfaces

Refer to section "Selecting the Communication Interface" in the FBView-H1 mode for further information.

When selecting the HSE communication, if the PC has more than one network adapter, click the

button Interface, *we*, to open the dialog box and select the adapter that will be used to capture the frames.

Dialog		×
192.168.163.4	16 💌	OK
Card :	\Device\NPF_{65833CDB-A3	Cancel
NetMask :	255 . 255 . 255 . 0	
BroadCast :	255 . 255 . 255 . 255	
Current Network Score Ether	vork Adapter Link PCI	

Figure 2.9. HSE Communication Interfaces

Refer to section "Selecting the Communication Interface" in the FBView-HSE mode for further information.

2.7 Defining the Diagnostic Structure

FBView uses a *XML* file to define the structure and the interpret the diagnostic messages. This file is named "*diagnostic.xml*" and it is located in the **FBView** installation folder. The default path is "C:\Program Files\Smar\FBView".

The diagnostic file "diagnostic.xml" can be edited in *Windows Notepad* or any HTML and XML editor.

For example, to decode the message Compel Data 2 showed below:

	为 耻 的 的	2 28			•	0	2 12	R	HT.X	DEC	FF 🔚	 H. A.	8
luaber	Time	Franc											
1004 126 1280 1038	11 09 47 328 09 40 48 032 11 17 53 873 11 09 47 605 09 40 48 474		00 00 00 00	0A 08 1 0A 08 1 0A 08 1	10								
1332 204 4080	11:17:54.300 09:40:40.695 11:09:47.935	33 20 01 33 F6 01 34											<u>.</u>
DUPDU class CD2 - 0x8 Prame Control Short Add DL-addresses Dest: P621 Dest: P621	l Iress - Necessary Return	Tolen - Priority	Normal									 	

Figure 2.10. Message Compel Data 2

Add the following structure to the XML file:

```
<files_structures>

<structure name='Compel Data 2' length='3'>

<Uchar>

<Name>Message Type</Name>

<Format>0x%x</Format>

<Length>1</Length>

<Opt value='81'>COMPEL DATA 2</Opt>

</Uchar>

<Uint>

<Sormat>%x</Format>

<Length>1</Length>

</Uint>

</structure>

</files_structures>
```

The structure <Uchar> has 1 byte, <Uint> has 2 bytes and <Ulong> has 4 bytes.

The field *<Format>* indicates the format of the byte value, according to the ANSII C standard: *%d* for decimal, *%l* for long int, *%x* for hexadecimal and *%c* for character.

The field <Length> always has the value equals to 1.

The value of the field *<Opt* value=' ' > must always be in decimal.

After editing and saving the file "*diagnostic.xml*", go to **FBView**, click the message to be interpreted, select the parameter *Data* in the *Decode* window and double right-click the message to open the menu:

🗅 📂 日	X 🖻 🖻 🖨) 🔝 🗩	• • 🔳 🖶	🤁 📎 🗞 🖂	F
umber	Time	Frame			
004	11:09:47.328	26 F6 01	00 00 0A 08 10		
26	09:40:48.032	26 14 01	00 00 0A 08 10		
280	11:17:53.873	26 FD 01	00 00 OA 08 10		
038	11:09:47.605	34	_		
74	09:40:48.424	B2 F6 20			
332	11:17:54.300	33 20 01	. –		
04	09:40:48.695	33 F6 01	9E		
080	11:09:47.935	34			
					1
CD2 -					
- Frame Cor					
	Address - Necessary Return	n Token - Priority	: Normal		
DL-addres					
- ·	F620				
Dest:					
Dest: Data					
E Data	Files Structures				

Figure 2.11. Selecting the Data Structure

Select the message format and the interpretation will be displayed according to the XML file:

FBView - [000302	20008:5MAR-DF51:43	5 Port: 1 - FBVie	vteste.fbv]	
📴 File Edit View	Message Window H	elp		_ 8 ×
0 🖻 🖬	X 🖻 🖬 🔿	1 🗷 🖉	• • 🔳 🖶 🤁	📎 🗞 🖂 🕅 🕅 💾
Number	Time	Frame		<u> </u>
126 1280 4038	11:09:47.328 09:40:48.032 11:17:53.873 11:09:47.605 09:40:48.424	26 F6 01 00 26 14 01 00 26 FD 01 00 34 B2 F6 20		
1332 204	11:17:54.300 09:40:48.695 11:09:47.935	33 20 01 9E 33 F6 01 9E 34		
DL-addresses Dest: F620 Data B2 F6 20 Interpretati	ess - Necessary Return T	oken - Priority : No	mal	
Frame Counter 45				

Figure 2.12. Interpretation of Compel Data 2

2.8 Saving a file in text format

The user can export the frame captures from **FBView** to a text file. This way, the user can share the Fieldbus line diagnostics with other machines that don't have **FBView** installed, or even generate diagnostic reports.

To export the messages to the text file, go to the *File* menu and click the option *Save Txt File*. The *Save as* dialog box will open:

Save As			? ×
Save in: 🔁	Projects	- 🗢 🔁	• 🖩
File name:	FBView1		Save
Save as type:	Text *.txt	•	Cancel
			11/1

Figure 2.13. Saving as a text file

- 1. Browse the directories to select the folder where the txt file will be saved.
- 2. Type the name for the txt file.
- 3. Click Ok to conclude.

2.9 Capturing messages using the DF51

The DF51 can work only as an interface for **FBView**, in the *sniffer* mode, or as a configuration/supervision interface, plus the *sniffer* mode.

In the *sniffer* mode, the DF51 doesn't appear in the *Live List*, it only captures the messages sent by the H1 communication bus.

In the Interface+*sniffer* mode, it is possible to use the same DF51 to operate with *Syscon*, with the supervisory system and **FBView**, at the same time.

2.9.1 When to use each mode?

The Interface+*sniffer* mode is easier to use because the H1 bus analysis can be executed with the interface installed, there is no need to alter the electrical connection. Therefore, it is the most recommended to perform the analysis.

The *sniffer* mode can be used to analyse the time interval between messages or during the LAS tests of the field devices. To analyse the time interval, the Interface+*sniffer* mode doesn't have a good precision for the messages sent by the interface itself. In the LAS test of the field devices, the *Syscon* interface has to be switched off, and then another interface would be necessary to capture the messages from the H1 bus.

3. FBVIEW - H1

3.1 Selecting the Communication Interface

After initializing the communication, the Interface dialog box will open:

Choose Interface	×
H1 Ethernet	ОК
	Cancel
O USB (In Future)	
	-

Figure 3.1. H1 Communication Interfaces

The messages file based on the H1 communication network will have the following interfaces available:

- Ethernet
 - 1. Select this option and click Ok.
 - 2. The Configuration dialog box will open:

Dialog			X
NIC	192.168.	163.46	ОК
Interface	0003020	026:SMAR-DF62:136	Cancel
Port	1	•	
FBCapture	Version	1.00	New Search
Firmware \	/ersion	B04B01_1131H0T_3	Search by IP
Firmware [)ate	22:00:00 12/31/69	
Capturing	on ports		More
IP		192.168.163.136	
		,	

Figure 3.2. Ethernet Configuration

- 3. The NIC box shows the IP address of the machine.
- 4. In the Interface box, select the communication interface from list.
- 5. In the Port box, select the communication port conected to the selected interface.

Click the button *New Search* to automatically search for a network card available in the communication network.

Click the button *Search by IP* to open a new dialog box and type the IP address of the remote machine that has the communication interface desired. See the example below:

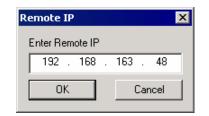


Figure 3.3. Searching for a remote IP address

When the interface is selected, specific information of this interface will be displayed in the dialog box, such as the firmware version and the IP address of the network card. The interface address is displayed instead of its name, to avoid problems with computers that have two or more cards with the same name.

Click Ok to conclude the interface configuration.

- USB
- 1. To capture the frames from the serial port of the PC, select this option and click *Ok*.
- 2. The configuration dialog box will open:

COM Settings	×
Choose Serial Port :	
COM1	•
OK	Cancel

Figure 3.4. Serial Port Configuration

- 3. Select the serial port from the list.
- 4. Click Ok to conclude.

3.2 Filters

3.2.1 Adding Filters

To configure a filter in the *Hexadecimal* mode, click the button **Enable Filters**, the toolbar. The *Filter Configuration* window showed in the figure below will open:

lexadecimal Filter				
Group Filter ☐ Enable Filter				
				<u>0</u> K
Filters				<u>C</u> ancel
11 26 10 02 10 XX 04				<u>A</u> dd Filter
27				<u>R</u> emove Filter
				R <u>e</u> move All Filters
Group Trigger - Just for Online Captu	re			
Trigger Filter				
Select Filter Trigger :	02 10 XX 04			•
Number of Messages After Trigger :	100			
Group Filter Profile				
LAS	-	Add Filter		Remove Filter Profile
Name Filter Profile :				
		Save Filter Profile	R	emove All Filters Profile
Wait a moment please :				

Figure 3.5. Filters Configuration

Select the option Enable Filter to apply the filters to the messages.

To add a new filter, type the first bytes of the message in the text box and click the button Add Filter.

To select the filter that will be applied to the messages being captured, mark the option *Trigger Filter*, select the filter from the *Select Filter Trigger* menu and type the number of messages to be captured.

There are codes that can be used to improve the filters and the analysis. The codes are listed in the table below:

	Code Table
Code	Function
XX	This code indicates that any hexadecimal number can occur in this position.
**	This code searches for the next occurrence of the following hexadecimal in the frame, independent of its position.
!!	This code captures all frames that are different from the following hexadecimal. It works as a filter " NOT ", only when the code is at the beginning of the filter.

	Code Examples
Example	Description
26XX10	Captures the frames that start with 26 and have 10 in the third byte of the frame.
**33	Captures the frames that have 33 in any position of the frame. (Note: **3310 is an invalid filter.)
!!34	Captures the frames that do not start with 34. (Note: 51!!1B is an invalid filter.)

The user can match the codes in a more coherent way having the codes on hands, to assure a better analysis of the frames and the fieldbus line.

3.2.2 Removing Filters

To remove a filter, select the specification in the *Filters* list and click the button **Remove Filter**. See the example below:

		OK
Fiters		Cancel
F0 073603636036036036104 9236012		Add Filter
11		Plog Piker
51		Remove Filter
		Remove All Filters
Group Trigger - Just for Online Capture		2
Trigger Filter Select Filter Trigger : Number of Messages Alter Trigger :		2
Trigger Filter Select Filter	Add Filter	Remove Filter Profile
Trigger Filter Select Filter Trigger: Number of Messages Alter Trigger: Group Filter Profile	Add Filter	Remove Filter Profile

Figure 3.6. Removing a Filter

To remove all filters, click the button Remove All Filters.

3.2.3 Creating a Filter Profile

The *Filter Profile* allows the user to save all filters configured with specific names, related to their function.

The user can create a library with configured filters, being able to add/remove one or all filters from the library.

To create a filter profile:

- 1. Click the button **Enable Filters**, to open the *Filter Configuration* window.
- 2. Type the first bytes of the message in the text box and click the button **Add Filter**. Repeat this step to add more filters to the filter profile.

Iodecimal Filter Group Filter Enable Filter	
Ensole Filter	QK
Filters	Qancel
	Add Filter
	Benove hite
	Remove All Filters

3. Type a name for the filter profile and click the button **Save Filter Profile**.

Group Filter Profile	Add Filter	Remove Filter Profile
Name Filter Profile : LAS	Save Filter Profile	Remove All Filters Profile

After adding a new filter profile, it will be displayed in the *Group Filter Profile* menu. Use the button **Add Filter** to add the selected filter profile to a group of filters from another message buffer.

Group Filter Profile		
LAS	Add Filter	Remove Filter Profile
News Elber De-Glass	<u> </u>	
Name Filter Profile :		
	Save Filter Profile	Remove All Filters Profile

3.2.4 Removing Profiles

To remove a filter profile, select the name of the profile in the *Group Filter Profile* list and click the button **Remove Filter Profile**. See the example below:

Group Filter Profile		
DOWNLOAD 🔻	Add Filter	Remove Filter, Profile
Name Filter Profile :		<u>\}</u>
	Save Filter Profile	Remove All Filters Profile
,		

Figure 3.7. Removing a Filter Profile

To remove all filter profiles, click the button **Remove All Filters Profile**.

3.3 Basic Components of the Message

A message is composed by data from different levels of the protocol: *Data Link Layer* (DLL), *Fieldbus Access SubLayer* (FAS), *Fieldbus Message Specification* (FMS) and *System Management* (SM).

The basic composition of a message is:

FC	DA	SA	DLL-p	FAS	FMS
FC	DA	SA	DLL-p	SM	

Where:

FC	<i>Frame Control</i> – indicates the type of the service, the priority and whether the token has been returned or not.
DA	Destination Address – address of the destination device of this message.
SA	Source Address – address of the device that transmitted the message.
DLL-p	Data Link Layer parameters.
FAS	FAS parameters.
FMS	FMS parameters.
SM	SM parameters.

3.3.1 Simplified De-codification of the Frequently Used Message

This section will describe the most frequently used messages. Some of the components will be described in the section "*Complete Message De-codification*". The purpose of this section is to provide the user with the basic idea on how to identify a *Read Request*, a *Write Request* and other commands frequently used for error detection in a *Fieldbus Foundation* system.

FBView suppresses the FCS when displaying a H1 message.

Pass Token (PT)

Used by the LAS to give time to the device in the same node of the DA. The device gives the token back to the LAS, after using the network, with the *Return Token* message type, or sends the last message with the third bit of the frame control set to 1.

	FC DA		XX	FCS			
FC	FC Assumes the following values: 31h, 32h or 33h.						
DA	Any acceptable value for the node, from 10h to FFh (16 to 255).						
ХХ	XX Non-decoded bytes. Sequence with two bytes.						
FCS	Two check sum bytes from the bytes of the message.						

Example: Pass Token for the device in node 19h.

FC	DA	XX		FCS	
33h	19h	01h	9Fh	44h	80h

Return Token (RT)

This message returns the token to the LAS.

	FC	FCS			
FC	Its value is always 34h.				
FCS	Two check sum bytes from the bytes of the message. As this is a 1-byte message and it is always with the same value, the FCS does not change and its value is AF21h.				

Example:

FC	FCS		
34h	AFh	21h	

Probe Node (PN)

The LAS uses this message to check if there is any device with the same node of the DA.

	FC DA		XX	FCS		
FC	lte value is a	lwave 26b				
гс	Its value is always 26h.					
DA	Any acceptable value for the node, from 10h to FFh (16 to 255).					
XX	Non-decoded bytes. Sequence with 6 bytes.					
FCS	Two check sum bytes from the bytes of the message.					

Example: Probe node for the node 19h.

FC	DA	XX					FCS		
26h	19h	01h	00h	00h	0Ah	08h	OCh	50h	A9h

Probe Response (PR)

When a device receives a *Probe Node*, it replies with a *Probe Response*. The LAS initiates this node when it receives this message.

	FC	XX	FCS				
FC	Its value is always	s 27h.					
ХХ	Non-decoded byt	es. Sequence with 8 bytes.					
FCS	Two check sum bytes from the bytes of the message.						

Example: The *Probe Response* does not contain the information about which node has been transmitting. To know which node transmitted the message, it is necessary to read the *Destination Address* (DA) of the *Probe Node* right before the *Probe Response*.

FC			FCS							
27h	01h	03h	00h	00h	00h	50h	OCh	ABh	55h	BOh

Node Activation (DT1)

Every time a new node replies to a *Probe Node*, its *Data Link Layer* status is set to offline. In this mode, the node only answers to the *Probe Node*. The LAS sends an activation message to change its *Data Link Layer* to the *Operational* status. This message is sent with a *Data Transfer 1* message (DT1).

FC		DA	SA	XX	FCS		
FC	lts va	alue is always D2h.					
DA		tination address. It h node. The second o	•	st one assumes any	acceptable value of		
SA	Sou	rce address. It has to	wo bytes with values	s 4 and 0.			
XX	Non-decoded bytes. Sequence with 11 bytes.						
FCS	Two check sum bytes from the bytes of the message.						

Example: Node19h activation.

FC	D	Α	S	Α		XX								FC	S:		
D2h	19h	00h	04h	00h	09h	00h	02h	00h	00h	00h	00h	00h	00h	DAh	ABh	D8h	22h

Establish Connection 1 (EC1)

All device information is located in the VFD. All configuration parameters of the fieldbus network are located in the management VFD (SMIB), such as: T1, T2, T3, VCRs, FB Schedule, etc. The parameters of the function blocks are located in the application VFD (FBAP). The device must have at least one SMIB. It is common to find devices with two VFDs: 1 SMIB and 1 FBAP. But the protocol allows the device to have more than one application VFD.

The device has to set the connection with the VFD to access the information from the VFD. *EC1* messages are used in this connection. To set a connection the node sends the *EC1* with a connection request and the addressed node sends another *EC1* accepting the connection.

FC	DA	SA	XX1	DC	XX2	FCS					
FC	It can assume to at 1.	vo values: F0h	or F4h. The F	4h is the EC1	with Return To	oken flag set					
DA	Destination add the node. The s		,	t one assume	s any acceptat	ole value for					
SA	Source address node. The seco transmitting the	nd one is the v			2 I						
XX1	Non-decoded by	/tes. Sequence	e with 19 bytes	5.							
DC	It has two bytes. one has the valu					ne second					
XX2	Non-decoded bytes. Sequence with 37 bytes.										
FCS	Two check sum bytes from the bytes of the message.										

Example: This is a connection request between 1191h (SA) and 18F3h (DC).

FC	D	Α	S	Α						XX1	– 13 I	oytes					
FOh	18h	07h	11h	91h	11h	07h	81h	76h	4Eh	20h	4Eh	20h	E1h	80h	00h	FOh	E1h
	X	X1 – (6 byte	es		D	С	C XX2 – 10 bytes									
80h	80h 00h F0h 00h 00h 00h 18h F3l							00h	00h	11h	91h	E2h	FFh	89h	02h	00h	00h
							X)	(2 – 1	8 byt	es							
12h	4Dh	47h	21h	00h	32h	00h	00h	41h	EFh	51h	EFh	68h	00h	30h	00h	00h	00h
		XX2	– 9 b	ytes				FC	:S								
00h	00h 00h 00h 71h 07h 01h 71h 08							01H	32h	36h							

To establish this connection, the node 18h must send an EC1 as indicated below:

FC	DA	SA	XX	FCS
FOh ou F4h	1191h	18F3h		

Observe that the DA of the confirmation is the same as the SA of the request, and the SA of the confirmation is the same as the DC of the request.

Disconnect 1 (DC1)

When the addressed node rejects a connection request or the connection is broken, the node sends a *DC1* message.

I	=C	DA	SA	XX	FCS			
FC	It can as flag set		'0h or 74h. The 74h	value is the DC1 wit	h Return Token			
DA		e. The second one i		ne assumes any acceleration of the addres	•			
SA				assumes any accept or for the source no				
ХХ	Non-decoded bytes. Sequence with 2 bytes.							
FCS	Two check sum bytes from the bytes of the message.							

Example: In the following message, the node 11h is breaking its connection 91h with the connection F3h of the node 18h.

FC	D	DA		Α	Y Y	X	FCS		
70h	18h	F3h	11h	91h	01h	46h	91h	E6h	

Read Request

A node makes a *Read Request* when it wants to know the parameter value from another node. This message is encapsulated in a *DT1*.

FC	DA	SA	XX1	RQ	FMS PDU	INVOKE ID	READ	XX2	INDEX	FCS					
FC		lt can ass <i>Token</i> fla			: D3h or D7	h. The D7h v	alue is th	e DT1 w	ith <i>Retur</i>	n					
DA			d node.			: the first one the value of t				ed					
SA			Source address. It has two bytes: the first one assumes the source node's value. The second has the selector's value of the source node connection.												
XX1		Non-deco	oded byt	es. Seq	uence with 2	2 bytes.									
RQ		Byte that	identifie	s the m	essage as a	request. Ass	umes va	lue 4.							
FMS PDU		Byte that 92h.	identifie	s the m	essage as a	request with	confirma	ition. Ass	sumes va	ue					
INVOI ID						used to iden it, it sends the				en the					
READ)	Byte that	identifie	s the m	essage as a	reading. It al	ways ass	sumes th	e value A	.1h.					
XX2		Non-deco	oded byt	e.											
INDEX	(Two bytes that identify which INDEX of the OD have been read.													
FCS		Two check sum bytes from the bytes of the message.													

Example: In the following message, the node 1091h is requesting the reading of index 0960h of the node 19F7h.

FC	D	DA SA		A	XX1		RQ	FMS PDU	INVOKE ID	READ	XX2	INDEX		FCS	
D3h	19h	F7h	10h	91h	70h	47h	04h	92h	67h	A1h	02h	09h	60h	B3h	9Ch

Read Response

Т

This message is the response to a *Read Request*. The node must send the same *invoke ID* as was received in the *Request*.

٦

FC	DA	SA	XX1	RS	FMS PDU	INVOKE ID	LENGTH	DATA	FCS					
FC		can assu oken flag		alues: D	3h or D7h. Th	e D7h value i	s the DT1 w	vith <i>Return</i>)					
DA	ac		node. Th			first one assu ector's value o								
SA		Source address. It has two bytes: the first one assumes the value of the source node. The second has the selector's value of the source node connection.												
XX1	N	on-decod	ed bytes	Sequer	nce with 2 byte	es.								
RS	By	/te that id	entifies t	he mess	age as a resp	onse. Assume	es value 5.							
FMS PDU	Ву	/te that id	entifies t	he mess	age as a conf	irmation. Assu	umes value	A2h.						
INVOR ID					nber. It is used ved in the req	I to identify the uest.	e answer. T	hat is, the	node					
LENG	th	Byte that identifies the data length that was read. If the length is less than 15 bytes, the value will be 2Xh, where X is the length. If the length is greater than or equal to 15 bytes, we will have the byte 2Fh and the next byte will be the data length.												
FCS	T۱	wo check	sum byte	es from t	he bytes of the	e message.								

Example: Response message to the *Read Request* example above. In this case, the data length is 8 bytes.

FC	D/	4	S	A	XX	(1	RS	FMS PDU	INVOKE ID
D7h	10h	91h	19h	F7h	80h	47h	05h	A2h	67h
LENGTH	DATA								FCS
28h	00h	00h	OOh	00h	00h	00h	00h	OOh	08C8h

Write Request

A node makes a *Write Request* when it wants to configure a new value of the parameter from another node. This message is encapsulated in a *DT1*.

FC	DA	SA	XX1	RQ	FMS PDU	INVOKE ID				
WRITE	XX2	INDEX	LENGTH	DATA	F	cs				
FC	It can assume t <i>Token</i> flag set		h or D7h. The	D7h value is th	ne DT1 with <i>F</i>	Return				
DA	Destination address. It has two bytes: the first one assumes the value of the addressed node. The second has the selector's value of the addressed node connection.									
SA	Source address node. The seco									
XX1	Non-decoded b	ytes. Sequend	e with 2 bytes.							
RQ	Byte that identi	fies the messa	ge as a reques	t. Assumes va	lue 4.					
FMS PDU	Byte that identi 92h.	fies the messa	ge as a reques	t with confirma	ation. Assume	s value				
INVOKE ID	This byte is a s addressed nod request.									
WRITE	Byte that identi	fies the messa	ge as a writing	. It always ass	umes value B	2h.				
XX2	Non-decoded b	oyte.								
INDEX	Two bytes that	identify which	INDEX of the C	DD to be writte	n.					
LENGTH	Byte that identifies the data length to be written. If the length is less than 15 bytes, the value will be 4Xh, where X is the length. If the length is greater than or equal to 15 bytes, we will have the byte 4Fh and the next byte will be the data length.									
DATA	Value to be written.									
FCS	Two check sun	n bytes from th	e bytes of the r	nessage.						

Example: In the following message, the node 1091h is writing 7 bytes in the index 01C7h of the node 19F7h.

FC	D	Α		SA XX1		RQ	FMS PDU	INVOKE ID	
D3h	19h	F7h	10h	91h	80h	58h	04h	92h	58h
WRITE	XX2	INE	DEX LENGTH DATA – 5 bytes			H DATA – S			
B2h	02h	01h	2Ch	47h	02h	80h	02h	01h	DOh
DATA –	DATA – 2 bytes F		CS .						
00h	01h	61h	E2h]					

Write Response

This message is sent in response to a *Write Request*. The node must send the same *invoke ID* as received in the *Request*.

FC	DA	SA	XX1	RS	FMS PDU	INVOKE ID	WRITE	FCS			
FC		It can assume two values: D3h or D7h. The D7h value is the DT1 with <i>Return</i> <i>Token</i> flag set at 1.									
DA	ado	Destination address. It has two bytes: the first one assumes the value of the addressed node. The second has the selector's value of the addressed node connection.									
SA		Source address. It has two bytes: the first one assumes the value of the source node. The second has the selector's value of the source node connection.									
XX1	No	n-decoded	bytes. Sec	quence with	n 2 bytes.						
RS	Byt	e that iden	tifies the m	nessage as	a response. A	Assumes value	5.				
FMS PD	U Byt	e that iden	tifies the m	nessage as	a confirmation	n. Assumes va	lue A2h.				
INVOKE ID	-	This byte is a sequence number. It is used to identify the answer. That is, the node will send the <i>invoke ID</i> received in the request.									
WRITE	Byt	Byte that identifies the message as positive response.									
FCS	Tw	o check su	m bytes fro	om the byte	es of the mess	age.					

Example: Response message from the Write Request example above.

DC	DA		s	A	XX1		
D7h	10h	91h	19h	F7h	90h	58h	
RS	FMS PDU	INVOKE ID	WRITE	F	CS .		
05h	A2h	58h	30h	COh	56h		

Get OD Request

The node sends this message to request an OD description of a specific parameter. This message is encapsulated in DT1.

FC	DA	SA	XX1	RQ	FMS PDU	INVOKE ID	GET OD	XX2	INDEX	FCS
FC		It can assume two values: D3h or D7h. The D7h value is the DT1 with <i>Return Token</i> flag set at 1.								
DA		Destination address. It has two bytes: the first one assumes the value of the addressed node. The second has the selector's value of the addressed node connection.								
SA						e first one ass value of the s				irce
XX1		Non-de	coded by	∕tes. Se	quence with	2 bytes.				
RQ		Byte the	at identifi	es the r	nessage as a	i request. Ass	sumes valu	ue 4.		
FMS F	DU	Byte that identifies the message as a request with confirmation. Assumes value 92h.							alue	
INVO ID	DKE This byte is a sequence number. It is used to identify the answer. That is, when the addressed node answers this request it sends the <i>invoke ID</i> received in the request.									

GET OD	Byte that identifies the message as a Get OD. It always assumes the value C2h.
XX2	Non-decoded byte. Sequence with 3 bytes.
INDEX	Two bytes that identify which INDEX of the OD to be described.
FCS	Two check sum bytes from the bytes of the message.

Example: In the following example, the node 1090h is requesting a *Get OD* to index 02C1h of node 1AF7h.

DC	D	Δ	s	Α	X	X1	RQ	FMS PDU
D3h	1Ah	F7h	10h	90h	30h	43h	04h	92h
INVOKE ID	GET OD	XX2			INDEX		FCS	
58h	C2h	01h	00h	12h	02h	C1h	7Eh	64h

Get OD Response

This message is sent in response to a *Get OD Request*. The node must send the same invoke ID as received in the request.

C DA SA XX1 RS FMS PDU INVOKE ID GET OD XX2 More F	FC	XX1	DA S	XX1 RS	FMS PDU	INVOKE ID	GET OD	XX2	More	FCS
--	----	-----	------	--------	---------	-----------	--------	-----	------	-----

FC	t can assume two values: D3h or D7h. The D7h value is the DT1 with Return
· · ·	Token flag set at 1.
i	Destination address. It has two bytes: the first one assumes the value of the addressed node. The second has the selector's value of the addressed node connection.
	Source address. It has two bytes: the first one assumes the value of the source node. The second has the selector's value of the source node connection.
XX1 I	Non-decoded bytes. Sequence with 2 bytes.
RS	Byte that identifies the message as a response. Assumes value 5.
FMS PDU	Byte that identifies the message as a confirmation. Assumes value A2h.
	This byte is a sequence number. It is used to identify the answer. That is, the node will send the <i>invoke ID</i> received in the request.
Get OD	Byte that identifies the message as positive response.
	Non-decoded bytes; the amount of bytes in this sequence depends on the description type that was asked.
6	This byte indicates there is more information. The value 00h means that there are not, and FFh means that there is more information on this parameter (More Follows).
FCS	Two check sum bytes from the bytes of the message.

DC	D	Α	SA		XX1		RS	FMS PDU
D7h	10h	90h	1Ah	F7h	40h	43h	05h	A2h
INVOKE ID	GET OD			XX2 – 7 bytes				
58h	C2h	81h	05h	02h	C1h	09h	OOh	45h
XX2	MORE	FCS				-		
11h	00h	1Ah	E8h					

Example: Response message from the *Get OD Request* example above.

Compel Data 2 (CD2)

When it is time for a output parameter of a link to be published, the LAS sends a *Compel Data 2* to request the node that produces this output to send it in that moment.

	FC	DA	FCS					
FC B1h, B2h and B3h.								
DA	Destination address. It has two bytes: the first one assumes the value of the addressed node. The second has the selector's value of the addressed node connection.							
FCS	Two check sum bytes from the bytes of the message.							

Example: This is a CD2 to the node 2221h.

FC	D	Α	FCS			
B1h	22h	21h	A5h	BEh		

Information Report

When a node receives the *CD2* it immediately sends the output parameter of the link specified by the *DA* of the *CD2*. This message is encapsulated in a *DT3*.

FC	SA	XX1	FMS PDU	INVOKE ID	INF. REPORT
XX2	INDEX	LENGHT	DATA	FCS	

FC	It can assume the values: 50h, 51h, 52h, 53h or 54h.			
SA	Source address. It has two bytes: the first one assumes the value of the source node. The second has the selector's value of the source node connection.			
XX1	Non-decoded bytes. Sequence with 2 bytes.			
FMS PDU Byte that identifies the message with no confirmation. Assumes value C2h.				
INVOKE ID	lts value is always FFh.			
INF. REPORT	Byte that identifies the message as an <i>information report</i> . Assumes value 82h.			
XX2	Non-decoded byte.			
INDEX	OD index of the published parameter.			

LENGTH	Byte that identifies the data length to be published. If the length is less than 15 bytes, the value will be 4Xh, where X is the length. If the length is greater than or equal to 15 bytes, we will have the byte 4Fh and the next byte will be the data length.
DATA	Value of the published parameter.
FCS	Two check sum bytes from the bytes of the message.

Example: *Information Report* of the *CD2* from the example above.

FC	SA		XX1		FMS PDU	INVOKE ID	INF. REPORT	XX2	INDEX
51h	22h	21h	OFh	06h	C2h	FFh	82h	02h	04h
INDEX	LENGTH		DATA				FCS	8	
54h	45h	80h	3Fh	80h	BFh	B2h	63h	32h	

Multi Variable Contained (MVC)

This view can be configured and used to optimize the bus usage during supervision. The node start sending it periodically after the MVC is configured. The periodicity is measured in macrocycles and it is one of the MVC configuration parameters.

FC	DA	SA	XX	FCS
----	----	----	----	-----

FC	It can assume two values: D3h or D7h. The D7h value is the DT1 with <i>Return Token</i> flag set at 1.
DA	Destination address. It has two bytes with the value 0140h.
SA	Source address. It has two bytes: the first one assumes the value of the source node. The second one is 08h.
XX	Non-decoded bytes; the amount of bytes in this sequence depends on the parameters that were configured.
FCS	Two check sum bytes from the bytes of the message.

Example: MVC of the node 18h.

FC	D	Α	s	Α				XX	_9 by	tes			
D3h	01h	40h	18h	08h	06h	C2h	FFh	82h	02h	0Ah	18h	4Dh	00h
					XX – 12	2 bytes	;					F	CS .
D1h	00h	09h	00h	ODh	80h	00h	80h	3Bh	D1h	E2h	48h	DEh	C3h

DLPDU	FC	DL Address					
Class	Frame Control	Destination (DA)	Source (SA)	Source (SA) 2nd source		User Data	
EC 1	1111 LF00	[HL.]N.S	[HL.]N.S	[HL.]N.S	EC-p	o-DLSDU	
EC 2	1110 LF00	—	[HL.]N.S	[HL.]N.S	EC-p	o-DLSDU	
DC 1	0111 LF00	[HL.]N.S	[HL.]N.S	—	DC-p	o-DLSDU	
DC 2	0110 LF00	—	[HL.]N.S	—	DC-p	o-DLSDU	
CD 1	1111 LFPP	[HL.]N.S	[HL.]N.S	—	—	—	
CD 2	1011 LFPP	[HL.]N.S	—	—	—	—	
DT 1	1101 LFPP	[HL.]N.S	[HL.]N.S	—	SD-p	o-DLSDU	
DT 2	1001 LFPP	[HL.]N.S	—	—	SD-p	o-DLSDU	
DT 3	0101 LFPP	—	[HL.]N.S	—	SD-p	o-DLSDU	
DT 5	0101 0F00	—	[PDA]	—	SD-p	o-DLSDU	
SR	0001 0F11	[PSA]	Ν	—	o-SR-p	—	
CT	0001 0F00	—	—	—	—	—	
TD	0001 0F01	—	Ν	—	TD-p	—	
RQ	1100 0F00	N.0	N.0	—	RQ-p	—	
RR	1101 0F00	N.0	N.0	—	RR-p	—	
PN	0010 0110	Ν	—	—	PN-p	—	
PR	0010 0111	—	—	—	—	SPDU	
PT	0011 0FPP	Ν	—	—	DD-p	—	
RT	0011 0100	—	[DTH]	—	_	—	
RI	0010 0000	—	[DTH]	—	DD-p	—	
CL	0000 0001	-	Ν	—	—	—	
TL	0000 0110	N	—	—	—	SPDU	
Idle	0001 0F10	—			_	o-DLSDU	

3.3.2 Complete Message De-codification

Table 1 - Data Link Layer Message Structure

LEGEND:

L	Indicates the length of the addresses used in the message (0=Short, 1=Long).
F	Indicates that the token will not be used anymore. The device is returning the token to LAS.
PP	Specifies the priority of the message (urgent, normal, time available).
_	Indicates that the field is not used.
[HL.]N.S	The address bytes. If L is equal to 1 there will be long addresses, which length is 4 bytes (HLNS), but if L is equal to 0 there will be short addresses, which length is 2 bytes (NS).
N	Indicates that the address is 1 byte, only with the node information (node address).
N.0	Indicates the short address where the first byte contains the node (node address) and the second byte is equal to zero.
[PDA]	The source address. In case the message does not have the destination address. This type of addressing is normally used in the information report message.
[PSA]	The destination address.
0-	Indicates that the field is optional.
хх-р	Indicates the parameter class of the DLL (ex: Time Distribution, Probe Node, etc.).
DLSDU	Parameters of the "DL Service Data Unit".
SPDU	Parameters of the "Support Protocol Data Unit". These are the parameters from the other levels of the protocol (FMS, SM and FAS).

Pass Token (PT = 33)

FC	DA	Dura	ntion	FCS						
33h	XX	XX	XX	XX	XX					

FC	It can assume different values according to the priority. The valid values are 31h, 32h and 33h, corresponding to the priorities urgent, normal and time available, respectively.
DA	Any valid value of the node from 10h to FFh (16 to 255).
Duration	Two bytes that contain the available time for the token use. Each increase values 256us.
FCS	Two check sum bytes from the bytes of the message.

Return Token (RT = 34)

FC	FC	CS
34	AF	21

FC	Its value is always 34h.
FCS	Two check sum bytes from the bytes of the message. As it is a 1-byte message, always has the same value. The FCS does not change and it is equal to AF21h.

Probe Node (PN = 26)

FC	DA	PNp-1	PNp-2	Slot	Time	VIV	lid	FCS			
26	XX	01	00	XX	XX	XX	XX	XX	XX		

FC	Its value is always 26h.
DA	Any valid value of the node from 10h to FFh (16 to 255).
PNp-1	Currently with value 1. Bit 7 to 4 – maximum inter-channel signal skew. Bit 3 – zero. Bit 2 to 0 – version of the DLL protocol.
PNp-2	Currently with value 0. Bit 7 to 4 – Post transmission Gap extension.
Slot Time	Two bytes that contain the slot time.
VMID	Two bytes that contain the minimum inter PDU delay.
FCS	Two check sum bytes from the bytes of the message.

3.4 Methodology

3.4.1 Signal Quality (CRC Test)

It is possible to quantify the quality of the signal using the Statistics View. Follow the steps below:

- i. Disable the filters.
- ii. Wait until 32,000 messages are captured.
- iii. If the CRC error is less than 0.8%, it means that this bus will not have installation problems.
- iv. If the CRC error is greater than or equal to 0.8%, it means that the bus will have a problem.

Here are some tips on where to look for the cause of the problem:

- Problems with terminators (BT): bad connection, lack or excess of BT;
- Bad grounding;
- There is water in the junction boxes or inside the devices;
- Transmitters with low insulation;
- Digital board of any transmitter has a problem;
- Interface with problem (PCI or DF51).



Figure 3.8. Statistics with CRC Error

3.4.2 Live List

The LAS (master) has an internal list with all of the devices that are communicating in that moment. This list is named *Live List*.

The LAS constantly verifies if there is any device in a specific address. The LAS sends *Probe Node* (PN) messages to every address that is not listed in the *Live List*. If a device receives a *PN* for its address it immediately answers with a *Probe Response* (PR), and afterward the LAS sends an activation command and passes the token to this device.

To leave the *Live List* a device must quit answering the token for three consecutive times.

The figure below shows a sequence of a device entering the *Live List* and leaving it. The following filters were used for this capture:

- 26 19
- 27
- D2 19 XX 04
- 33
- 34

File Edit Verv	Message Window H		
		= = = = = • • • • • • • • • • • • • • •	
Number	Title	Frame	
13075	17:41:52.049	ы	
13076	17:41:52.056	30 10 01 90	
13077	17:41:52.061	34	
13078	17:41:52.068	30 10 01 90	
13079	17141:52.074	ж	
13000	17141:52.001	33 10 01 90	
13001	17(41:52.007	34	
13002	17(41:52.093	30.10.01.9K	
10003	17:41:52.099	34	
13094	17:41:52.106	26 19 01 00 00 0A 00 0C	
13005	17141:52.115	27 01 03 00 00 00 50 0C AB	
13006 13007	17(4):52.139 17(4):52.146	33 10 01 9K	
13007	17(41:52.157	D2 19 00 04 00 09 00 00 00 00 00 00 00 00 00 00 00	
10009	17(41:52.162	24	
13090	17)41:52.169	30 10 01 95	
13091	17:41:52.175	34	
13092	1241/52.182	33 19 01 90	
13093	17:41:52.189	34	
13094	17:41:52.196	33 10 01 90	
13095	17:41:52.203	34	
13096	17:41:52.209	33 10 01 96	
13097	17:41:52.215	34	
13098	17:41:52.221	33 19 01 90	
13099	17:41:52.228	34	
13100	17:41:52.235	33 10 01 90	
13101	17:41:52.241	34	
13102	17:41:52.247	33 10 01 90	
13103	17:41:52.253	34	
13104	17:41:52.259	33 19 01 96	
13105	17:41:52.266	24	
13106	17:41:52.273	33 10 01 %	
13107	17:41:52.279	34	
13108	17:41:52,285	33 10 01 96	
13104	17:41:52.291	24	*
eady			N.M.

Figure 3.9. Live List Maintenance (Input)

The messages from number 13076 to 13083 shows that the token passing was being made only for node 10H.

The message of number 13084 is a probe node for the node 19H. The device from node 19H answers immediately with a *Probe Response* in the message of number 13085. A little below in the message of number 13087, the LAS is making the activation of that device. After that we can see that the LAS began to pass the token for that node (messages of number 13090 to 13098).

File Edt V				ind	Deri .	14								110				-	-										-101
	X	123		-	100		30	E		.0	1	- 6	24	. 2	1	٩,	-		1.	: 2		H. 2		8					
Nimber	_	Time	11-1			E	Pro		-		1111		-	-		1.11	-	-	-	-		1	-	_		_	_		
15199		17:4	2:06	345	-	_	.34	-		_	_	_	_	_	_	_	_	_			-	-	_	_	_				
15200		17:4						10 05	se .																				
15208		17:4					34																						
15202		17:4					33	10.01	æ																				
15203		17:4	2:08.	370			24																						
15204		17:4	2:06.	376			33	19-05	9E																				
15205		17:4	2:08.	405			33	10.01	96																				
15206		17:4	2:08.	415			- 34																						
15208		17:4	2:08.	455			33	19:05	9E																				
15209		17:4	2:08.	408			33	10.01	9C																				
15210		17:4	Z:08.	494			- 34																						
15211		17:4						19.01																					
15212		17:4						10.00																					
15213		1/14						01.01	OH OS	P1 00	105 t	9.01																	
15214		17:4					. 24																						
15215			2:00.					10.05	ж																				
15216		17:4					- 34																						
15217		1714						10.01	×																				
15218			2:06.				- 34		12																				
15219		17:4						10.01	90																				
15220		17:4					34																						
15221 15222		17:4						10.05	96																				
15223		17:4					-24	10.05																					
15224		17.4					34	iù sa	100																				
15225		17.4						10 01	iar -																				
15226		17:4					- 54		76																				
15227		17:4						10.01	10																				
15228			2:00.				34		10																				- 11
15230		17:4						10 01	æ																				
15231		17:4					34		33																				
15232		17:4						10-01	×																				
15233		17:4					34																						
15234		17:4	2:08.	701			33	10.01	96																				
15235		17:4	2:08.	707			34																						-
eady																											-	MP	

Figure 3.10. Live List Maintenance (Output)

The messages 15204, 15208 and 15211 in Figure 3.10 shows the three attempts of the LAS to pass the token for that node, but with no success. In this case, the LAS removes that node from the *Live List.* This can be verified starting from the message 15215, where we see only the token passing for the node 10H (messages 15215, 15217, 15219, 15221 and 15223).

As we can see in the previous example, it is enough to analyze the *PT* message to know which devices are in the live list at a certain moment, because the LAS is passing the token for all of the nodes that are active.

3.4.3 Link Master - LAS

Each fieldbus has a device that controls the use of the transmission means (bus). That device is named *Link Master*.

It is possible to have more than one device with *Link Master* capability in the same bus, but in a specific moment only one of them will be the *Active Link Master*, also named LAS.

To determine the LAS, search for the *Time Distribution* message (TD), because only the LAS can send this message type.

When the LAS stops communicating, another device takes the control of the bus. The *Link Master* that becomes active sends the message *Claim LAS* to inform that it will assume the control.

Fieldbus has the concept of *Preferential LAS*. The *Link Master* that has the parameter **PrimaryLinkMasterFlag** equal to TRUE is the *Preferential LAS*. When the *Preferential LAS* is not the LAS of the network, it always asks to become the LAS. It sends the *DT* message, *Transfer LAS Rolls*, requesting the transfer control of the bus to the LAS. The LAS sends the *Transfer LAS* to transfer the role of LAS to the *Link Master*.

Figure 3.11 shows the messages related with the transfers of control of the bus. The following filters were used:

- 11
- 01
- 06
- 2610
- 27
- D210XX04

FilView - [L	days to do a second		
	View Message Window He		
	X 10 10 🖨 🚹	I = = ● ● ₽ ⊕ > > "\ " \ m m n. n. ?	
Number	Time	Frate	
432398	15:42:39.675	11 10 00 00 60 00 00 00 00 00 00 00 00 00 00	
433094	15:42:52.160	11 10 00 00 60 00 00 00 00 00 00 00 00 00 25 F2 C8 B4 00	
435411	15:43:04.595	11 10 00 00 60 00 00 00 00 00 00 00 00 00 00	
436926	15:43:16.891	01 11	
436927	15:43:16.940	01 11	
437044	15:43:17.969	11 11 00 00 60 00 00 00 00 00 00 00 00 00 00	
437783	15:43:24.420	26 10 01 00 00 0A 08 0C	
438194	15:43:28.036	11 11 00 00 60 00 00 00 00 00 00 00 00 00 00	
438600	15:43:31.593	26 10 01 00 00 0A 08 0C	
439337	15:43:38.066	11 11 00 00 60 00 00 00 00 00 00 00 00 00 00	
439424	15:43:38.813	26 10 01 00 00 0A 08 0C	
440248	15:43:46.018	26 10 01 00 00 0A 08 0C	
440404	15:43:40.126	11 11 00 00 60 00 00 00 00 00 00 00 00 00 00	
441073	15:43:53.228	26 10 01 00 00 0A 08 0C	
441074	15:43:53.235	27 01 03 00 00 00 50 0C 88	
441078	15:43:53.202	D2 10 00 04 00 09 00 02 00 00 00 00 00 00 0A 88	
441791	15:43:58.160	11 11 00 00 60 00 00 00 00 00 00 00 00 00 00	
442000	15:43:59.518	0610	
442362	15:44:00.830	11 10 00 00 60 00 00 00 00 00 00 00 00 00 00	
443627	15:44:13.320	11 10 00 00 60 00 00 00 00 00 00 00 00 00 00	
445139	15:44:25.795	11 10 00 00 60 00 00 00 00 00 00 00 00 00 00	
eady			NUM

Figure 3.11. Link Active Schedule Mechanism (LAS)

The messages 432398, 433894 and 435411 are the *TD* messages from the LAS of the node 10h. In the message 436926 the LAS of the node 11h assumed the control after the node 10h was removed from the bus. The node 11h starts to send the *TD*. After the node 10h returns to the bus (messages 441073, 441074 and 441078) it asks to assume control. The LAS then sends the *TL* (message 442000) and right after that we can see the node 10h sending the *TD* (messages 442162, 443627 and 445139).

3.4.4 Publishing Control (Traffic Schedule)

The most important task of the LAS is to control the publishing, that is the control of the time of publishing each link output parameter between function blocks from different devices. The period of time to publish the same parameter should be recurrent and equal to the macrocycle.

The LAS transmits the *Compel Data* message (CD) to inform the device that is the time to transmit the specific parameter. When the device receives that message it transmits the value of that parameter using the information report service encapsulated in a *Data Transfer 5* (DT5).

3.4.5 Master Backup

The field device configured as master backup is a LAS with the *PrimaryLinkMasterFlag* equal to FALSE. To know that a master backup is correctly configured it is necessary to verify the following characteristics:

- It assumes the network control when the other LAS are removed.
- It is executing the traffic schedule.

The procedure to test a master backup is:

- i. Certify that the system interface (PCI/DF51) is connected to the bus.
- ii. Starts FBView and configure the filters with:
 - 11
 - B1
- iii. Disable the Statistics View to see the messages that are being captured.
- iv. Initiate the capture. Certify that one of the interfaces is the LAS.
- v. Wait for at least 4 macrocycle periods and then stop the capture.
- vi. Write down which traffic schedule has been executed and the macrocycle.
- vii. Configure the filters with:
 - 11
 - 06
 - 01
- viii. -initiate the capture.
- ix. Remove all of the devices with LAS capability for the bus, leaving just the device to be tested.
- x. Certify that the device to be tested assumed the LAS role. If it did not, remove the LAS device from the bus. Repeat this step until the tested device assumes the LAS role.

If the bus activity stops at any moment, it will mean that the tested device does not have the LAS capability or this capability is not configured. In this case, the test can be interrupted in this step.

- xi. If the tested device assumed the bus control then configure the filters with:
 - 11

_

- B1
- xii. Re-initiate the capture.
- xiii. Wait for at least 4 macrocycle periods and then stop the capture. In this case it is also important to wait for a TD to certify which is the LAS.
- xiv. Verify that the traffic schedule and the macrocycle has the same values as written in step **vi**.
- xv. If the traffic schedule and the macrocycle are the same, then the device is correctly configured to work as LAS. If not, the device is not correctly configured to work as LAS.
- xvi. Reconnect all the devices and finish the test.

The following figures show a sequence of **FBView** screens for a bus where there are three LAS, which are the nodes 10h, 11h and 19h. The device that will be tested is the node 19h. The node 10h is the *Preferential LAS*.

FIIView - [LA	and the second se		1912
File Edt V	lew Message Window	np	
	X III B B	₩ = 0 0 0 0 0 0 1 , "	1 m n. n. 1
Number	Tine	Frane	
326332	-00:00:03.999	61 19 20	
328334	-00:00:03.969	61 1A 20	
328467	-00:00:02.999	81 19 20	
329469	-00:00:02.969	61 1A 20	
328595	-00:00:05.999	61 19 20	
328597	-00:00:01.969	#1 1A 20	
328727	-00:00:00.999	61 19 20	
320729	-00:00:00.969	61 1A 20	
320057	00:00:00.000	61 19 20	
328859	00:00:00.031	81 1A 20	
329905	00:00:01.001	81 19 20	
328987	00:00:01.031	61 1A 20	
329120	00:00:02.001	81 19 20	
329122	00:00:02.031	E1 1A 20	
329250	00:00:03.001	81 19 20	
329252	00:00:03.031	61 1A 20	
329378	00:00:04.001	61 19 20	
329380	100.00.04.031	61 1A 20	
329513	00:00:05.001	#1 19 20	-
329515	00:00:05:031	61 1A 20	
329643	00:00:06.002	01 19 20	
329645	00:00:06.032	61 1A 20	
329774	00:00:07.002	81 19 20	
329776	00:00:07.031	#1 1A 20	
329909	00:00:08.002	61 19 20	
329911	00:00:08.032	81 1A 20	
330029	00-00-08.939	11 10 00 00 60 00 00 00 00 00 00 00 00 00 00	
330038	00:00:09.001	#1 19 20	
330040	00:00:09.032	61 1A 20	
330169	00:00:10.001	81 19 20	
330171	00:00:10.031	81 1A 20	
330304	00:00:11.001	81 19 20	
330306	00:00:11.031	61 1A 20	
330434	00:00:12.001	81 19 20	
330436	00:00:12.031	81 1A 20	
eady.			M.H

Figure 3.12. Traffic Schedule from preferential LAS

The capture showed in Figure 3.12 had the filters:

- 11
- B1

It shows that the LAS is the node 10h (message 909 - TD) and the messages 0 and 2 shows that the traffic schedule is:

- B1 19 20
- B1 1A 20

Observe that the frame 0 is selected and the option relative time measure is enabled. In this way the macrocycle is the period of time for the next "B1 19 20" message to appear. Therefore, the macrocycle is 1001 ms that is the time for the message 328985.

FUNEW - [L/	and the second	in the second		-															-10
File Edit	Ven Melsag	pe Wir	ndow	Help															-10
0 📽 🖬	12.00	121	8	-			1	- 0	0	2	He _g	er "14		 н.	л.	8			
aunber	Time	-	-	Fea	De l				-				1	 	1				
369559	19:4	8:05.33	15.	11	10.00.00	60.000	0 00 0	0.00.00	00.00	00 03 0	€ 31 2	0 85 00	1						
371265	19:4	6:10.37	ra .	11	10 00 00	60 00 0	0 00 0	0 00 00	00 00	00 03 8	4 86 1	315.001	0						
372978	19:4	0:31.42	18	11	10 00 00	60 00 0	0 00 0	0 00 00	00.00	00 03 8	8 30 5	0.06.00	***						
374693	19:4	8:44.50	11	11	10 00 00	60 00 0	0 00 0	0 00 00	00.00	00.03 F	1 66 8	5 CS 00							
376409	19:4	8:57.56	12									C CP 00							
370114	19:4	9:10.54	60	11	10 00 00	60 00 0	0 00 0	0 00 00	00.00	00 03 F	E CB 7	8.88.00							
379814	19:4	9:23.51	18	11	10 00 00	60.000	0 00 0	0 00 00	00.00	00 04 0	15 40 B	203.00	***						
301542	19:4	9:36.66	5	11	10 00 00	60 00 0	0 00 0	0 00 00	00 00	00 04 0	6 D6 6	6 EA 00	-						
383255		9:49.73										9 D€ 00.							
384976	19:5	0.02.85	8	11	10 00 00	60 00 0	0 00 00	0 00 00	00.00	00:04 1	8F4.4	854001	Q						
305631		0:07.97		01															
305632		0:08.02		01															
385749		0:09.05										6 CA 00							
386909		0:19.10				60.000	0 00 0	0.00.00	00.00	00.04.2	OBF A	C AE 00	+++						
307096		0:27.72		01															
307097		0:27.79		01															
392715		1:10.21										3 02 00 1							
397653	19:5	1:53.64	11	11	19 00 00	60 00 0	0 00 0	0 00 00	00.00	00 04 4	E EB 7	8 02 00 1	0						
																	_		
eady																		14.1	14

Figure 3.13. Other LAS removed

The capture showed in Figure 3.13 has the filters:

- 11
- 01
- 06

When the node 10h was removed the LAS 11h assumed control (message 385631). Only after the node 11h was removed the LAS that we wanted to test assumed control (message 387896). That indicates the node 19h is configured as LAS. If it was not configured as LAS, after we removed the node 11h, then we would not have had any captured messages. The bus activity would have stopped.

FUMen - [LASI	005,789]		
File Edt Ver	m Message Window	Philip .	X
	X 1 8 8	N = = = + + + + + + + + + + + + + + + +	
Number	Time	Frane	
299380	-00.00.03.997	81 19 20	
399383	-00.00.03.967	61 1A 20	
299496	-00.00.03.004	81 19 20	
399500	-00-00-02.966	81 14 20	
399611	-00-00-02-005	85 19 20	
399615	-00:00:01.968	61 1A 20	
399725	-00.00.01.005	81 19 20	
399729	-00.00.00.966	8t 1A 20	
399640	00-00-00.000	81 19 20	
299044	00:00:00.032	61 1A 20	
399955	00:00:01.002	81 19:20	
299958	00:00:01.032	81 1A 20	
400068	00:00:01.995	#8 19 20	
400072	00:00:02.032	#1 1A 20	
400177	00:00:02.960	11 19 00 00 60 00 00 00 00 00 00 00 00 00 00	
400176	00:00:02.997	#1 19 20	
400181	00:00:03.027	#1 1A 20	
400292	00:00:03.996	61 19 20	
400296	00:00:04.034	80 1A 20	
400406	00:00:04.995	#1 19 20	
400410	00:00:05.032	01 1A 20	
400520	00:00:06.002	81 19 20	
+00523	00:00:06.032	8t 1A 20	
400633	00:00:06.995	81 19 20	
400637	00:00:07.032	61 1A 20	
400748	00:00:08.002	81 19 20	
400751	00.00.08.033	61 1A 20	
400864	00:00:09.007	81 19 20	
400967	00.00.09.033	81 14 20	
400977	00.00.09.997	81 19 20	
+00980	00:00:10.027	81 1A 20	
401090	00:00:10.996	81 19 20	
401093	00:00:11.026	81 1A 20	
401204	00:00:11.999	#1 19 20	
401200	00:00:12.031	81 1A 20	-
eady			ALM

Figure 3.14. Master Backup Traffic Schedule

The capture showed in Figure 3.14 has the filters:

- 11
- B1

It shows that the LAS is the node 19h (message 337 – TD) and the messages 0 and 4 shows that the traffic schedule is:

- B1 19 20
- B1 1A 20

Note that the frame 0 is selected and the option relative time measure is enabled. In this way the macrocycle is the period of time for the next "B1 19 20" message to appear. Therefore, the macrocycle is 1002 ms which is the time for the message 399955.

As the traffic schedule from node 10h and 19h are the same and the macrocycle is closed, we can say that the node 19h has the correct LAS configuration.

3.4.6 Checking Links

It is possible to diagnose the external links with **FBView**, once the internal links are not transmitted in the bus. The external links always have the device that publishes the output parameter (named *publisher*), the device that subscribes the published value (named *subscriber*), and the device that controls the publishing (the LAS described above). In the example:

- Node 19h is publishing a link in 1920h, which the node 1Ah is subscribing.
- Node 1Ah is publishing a link in 1A20h, which the node 19h is subscribing.

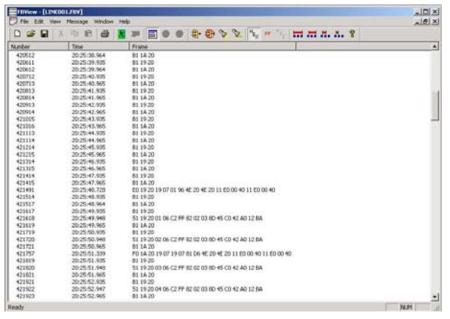


Figure 3.15. Node 19h Publishing

The capture showed in Figure 3.15 had the filters:

- B1
- 51
- EO
- E4
- FO
- F4

In the beginning the messages from 421113 to 421719 show that none of the parameters were published, because after the *Compel Data* (CD) there is no information report (DT5). This is because the two devices were removed from the bus.

The first device connected to the bus was the one from node 19h. Before it starts to publish a parameter the node sends a message to establish the *Publisher* connection. This message is an *Establish Connection 2* (EC2, message 421491) type and afterward the node starts to send the information report (DT5, messages 421618, 421720, 421820 and 421922).

As this node also has a parameter subscribing a value, it sends connection requests (establish connection EC1) to the publisher address of this link, in the example it is 1A20h (message 421757). The node will not subscribe a value until the publisher answers this connection request.

Hitter - (LIN			لللله
J File EDE VI	ew Message Window I		-161
	I R R G	■ ■ ● ● むむ ひ 2 1/2 # 1/2 円 用 用 A. S	
Number	Time	Fratue	
424747	20:26:19.936	81 19 20	
424748	20:26:19.949	51 19 20 1F 06 C2 FF 82 02 03 8D 45 C0 42 AD 12 8A	
424749	20:26:19.966	Bt 1A 20	
424823	20:26:20.527	F0 1A 20 19 07 19 07 81 D6 4E 20 4E 20 11 E0 00 40 11 E0 00 40	
424000	20:26:20.936	B1 19 20	
424881	20:26:20.948	51 19 20 00 06 C2 FF 82 02 03 80 45 C0 42 A0 12 8A	
424082	20:26:20.966	B1 1A 20	
425013	20:26:21.936	81 19 20	
425014	20:26:21.940	51 19 20 01 06 C2 FF 62 02 00 80 45 C0 42 A0 12 BA	
425015	20:26:21.966	B1 14 20	
425140	20:26:22.935	81 19 20	
425149	20:25:22.948	51 19 20 02 06 C2 FF 82 02 03 80 45 C0 42 A0 12 8A	
425150	20:26:22.965	01 1A 20	
425282	20:26:23.935	61 19 20	
425283	20:26:23.948	51 19 20 03 06 C2 FF 82 92 03 80 45 C0 42 A0 12 BA	
425204	20:26:23.965	B1 1A 20	
425414	20:26:24.935	81 19 20	
425415	20:26:24.948	51 19 20 04 06 C2 FF 82 02 03 80 45 C0 42 A0 12 8A	
425416	20:26:24.965	81 14 20	
425429	20:26:25.005	F0 1A 20 19 07 19 07 81 D6 4E 20 4E 20 11 E0 00 40 11 E0 00 40	
425432	20:26:25.108	F0 19 20 1A 07 1A 07 81 D6 4E 20 4E 20 00 00 00 00 51 E0 00 40	
425433	20:26:25.117	E4 LA 20 1A 07 01 96 4E 20 4E 20 51 E0 00 40 51 E0 00 40	
425453	20:26:25.249	E0 19 20 19 07 01 96 4E 20 4E 20 11 E0 00 40 11 E0 00 40	
425549	20:26:25.935	81 19 20	
425550	20:26:25.948	51 19 20 05 06 C2 FF 82 02 03 8D 45 C0 42 A0 12 8A	
425551	20:26:25.965	B1 1A 20	
425556	20:26:26.060	F0 1A 07 10 80 10 07 81 76 EA 60 75 30 A1 80 00 80 A1 80 00	
425563	20:26:26.113	F4 10 00 1A F3 1A 07 01 76 EA 60 75 30 A1 00 00 00 A1 00 00	
425684	20:26:26.935	81 19 20	
425685	20:26:26.947	51 19 20 06 06 C2 FF 82 02 03 8D 45 C0 42 A0 12 8A	
425686	20:26:26.965	BI 1A 20	
425021	20:26:27.934	81 19 20	
425822	20:26:27.947	51 19 20 07 06 C2 FF 82 02 03 80 45 C0 42 A0 12 8A	
425823	20:26:27.964	81 1A 20	
425955	20:26:28.934	81 19 20	
vbeel			NM
and the second se			

Figure 3.16. Established Links

Figure 3.16 shows two links being established. The message 424823 shows the node 19h trying to establish the connection with the publisher 1A20h again but it still does not have the answer. In the message 425429 the node 19h tries to establish the connection again and now the connection is established, because the publisher answered the connection request (message 425433).

This figure also shows the link where the node 19h is the publisher being established. In the message 425432 the link subscriber is requesting the connection and in the message 425453 the node 19h answers the request.

Fillinew - [LIN	K001.FBV]		aidi X
File Edit We	w Message Window	Help	_[#] X
	IBBB	I = = = = = = > > > > > > > > = = = = =	
And the second second			
Number	Tane	Fratie	
427904	20:26:42.949	51 19 20 16 06 C2 FF 82 02 03 80 45 C0 42 80 65 28	
427905	20:26:42.966	BI 1A 20	
427906	20:26:42.974	51 1A 20 09 06 C2 00 02 02 01 1A 45 C0 42 00 58 F3	
428045	20:26:43.936	B1 19 20	
420046	20:26:43.940	51 19 20 17 06 C2 FF 82 02 03 8D 45 C0 42 80 6E B8	
428047	20:26:43.966	B1 1A 20	
420040	20:26:43.975	51 LA 20 DA 06 C2 00 82 02 01 LA 45 C0 42 80 65 28	
428187	20:26:44.935	81 19 20	
420100	20:26:44.948	51 19 20 18 06 C2 FF 82 02 03 80 45 C0 42 80 77 CF	
428189	20:26:44.965	BI 1A 20	
428190	20:26:44.974	51 1A 20 08 06 C2 00 82 02 01 1A 45 C0 42 80 6E 88	
428325	20:25:45.936	81 19 20	
428026	20:26:45.940	51 19 20 19 06 C2 FF 82 02 03 8D 45 C0 42 80 81 1E	
428327	20:26:45.965	B1 LA 20	
428328	20:26:45.974	51 1A 20 0C 06 C2 00 82 02 01 1A 45 C0 42 80 77 CF	
429466	20:26:46.936	B1 19 20	
428467	20:25:46.949	51 19 20 1A 06 C2 FF 82 02 03 8D 45 C0 42 80 8A 69	
420468	20:26:46.966	B1 1A 20	
428469	20:26:46.974	51 1A 20 0D 06 C2 00 82 02 01 1A 45 C0 42 80 81 1E	
429607	20:26:47.936	B1 19 20	
429608	20:26:47.948	51 19 20 18 06 C2 FF 82 02 03 8D 45 C0 42 80 93 80	
429609	20:26:47.966	B1 1A 20	
428610	20:26:47.975	51 1A 20 0E 06 C2 00 82 02 01 1A 45 C0 42 80 8A 69	
428740	20:26:40.936	81 19 20	
428749	20:26:48.948	51 19 20 1C 06 C2 FF 82 02 03 8D 45 C0 42 80 9D 42	
420750	20:25:48.965	B1 LA 20	
428751	20:26:40.974	51 1A 20 0F 06 C2 00 82 02 01 1A 45 C0 42 80 93 80	
420006	20:26:49.935	B1 19 20	
428887	20:26:49.948	51 19 20 10 06 C2 FF 82 02 03 80 45 C0 42 80 A6 42	
420000	20:26:49.965	B1 1A 20	
428889	20:26:49.974	51 1A 20 10 06 C2 00 82 02 01 1A 45 C0 42 80 90 42	
429028	20:26:50.935	81 19 20	
429029	20:26:50.948	51 19 20 1E 06 C2 FF 82 02 03 8D 45 C0 42 80 AF C5	
429030	20:26:50.966	81 LA 20	
429031	20:26:50.974	51 1A 20 11 06 C2 00 82 02 01 1A 45 C0 42 80 A6 42	
eady.			NM

Figure 3.17. Sequence with Established Links

Figure 3.17 shows the *Compel Data* and *Information Report* messages for a bus where all of the links were established and the capture used the filters below.

- B1
- 51
- EO
- E4
- FO
- F4

3.4.7 Supervision and MVC

The simplest way to execute the parameter supervision of the device is by using an object named *View*. Each function block has four *View* types.

View is a pre-configured list of parameters. When the device receives a *Read Request* of a specific *View*, it sends the current values of each parameter of the function block that composes this *View*.

In some cases, there are function block parameters that do not belong to any *View*. Then, if the analyzer system wants to monitor this parameter it must send a *Read Request* to the parameter index.

Some fieldbus devices have an object that optimizes the time spent with supervision. This object is named MVC (Multi Variable Contained). The analyzer system is responsible for the configuration of the parameters that will be sent in the MVC and the period of time this MVC must be transmitted into the bus.

The *MVC* optimizes the supervision for the following reasons:

- One single *MVC* can contain parameters of different function blocks from the same device.
- The analyzer system does not have to send a request and wait for the answer, because the device sends the message without needing a request.

A *MVC* is easily detected. Use a filter to capture the *DT1* and set the destination address to 0140h. In this case, the filters were:

- D30140
- D70140

4. FBVIEW - HSE

4.1 Selecting the Communication Interface

After creating the messages file for the HSE communication, **FBView** automatically initializes the communication, searching for the communication interfaces available in the network.

If the PC executing **FBView** has more than one network adapter, click the button **Interface**, *m*, to open the dialog box and select the adapter that will be used to capture the frames.

Dialog		×
192.168.163.	46 💌	ОК
Card :	\Device\NPF_{65833CDB-A3	Cancel
NetMask :	255 . 255 . 255 . 0]
BroadCast :	255 . 255 . 255 . 255	
Current Net 3Com Ethe	work Adapter rLink PCI	

Figure 4.1. HSE Communication Interfaces

Click the button **Start**, **L**, to start capturing the messages from the bus.

The figure below shows the messages in the HSE network:

			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	m m n. x. 8
×	Number	Tinc	Service	Source
Parameters	0	14-07-39 735	SM Device Annunciation	192 168 163
SM Device Annunciation	1	14:07:44.614	SM Device Annunciation	192.168.163
R Header	2	14:07:46.810	AUD Audit Diagnostics	192,168,163
- Version: 1	3	14:07:54.876	SM Device Annunciation	192.168.163
Options: 0x80	2	14:07:59.715	SH Device Annunciation	192 168 163
Protocol: SM	6	14:08:01.915	AUD Audit Diagnostics	192.168.163
- Msg Type: Request Msg	1 2	14:08:10.022	SN Device Annunciation	192,168,163
- Service: (Unconf.)	2	14:00:14.004	SM Device Annunciation	192.168.163
Msg Length: 140	8	14:08:16.998	AUD Audit Diagnostics	192,168,163
PDA Address: 0x00000002	9	14:08:25.155	SM Device Annunciation	192.168.163
Traler	10	14 08 29 906	SM Device Annunciation	192 168 163
- Msg Number: 29300	11	14:08:32.104	AUD Audit Disgnostics	192.168.163
Invoke ID: Not Used	12	14:08:40.316	SM Device Annunciation	192 168 163
- Time Stamp: Not Used	13	14:08:45.024	SM Device Annunciation	192 168 163
- Extended Control: Not Used	14	14 08 45 317	FDA Open Session Reg	192 168 163
Data	15	14:00:45.393	FDA Open Session Rsp	192,160,163
SMK State: 4	16	14:08:45.415	FMS Initiate Reg	192.168.163
- BRS 1-7 = 2 (OPERATIONAL)	17	14 08 45 428	FMS Initiate Rap	192,168,163
	10	14 08 45 515	FMS GetOd Reg	192 168 163
Bit 0 = 0 (Not Synchronized with	19	14:08:45.569	FMS GetOd Rsp	192.168.163
Device Type: 128 Device Rendundancy State = 4	20	14:08:45.615	FMS Read Reg	192.168.163
	20	14:08:45.639	FMS Read Rap	192.168.163
Duplicate Detection State = 0	22	14:08:45.715	FMS Write Reg	192.168.163
Device Index = 0	23	14:08:45.744	FMS Write Rsp	192.168.163
Max Device Index = 512	23	14:00:45.744	rap write ksp	192.168.163

Figure 4.2. FBView Interface

4.2 Filters

4.2.1 Adding Filters

To configure a filter, click the button **Enable Filters**, to the toolbar. The *Filter Configuration* window showed in the figure below will open:

Others	OK Cancel Add Filter Remove Filter Clear Filters
	Add Filter Remove Filter
	Remove Filter
Destination	
· · · /	C1
	Clear Filters
Remove Filter Public	
	FDA Address

Figure 4.3. Filters Configuration

Select the option Enable Filter to apply the filters to the messages.

In the field Protocol, select the communication protocol for the filter:



- HSE: capture the HSE frames defined in the documentation FDA Agent (FF-588) FS 1.09;
- **SE UDP/SE TCP**: capture the frames from the Smar Ethernet protocol;
- Others: filters the frames from a log file of the HSE, DFI or ModBus.

In the field By Service, select the type of the service related to the message:

⊢ by Servic	ə ————	1
Service	FMS GetOD Reg 💌	Filter Not
		I TIKET NOC

The list with the services depends on the protocol selected in the field *Protocol*. The service showed in the figure above was selected in the HSE protocol.

Mark the option Filter Not to filter the messages that do not have the selected service.

Click the button Add Filter to add the filter to the Filters list. See the example below:

	C Others	- OK
by Service		Cancel
Service AUD Audit Diagnostics	File	Not Add Filter
by IP Source	Destination	Remove Filter
		Clear Filters
Sele	et Filter's Logic : C Or G	And
	FDA Address	And
ervice: FMS Read Reg lot Service: FMS Get0D Reg		
Group Filter Profile		

Figure 4.4. Creanting a Filter by Service

In the field *By IP*, type the IP address of the computer from where the messages are being sent (filed *Source*) to filter the received messages, or the IP address of the computer receiving the messages (field *Destination*):

Source	Destination
192 . 168 . 163 . 48	· · ·

Click the button Add Filter to add the filter to the Filters list. See the example below:

tView Filter			
7 Enable Filter Protocol IF HSE IT SEUDP IT SET(CP 「Others 」		OK.
by Service			Cancel
Service		Filter Not	Add Filter
by IP Source	Destinatio	n	Remove Filter
a	192 . 168 . 10	53 . 048	Clear Filters
s,	elect Filter's Logic : 🙃	Or C And	
Se Filters	elect Filter's Logic : (*	Or C And	
Source: 192.168.163.192			
Group Filter Profile Ad	d Filter Remove	Filter Profile	
Name Filter Profile : Save F	iter Profile Dear All I	Filters Profile	

Figure 4.5. Creanting a Filter by IP Address

In the field *By Port*, type the number of the communication port to filter the messages being received (filed *Source*) or being sent (field *Destination*) through that port:

by Port Source	Destination

Click the button Add Filter to add the filter to the Filters list.

In the field By FDA Address, type the FDA address to filter the received messages:

- by FDA Address	
FDA Address	

Click the button Add Filter to add the filter to the Filters list.

If the user add two or more filters to the list of filters, select the logic operation:

Select Filter's Logic :
 Or O And

- **Or**: applyes the logic "or" when capturing the frames the message must fill at least one criterion defined by the filters to be captured.
- And: applyes the logic "and" when capturing the frames the message must fill all criteria defined by the filters to be captured.

4.2.2 Removing Filters

To remove a filter, select the specification in the *Filters* list and click the button **Remove Filter**. See the example below:

F Others	Cancel
Filter Not	Cancel
Filter Not	
	Add Filter
Destination	Renove Filer
1 4 1	Clear Filters
t Filter's Logic : 🤨 Or 🛛 🤇 Ar	d
	-
Remove Film Public	
Profile Clear All Filters Profile	

Figure 4.6. Removing a Filter

To remove all filters, click the button **Remove All Filters**.

4.2.3 Creating a Filter Profile

The *Filter Profile* allows the user to save all filters configured with specific names related to their function.

The user can create a library with configured filters, being able to add/remove one or all filters from the library.

To create a filter profile:

- 1. Click the button **Enable Filters**, in the toolbar, to open the *Filter Configuration* window.
- 2. Add the filters as indicated in the figure below.

Protocol HSE I SE UDP	E SETCP E Other		0K
by Service		_	Cancel
Service	<u>×</u>	Filter Not	Add Filter
by IP Source	De	estination	Remove Filter
1 40 40 AC		10 M	Clear Filters
Filters			
Source: 192,168,163,48			
Source: 192.168.163.48 Not Service: FDA Idle Reg	Add Filter F	emove Filter Profile	
	Add Filter F	emove Filter Ptofile	

3. Type a name for the filter profile and click the button Save Filter Profile.

Group Filter Profile		
_	Add Filter	Remove Filter Profile
Name Filter Profile :		
HSE-01	Save Filter Profile	Clear All Filters Profile
	· v	

After adding a new filter profile, it will be displayed in the *Group Filter Profile* menu. Use the button **Add Filter** to add the selected filter profile to a group of filters from another message buffer.

Group Filter Profile		
HSE-01	Add Filter	Remove Filter Profile
Name Filter Profile :	<i>*\</i>	
	Save Filter Profile	Clear All Filters Profile

4.2.4 Removing Profiles

To remove a filter profile, select the name of the profile in the *Group Filter Profile* list and click the button **Remove Filter Profile**. See the example below:

Group Filter Profile		
HSE-01	Add Filter	Remove Filter, Profile
Name Filter Profile :		
	Save Filter Profile	Clear All Filters Profile

Figure 4.7. Removing a Filter Profile

To remove all filter profiles, click the button **Remove All Filters Profile**.

4.3 Message De-codification in the HSE Mode

To decode a message captured in the HSE mode, click the message in the list. The details of the selected message will be displayed in the *Decoder* window. See the example below:

FBView (Net Card-3Com EtherLink PCJ) File Edit View Message Window Help					102
D 📽 🖬 🗡 🖻 📾 📕	38 .		5 2 13 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ш ш н. н.	8
* N	lumber	Tino	Service	Source	2
Parameters		11.00.10.100	DIE D. J. D.	192 168	140
Service Name	36 37	14:08:46.496	FMS Read Req FMS Read Rep	192.168	
FMS Read Rsp	30	14:08:46.698		192.160	
S Header	39	14:00:46.590	FDA Open Session Req	192.160	
- Version: 1	40	14:00:46.068	FDA Open Session Rsp FMS Initiate Reg	192.160	
- Options: 0x40		14:00:46.883	FMS Initiate Rsp	192.168	
Protocol: FMS	41 42		FMS Read Reg	192.168	
Msg Type: Response Msg	42	14:08:46.969 14:08:47.053	FMS Read Rep	192.168	
Service: (Corf.)	44	14:08:47.067	FMS GetOd Reg	192.168	
Msg Length: 64	44	14:08:47.067	FMS Read Reg	192.168	
FDA Address: 0x00000500	45	14:08:47.100	FNS GetOd Rap	192.168	
🖹 Trailer	47	14:08:47 106	FNS Read Exp	192.168	
Msg Number: Not Used	48	14:08:47.167	FMS Read Reg	192,168	
- Involue ID: 12	49	14 08 47 211	AUD Audit Disuncatica	192.168	
- Time Stamp: Not Used	50	14 08 47 224	FMS Read Rop	192.168	
Extended Control: Not Used	51	14:08:47.268	FMS Write Reg	192.168	
⊖ Data	52	14:08:47.287	FNS Write Rsp	192.168	
Data: 00 00 00 15 03 01 e0 00 00 C	53	14:08:47.367	FMS Read Reg	192.160	
	54	14:00:47.393	FMS Read Rep	192 160	
	55	14:00:47.555	FMS Read Req	192.160	
	56	14:00:47.579	FMS Read Rsp	192.168	
	57	14:08:47.648	FMS Read Reg	192.168	
	58	14:08:47.714	FMS Read Rep	192.168	
	59	14:08:47.748	FMS Read Reg	192.168	
	60	14:08:47.771	FMS Read Rap	192.168	
d 1	10.57		ran what wab	176.100	
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sady				N.I	1

Figure 4.8. Displaying Message Information

The figure above shows the interpretation of a HSE message, type *FMS Read Rsp.* A HSE message is composed by three sets of information: *Header, Trailer* and *Data*.

The Header contains all common and mandatory fields for each HSE message.

The Trailer contains optional fields for HSE messages.

The *Data* contains object data, therefore the length and the content of this field depends on the object that the message is accessing. This field doesn't appear in all HSE messages. If a message doesn't have an associated object or error, then this field is not necessary.

Every message has the type of the service, that can *request*, *response* or *error*, and an option that indicates whether the message requires a confirmation or not.

It is important to notice that some messages have reserved fields, that must have value 0 (zero).

Header Details

Version: specifies the version number of the message. Currently in version 1.

Option: each bit in this field has a meaning, described below:

Bit 8:	message number is in the trailer.
Bit 7:	the <i>invoke ID</i> is in the trailer. (for client/server sessions, this bit will always be 1)
Bit 6:	Time Stamp is in the trailer.
Bit 5:	reserved.
Bit 4:	extended control field is in the trailer.
Bits 1-3:	number of bytes sent between the trailer and data to align the message.

Protocol ID and Confirmation Msg: bits 3 to 8 indicate the protocol of the message, that can be: *FDA Session Management, SM, FMS* or *Lan Redundancy*. Bits 1 to 3 indicate the type of the message: *request, response* or *error*.

Service: bit 8 indicates if a confirmation was requested, and bits 1 to 7 show the identification of the service.

Message Length: indicates the total number of bytes in the message, including the *Header* and the *Trailer*.

FDA Address: the usage of this field depends on the type of the message and the VCR used. For further information, see table 14 in norm FF-588 FS 1.3 of the *Fieldbus Foundation (Field Device Access Agent)*.

Trailer Details

Message Number: sequential number of the messages transmitted by a specific VCR.

Invoke ID: identification of request and response. This means it is used to associate a response to a request, and vice versa.

Time Stamp: indicates the time, in the system, that the message was created. The device receiving the message can use this field to determine the transmission time of the message.

Extended Control Field: to be used in the future.

For some HSE-type services, such as *FMS Read Rsp*, *FMS Write Req* and *FMS Get OD Rsp*, it is possible to decode the parameter *Data*, since this parameter has several types of data structure.

For example, to decode the HSE service named *FMS Read Rsp*, showed in the figure below, double right-click the parameter *Data*. The popup menu will open showing the list of options to decode the service.

FBView - [Net Card-3Com EtherLink PC1] File Edit View Message Window Help			-0
D 😅 🔒 🖌 🗠 🖻 🐣		> 12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
coder ×	Number Time	Service	Source
Parameters			
E-Service Name	0 14:07:39.735		192.168.16
- FMS Read Rsp	1 14:07:44.614		192.160.16
S-Header	2 14:07:46.810	Here House - Programmer and	192.168.16
- Version: 1	3 14:07:54.076		192.160.16
- Options: 0x40	4 14:07:59.715		192.168.16
- Protocol: FMS	5 14:00:01.915	AUD Audit Diagnostics	192.160.16
Msg Type: Response Msg	6 14:08:10.022	SH Device Annunciation	192.168.16
- Service: (Conf.)	7 14:08:14.004	SM Device Annunciation	192.160.16
- Msg Length: 80	8 14:08:16.998	AUD Audit Diagnostics	192.168.16
FDA Address: 0x00000520	9 14:08:25.155	SM Device Annunciation	192.168.16
E Traler	10 14:08:29.906	SH Device Annunciation	192.168.16
Msg Number: Not Used	11 14 08 32 104	AUD Audit Diagnostics	192.168.16
Invoke ID: 2	12 14:08:40.316	SM Device Annunciation	192.168.16
Time Stamp: Not Used	13 14:08:45.024	SM Device Annunciation	192,168,16
Extended Control: Not Used	14 14:00:45.317	FDA Open Session Reg	192.168.16
C DATA	15 14:08:45.393	FDA Open Session Rep	192 168 16
NM Structures + 0.0	16 14:00:45.415	FMS Initiate Reg	192 168 16
1	17 14 00 45 428		192 168 16
	evice Identification 5.515	FMS GetOd Reg	192 168 16
General Structures	Schedule Descriptor 5,569		192.168.16
General Structures P	Schedule List Characteristics 5.615		192 160 16
Files Structures 5	mc and Scheduling		192 168 16
	PD Ref Entry 5.715	FMS Write Reg	192.168.16
	23 14.08.45.744		192.168.16
	24 14:08:45.845	FMS Read Reg	192.160.16
	25 14:08:45.896		192.168.16
	26 14:00:45.935	FMS Read Req	192.168.16
<u>1</u>	411		
	ACCOUNTS		N.M

Figure 4.9. Decoding the HSE Service

The user must know which type of data structure is included in the parameter *Data* of the service *FMS Read Rsp* (in the example above, the user has the *index* information sent in the service *FMS Read Req*), to select the correct data structure in the options menu.

19 日 - 19 19 日 日 19 0 三 年 日 ノ ノ	12	m m n. r			
	-	Time	Service	Source	Deat
Serves (Cold.) Histandh: 80		10 55 32 008	40D Audit Disposition	\$10 800 800 180 5201	12 22
FCA Address: B00000000		18 55 33 178	SH Device Annualistics.	810 800 800 180 8333	
Toke Address Incolorized		10 55 33 420	FIA Open Separation Reg.	010 000 000 010 0131	
		18 55 33 428	FDA Open Session Rap	010 000 000 100 0435	
Mig Number I Not Load Involat ID: 2	1 1 2	18 55 33 521	FMS Initiate Reg	010 000 000 010 0135	
	1 2	18 55 33 535	FWS Initiate Esp	810 800 800 180 8435	
Take Stange fast Used	1 2	10 55 33 423	FWS GetOd Neg	\$10 000 000 010 0114	
Extended Control Net Used		10 15 33 636	FMS GatOd Rep	\$10 800 000 180 B415	
Deta	1.	10 55 33 724	FES Read Reg	010 000 000 010 0135	
Ceta: 00 00 00 00 00 00 00 00 00 00 00 00 00		10.10.13.72	PES Read Rep	010 E00 E00 AE0 E40	
😟 Starpetation					
ill Header	10		FHS Write Req	010.000.000.010.0175	
Reserved = 0	11	10.55.33.039	FMI Write Hup	610.800.800.180.6435	
Desctory Revision Number = 0	12		FEI Bood Bog	010 000 000 010 0135	
Number of Devictory Objects = 0	13	18:55:33.938	FES Band Exp	010.000.000.100 0435	
Total Number of Directory Entries + 1	14	18:55 34 927	FES Read Req	610.000.000.010.0175	
Directory Index of Composite Unit Reference = 0	15	18 55 34 038	FRS Read Rep	010.000.000 180 8455	
Number of Composite Lat Reference = 1	16	10:55:34.126	FHS Read Req	010.000.000.010.0135	
Gampinske Devoltary Deletes	. 17	28.55.34.240	FMS Read Rep	010 000 000 100 0435	
CO 3ndex for Starting Action Object + 0	18		FWS Read Req	810.000.000.010.0335	
Number of Action Objects = 5	19		FRI Read Rep.	010 000 000 100 0435	
CD Index of the Starting Link Object in the VFD + 0	26		FH5 Read Req	010 000 000 010 0175	
Number of Link Classific in the VPD = 0	23	28.55 34.340	FHS Reed Rup	810 800 800 180 8435	19 0
CO Index of the Starting Jiert Closet # the VFO = 3	22	10:55:34.436	FWS Read Reg	010.800.000.010.0135	15 0
Number of Aiert Notification Objects in the IPD = 0	23	18 55 34 444	FWI Read Rap	010 000 000 100 0435	19 01
CD Index of the Iberting friend Closelt in the VPD = 0	-24	18 55 34 537	FWS Band Reg	010 000 000 010 0134	15 01
Number of Frend Objects in the WD = 300	25	10.55 34.547	FHI Read Rup	010 000 000 100 0415	
CD 3rdex of the Starting Sonian Object in the VPD = 0	26	28 55 34 739	FDA Open Session Reg.	010 000 000 010 0195	
Total Number of Doman Objects Allowed (Hausmun) in the WD = is	27	10:55:34 740	FDA Open Sension Rup	010.000.000 100 0441	
Camposte Lat Sentory Drows	28	10 55 34 042	FWI Initiate Reg	\$10 500 600 610 8174	
Desctory Index for the Resolute Block = 0	29		FWS Initiate Rup	010 000 000 100 5441	
Number of Resource Biclus in the VPD = 350	20	10 55 34 544	FWS Read Reg	010 000 000 010 0115	
Desctory Index for the Fest Transducer Block Pointer = 0	31	18 55 34 956	FES Read Rap	010 000 000 100 0425	
	32	18-55 35.044	FHS GetOd Heg	\$10,000,000,010,0104	
tamber of franclacer Biolo in the WD = 3	33		FWS Read Reg	810 800 800 810 8135	
Deectory Index for the Peut Punction Block Pointer = 0	34	10 15 35 044	FWS GetOd Rep	510 800 000 180 8461	
Number of Punction Blocks in the 1PD = 400	15	10 55 35 049			
— Composite Deactory Entries for Composite Lats	35	10 55 35 145	FES Read Rap	010.000.000.100 0435 010.000.000.010 0135	
Resource Block - Shart CO Index = 0			FRS Read Req		
Resource Block - Number of OD Entres = 1	27		FMS Read Rap	010.000.000.100.0441	
Transluce Block 1 - Start OD Index = 0	38	18.55.05.247	FHE Write Req	810.800.800.810.8195	
Translace Book 1 - Number of CO Entres + 450	- 39		PES Vrite Rep	D10 800 800 180 8435	
Transfacer Block 2 - 31art OD Index = 3	40		FMS Rend Req	810.800.800.810.8135	
Transducer Block 2 - Number of CO Entries + 6	-43	10 55 25 359	FES Read Rep	010 000 000 100 0461	
Translater Blok 3 - Start OD Index = 0	42	18 55 35 449	FHS Read Req	610.000 000.010.8135	
Transducer Block 3 - Namber of CO Entres + 500	-43		FES Read Rep	010.000.000 100 0435	
Punction Block 1 - 31art CD Index = 3	44	10 11 21 550	FWS Bood Enq	010.000.000.010.0175	
Function Block 3 - Rumber of CO Entries + 5	45		FWS Read Rep	010.000.000.100 0461	
	46	18.55.35.451	FMI Read Reg	\$10,800.000.010 E135	16 10
	0.00				
					14.0

Figure 4.10. Service De-codification

Figure 4.10 shows the de-codification for reading the directory of the VFD application.

4.4 Importing Log Files

To import a log file generated by **Smar NetView**, click the button **New**, **D**, in the toolbar, to create a new file and select the HSE communication.

Go to the File menu and click the option Import NetView Old Version Files. The Open dialog box will appear. Select the log file and click Open.

Open			? ×
Look in: 🔁	HSE-FBView	💌 🗢 🖻 🖬	-
NetViewLo	g.snl		
File name:	NetViewLog.snl	0	pen
Files of type:	Smar NetView Log File (*.snl)	▼ Ca	incel

Figure 4.11. Importing NetView Log Files