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WiMedia Explorer 300 Analyzer

User Guide

PROTOCOL TEST SOLUTIONS

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This manual is populated throughout with screens captured from a specific version of Ellisys WiMedia Explorer 300 software. All the information contained in the screens are samples and serve as instructional purposes only.

Document Revision History

Date	Revision	Changes
2005-09-04	1.0	Initial release.
2006-06-20	2.0	Major edits to all chapters.
2007-12-12	2.8	New design. Major edits to all chapters.
2008-04-24	2.8.2985	Minor edits to chapter 5.

Ellisys Contact Details

Ellisys
Chemin du Grand-Puits 38
CH-1217 Meyrin Geneva
Switzerland

Phone: +41 22 777 77 89
Fax: +41 22 777 77 90
Email: info@ellisys.com
Web: http://www.ellisys.com

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Governing Law

These conditions and terms shall be governed by and construed in accordance with the law of Switzerland.

Jurisdiction; Venue

The parties consent to the exclusive personal jurisdiction of, and venue in, the District Court of Geneva, Switzerland.

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About this Manual

Typographic Conventions

Bold is used to indicate menu commands, buttons, and tabs.

Italics are used to indicate fields, pane names, window names and cross references.

`Fixed width` is used to indicate system file names, text typed and code snippets.

A warning symbol describes a possible critical situation and how to avoid it.

An information symbol tells you how to respond to a situation that may arise.

A tip symbol tells you information that will help you carry out a procedure.

Where to Find More Help

Go to the Ellisys website and the following pages for the latest information:

- Ellisys products page - Go to **www.ellisys.com/products/** for the latest product information and documentation.
- Application notes and white papers - Go to **www.ellisys.com/technology/** to find up-to-date information about the technology.
- Distributors - Go to **www.ellisys.com/sales/** to find a list of Ellisys distributors.
- Technical support - Go to **www.ellisys.com/support/** to send a question directly to the Ellisys support team.

1 Ellisys WiMedia Explorer 300 Analyzer Overview

1.1 Product Overview

The Ellisys WiMedia Explorer 300 Analyzer is an over-the-air MB-OFDM protocol analyzer for WiMedia Alliance's Ultrawideband common radio platform and Certified Wireless USB protocol.

The WiMedia Explorer 300 Analyzer high-quality RF front-end records traffic exchanged over the air between devices so you can display the resulting decoded information in your choice of several convenient formats. The Analyzer software provides instantaneous user understanding about the protocol and enables capturing, filtering and decoding the data in real time.

1.2 Main Features

The Ellisys WiMedia Explorer 300 Analyzer has many unique features:

- Traffic overviews display UWB and Wireless USB protocols elements in real time with no need to set up complex triggers.
- *Instant Timing* displays time allocations and violations, measures protocol item duration and helps understanding complex traffic sequences of WiMedia-based protocols.
- *Instant Superframe* gives a real-time overview of all traffic exchanged by all devices.
- *Instant Beacons* helps identifying devices recognition status by other devices.
- *Summary* view displays real-time statistics of ongoing traffic and organizes it in categories.
- Integrated Decryption Engine verifies wireless encryption and 4-way handshake session key exchange, and automatically decrypts ciphered frames.
- Extensive protocol verification helps debug interoperability issues.
- Powerful search and filtering features ensure a quick access to the information you need.

Visit the product web page at www.ellisys.com/products/wex300/ for the latest product information and documentation.

2 Installing the Ellisys WiMedia Explorer 300

Before installing the Ellisys WiMedia Explorer 300 ensure your computer meets the following requirements:

- Microsoft Windows Installer 3.0 or later. If the installation does not run smoothly, or if the system indicates that there is a version error, update your Windows Installer.
- Microsoft .Net Framework version 2.0.
- Pentium 4, 1.8 GHz or compatible processor, or better.
- 512 MBytes of RAM or more.
- 1024x768 screen display resolution with 256 colors or better.
- USB 2.0 host controller.

2.1 Software Prerequisites

The WiMedia Explorer 300 software requires several software components. Ellisys recommends that you visit the following web pages to update your version of Microsoft .Net Framework and Windows:

- **www.microsoft.com/net** to download the Microsoft .Net Framework version 2.0.
- **windowsupdate.microsoft.com** to update your version of Windows. When using the Windows update service it will automatically download and install the Microsoft .Net Framework version 2.0.

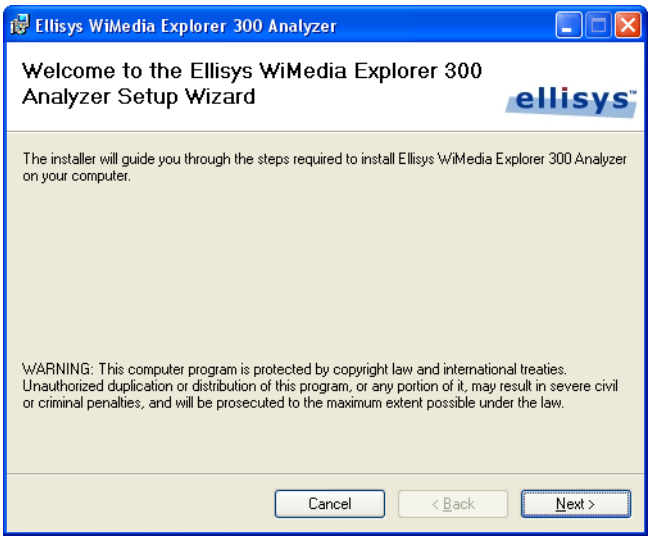
See your System Administrator for more information about updating Microsoft .Net Framework and Windows.

2.2 Installing Software

To install the WiMedia Explorer 300's software:

1. Insert the Ellisys WiMedia Explorer 300 installation CD-ROM that accompanies the product into the computer's CD-ROM drive.

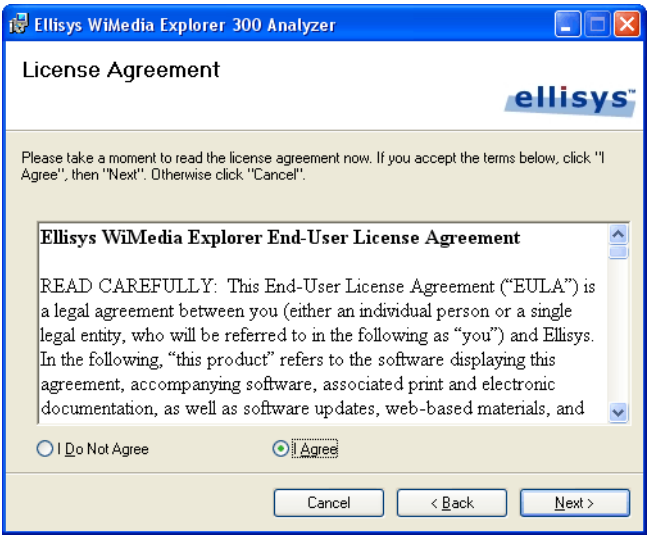
The WiMedia Explorer 300 *Setup Wizard* screen appears:



If the WiMedia Explorer 300 *Setup Wizard* screen does not appear automatically; Click Start | Run, type `d:\setup.exe` (change `d:` to match the drive letter of your CD-ROM) and click on OK.

2. Read the *Warning* note and click on **Next**.

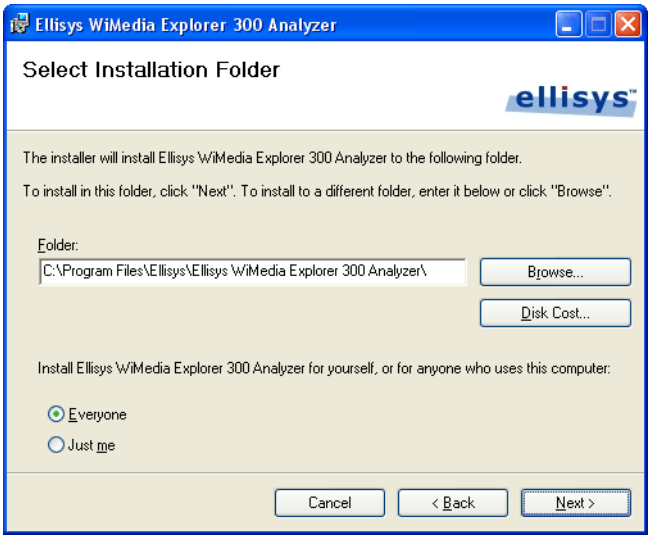
The WiMedia Explorer 300 *Licence Agreement* screen appears:



3. Read the licence agreement carefully and select **I Agree**.

4. Click on **Next**.

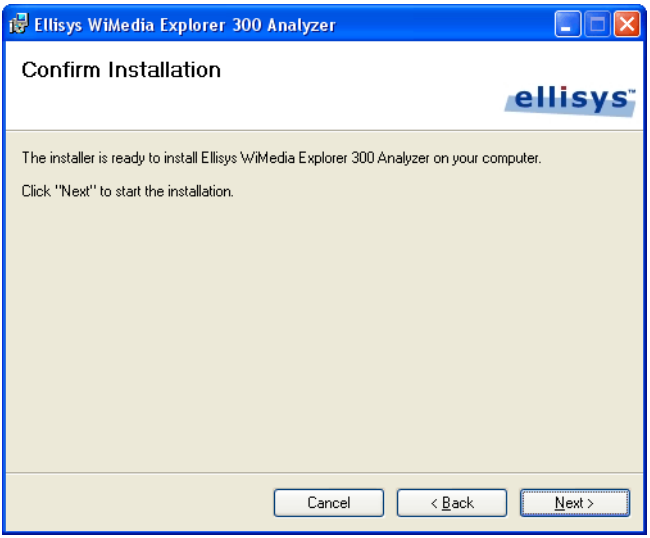
The *Select Installation Folder* screen appears:



5. The default installation folder appears in the *Folder* field. Ellisys recommend that you use the default folder, however if you wish to change this folder click on **Browse** and navigate to the folder required.
6. Select whether anyone or only the user currently logged can access the software by selecting either **Everyone** or **Just me**.

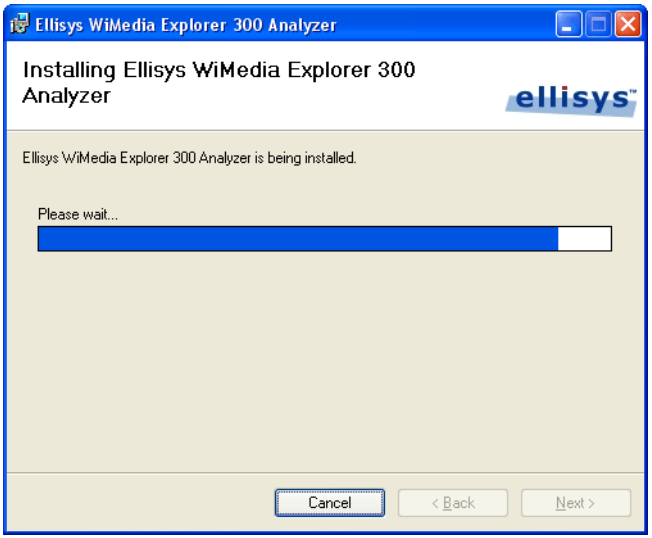
7. Click on **Next**.

The *Confirm Installation* screen appears:

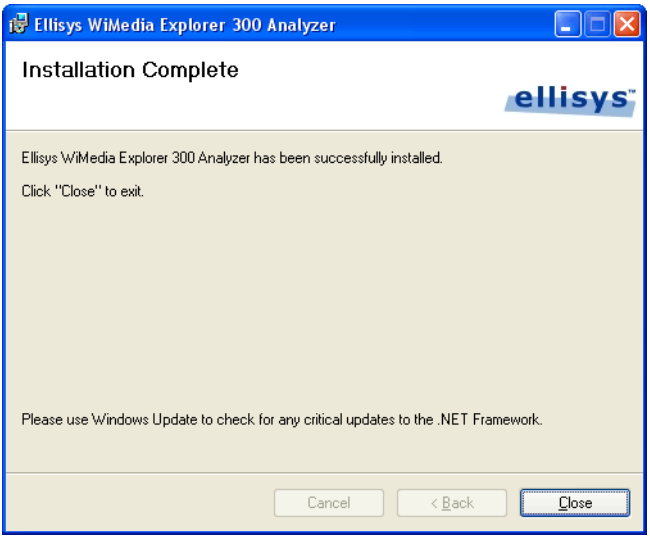


8. Click on **Next** to continue the software's installation.

An *Installation Progress* screen appears.



When the software has been installed, the *Installation Complete* screen appears:



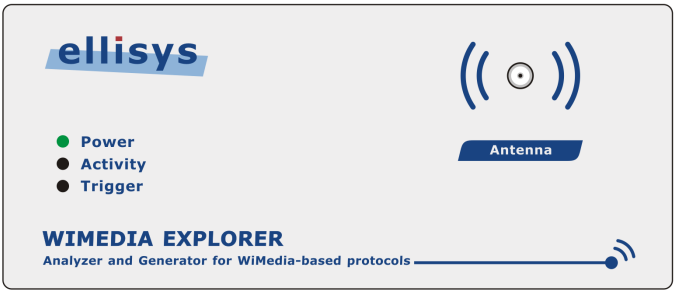
9. Click on **Close**.

The WiMedia Explorer 300 software is now installed.

After installing WiMedia Explorer 300 software a new Hardware Wizard may appear. Refer to *2.6, Connecting to the Computer,* on page 20 for more information about installing the USB driver.

2.3 Front Panel Overview

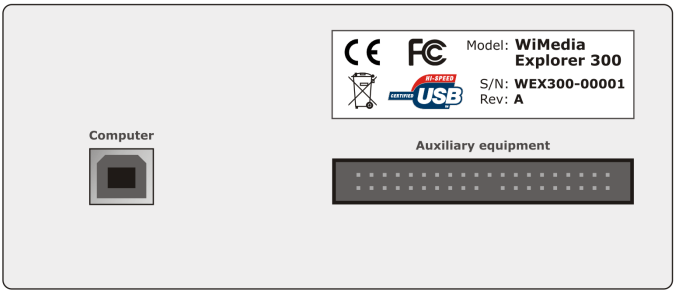
Ellisys WiMedia Explorer 300's front panel:



Power	The *Power* LED is illuminated constant green when connected to a USB 2.0 host controller and working normally.
Power	The *Power* LED is illuminated constant red when connected via a USB 1.1 host controller and working normally. Performance may not be optimal.
Power	The *Power* LED blinks green when connected to a USB 2.0 host controller and the driver is not yet fully installed.
Power	The *Power* LED blinks red when connected to a USB 1.1 host controller and the driver is not yet fully installed.
Activity	The *Activity* LED blinks green when traffic is detected. The blink rate depends on the amount traffic detected, the faster the blink rate the greater amount of traffic detected.
Activity	The *Activity* LED blinks red when traffic is recorded or generated.
Trigger	The *Trigger* LED blinks green when waiting for an event to occur.
Trigger	The *Trigger* LED is illuminated red for a short period when the expected event occurs.

2.4 Back Panel Overview

Ellisys WiMedia Explorer 300's back panel:



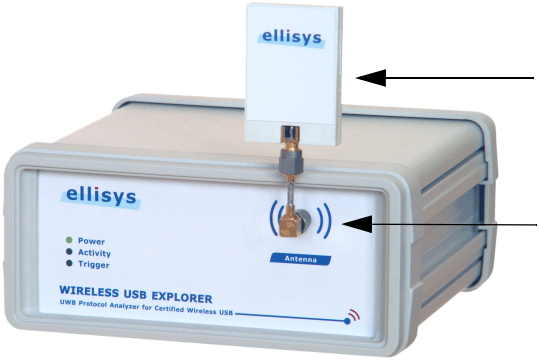
A USB cable must be connected between the *Computer* connector and the computer on which the software runs.

When connecting the USB cable DO NOT force the connector into the WiMedia Explorer 300. The metal part of the connector should not be inserted completely into the connection port. Forcing the connector or inserting all of the metal part of the connector may break the port connection and is not covered by the warranty.

2.5 Mounting the External Antenna

The Ultrawideband antenna connects to the Antenna SMA connector on the front panel. The antenna should be screwed on the front panel connector, tightened by hand, and oriented upright for best performance.

Before mounting the external antenna ensure that the WiMedia Explorer 300 is powered off by disconnecting the USB cable.



Do not use a wrench or other tools, and avoid damage by not over-tightening the connector, however ensure that the antenna is firmly secured.

It is possible to connect a device to the WiMedia Explorer 300 using the Wired Kit which is available as an option. Please refer to the documents that accompanies the Wired Kit for more information on how to connect a device using the Wired Kit.

2.6 Connecting to the Computer

The WiMedia Explorer 300 connects on a USB port, allowing the use of any notebook or desktop computer. The unit is powered by USB and does not require an external adapter. A driver needs to be installed on the computer to ensure proper operation.

Although the WiMedia Explorer 300 can upload or download data on a full speed USB 1.1 connection, Ellisys strongly recommends that you connect it to a high speed USB 2.0 port to obtain optimal performance. If you experience problems with the WiMedia Explorer 300, please ensure it is connected on a high speed USB 2.0 enabled host controller before contacting technical support.

Follow the steps below to install the USB driver:

1. Connect the WiMedia Explorer 300.
   If you are connecting the WiMedia Explorer 300 for the first time wait until Windows displays a message saying a new device has been discovered and go to *Step 3*.
2. If you want to update a previously installed device driver:

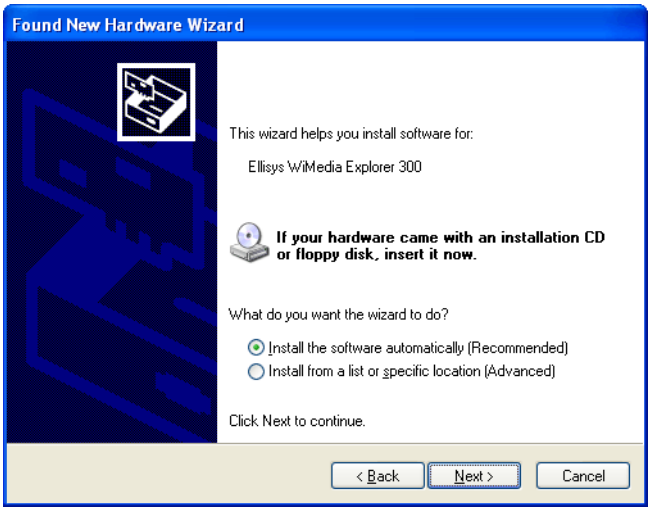
- Open the Device Manager window: **Start | Control Panel**.
- Double-click the **System** icon.
- Click the **Hardware** tab.
- Click on **Device Manager**.
- Click on **Ellisys protocol analyzers**.
- Right-click and select **Update Driver**.

The *Hardware Update Wizard* window opens:

3. Select **No, not this time**.

4. Click on **Next**.

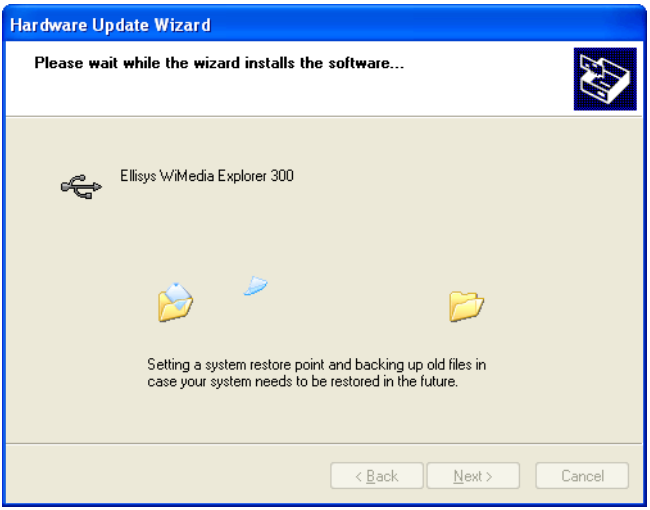
The *Found New Hardware* window appears:



5. Select **Install the software automatically (Recommended)**.

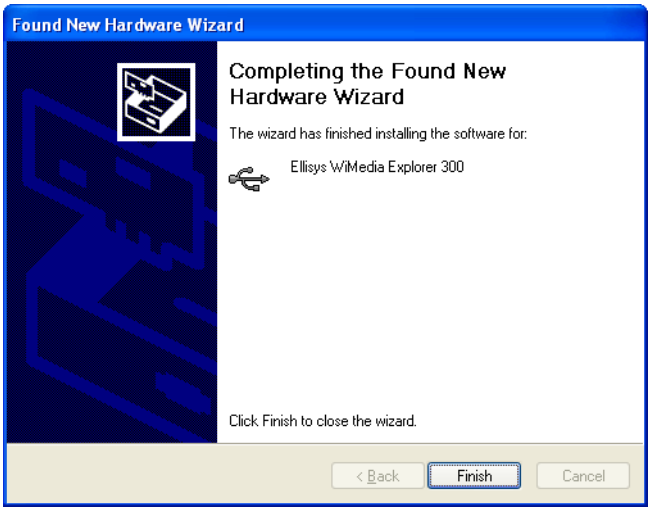
6. Click on **Next**.

The *Please wait while the wizard installs the software* window appears:



Windows installs the driver.

When the installation is complete *The wizard has finished installing the software* window appears:



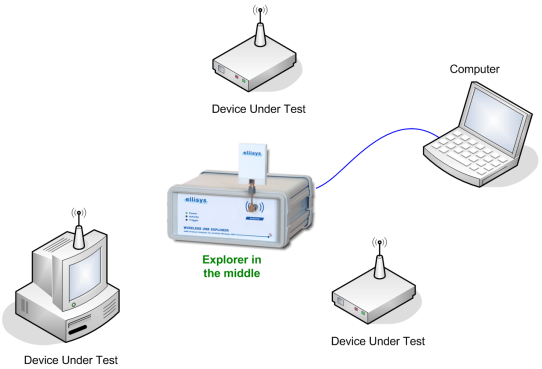
7. Click on **Finish**.

The installation is complete.

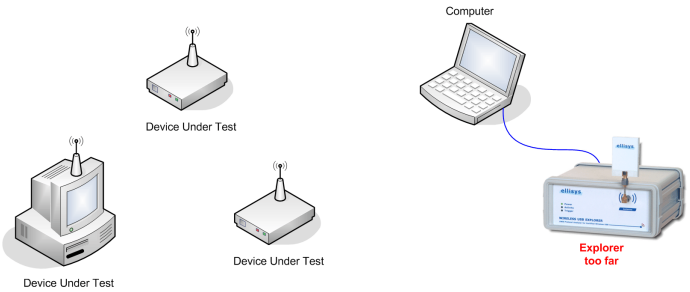
2.7 Placing the WiMedia Explorer 300

The WiMedia Explorer 300 probes and generates Ultrawideband waves. The Ultrawideband circuitry used by the WiMedia Explorer 300 is optimized to have excellent receiver characteristics.

Ellisys strongly recommends using the configuration shown below for optimal performance. Placing the WiMedia Explorer 300 at mid distance between the transmitting units provides the lowest error rate and the best performance:



If the WiMedia Explorer 300 is not placed at an equal distance from the transmitting units, this may result in causing transmission issues that are not related to the Devices Under Test:



3 First Data Capture

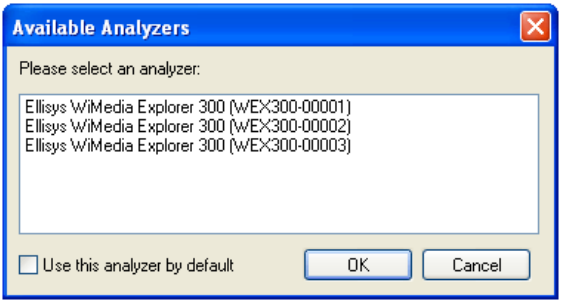
Performing the first data capture with the Ellisys WiMedia Explorer 300 Analyzer is very straightforward. Once you have installed the hardware and software follow instructions in this chapter to analyze a device that uses the WiMedia protocol. Ensure your device sends data wirelessly on WiMedia ultrawideband before trying to record its traffic.

3.1 Selecting an Analyzer

To select an analyzer:

1. Select **Record | Select an analyzer** in the menu.

The *Available analyzers* window appears:



2. Select the required analyzer.
3. Click on **OK**.

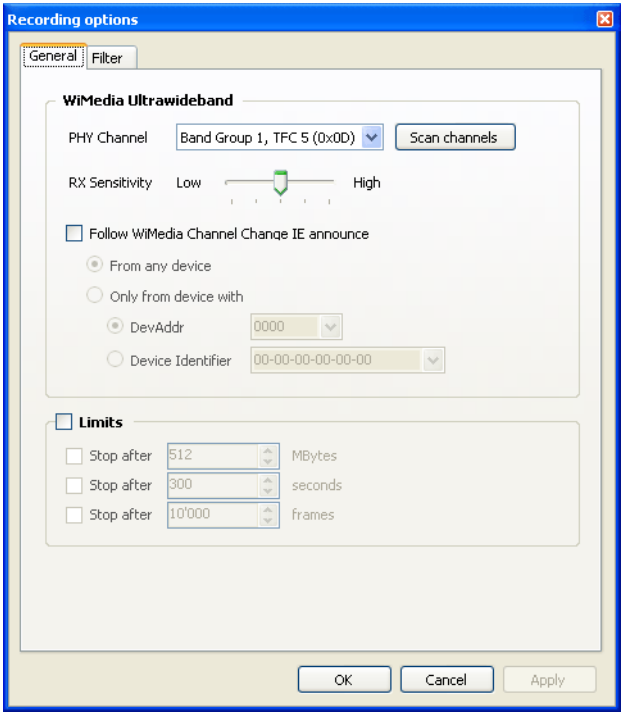
It is advisable to select an Analyzer and then select that analyzer as the default analyzer by selecting the *Use this analyzer by default* check box. This will stop the *Available analyzers* window appearing every time you try to record a device.

3.2 Setting Recording Options

To set recording options:

1. Select **Record | Recording options** in the menu.

The *General Recording options* window appears:



2. Click the **PHY Channel** arrow and select the required PHY Channel.

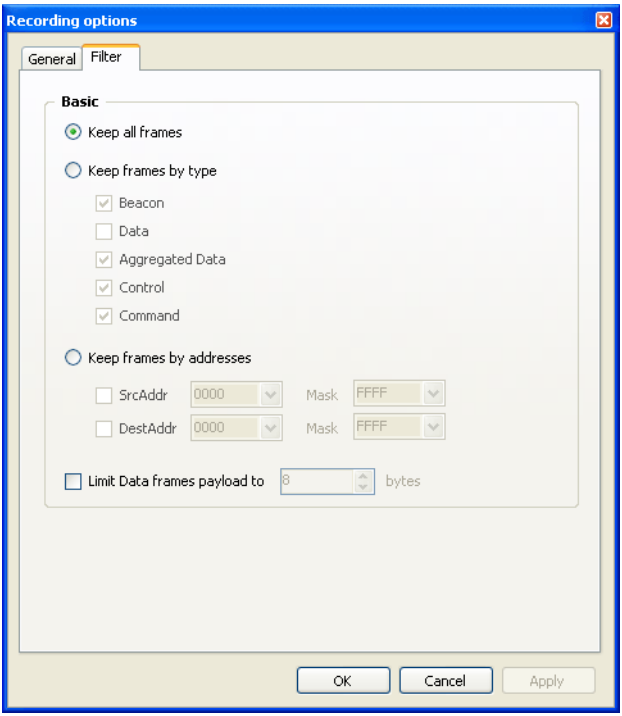
If you are not sure which channel your devices use, you can scan the channels using the *WiMedia Channel Scanner*. See *17.1 Scanning Channels* on page 155 for more information.

Some Ultrawideband PHY components only support a subset of the channels defined by the WiMedia specification. Please ask the vendor of the PHY component you are using for more information.

3. Select the **Follow WiMedia Channel Change IE announce** check box to instruct the analyzer to automatically change channel in response to Channel Change IE announces. It is possible to select this option for all devices or for a subset of devices by selecting the **From any device** radio button or the **Only from the device with** radio button and then selecting the required *Device Address* or *Device Identifier*.
4. Select the **Limits** check box to automatically stop recording after a given number of MBytes, after a given time or after a given number of frames by selecting the relevant check box and selecting the required limit.

5. Click the **Filter** tab button to display filtering options.

The *Filter options* window appears:



6. Select **Keep all frames** to disable all filtering. This will ensure that you see all captured frames.
7. Select **Keep frames by type** and select one or more type to keep only these types of frame.
8. Select **Keep frames by addresses** and select a **SrcAddr** and a **DestAddr** to keep only frames with the specified addresses.
9. Select **Limit Data frames payload to** *N* **bytes** to cut all data frames after *N* bytes of payload.

10. Click on **OK**.

The selected recording options are saved.

When traffic is recorded for a long time the resulting file size can be very large. The **Limit Data frames payload** option can be used to keep the first bytes of the data frames and discard the remaining bytes. This will produce a smaller file and ensure application-specific headers are available although most of the data bytes are discarded.

3.3 Recording Wireless Traffic

To record wireless traffic:

1. Click on **Record** .

The wireless traffic is recorded using the current recording options and the resulting traffic data is displayed in the WiMedia Explorer 300 Analyzer in real-time. If you do not see any traffic ensure that your device is sending wireless data.

3.4 Stopping or Restarting Recording

To stop a recording:

1. Click on **Stop** .

The recording is stopped.

It is possible to stop the recording at anytime during the recording process and discard the recorded traffic.

It is also possible at anytime to discard any traffic recorded so far and restart recording.

To restart a recording:

1. Click the **Restart** to start a new recording session.

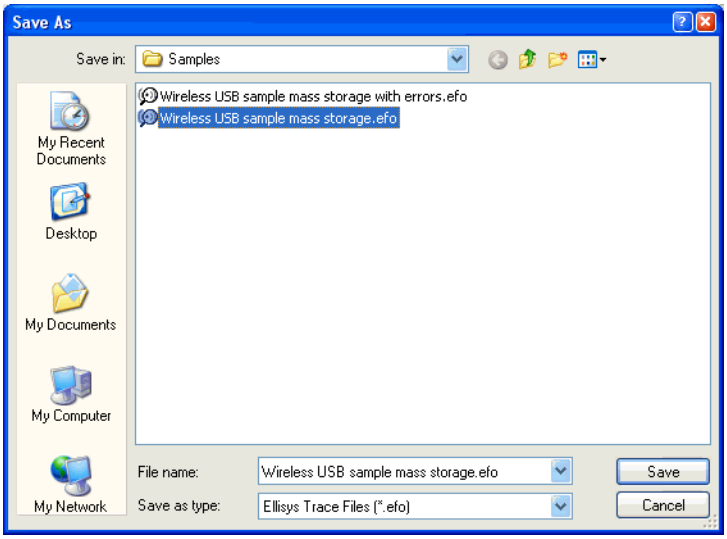
The software discards any previously recorded traffic and restarts the recording process from the beginning.

3.5 Saving a File

To save a file:

1. Select **File | Save** in the menu or click on **Save** .

The *Save As* window appears:



2. Navigate to where the file is to be saved.
3. Type the required name of the file in the *File name* field and click on **Save**.

The file is saved as a `.efo` file.

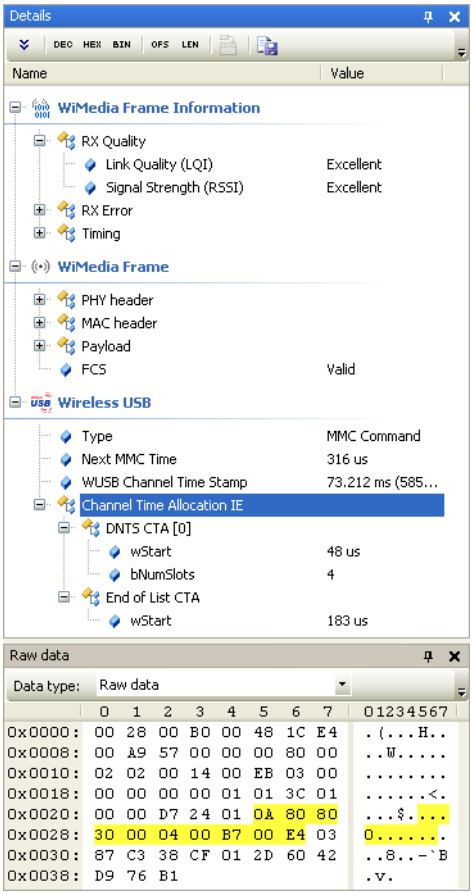
3.6 Viewing WiMedia Frame Information

Traffic received is listed sequentially in time in the overview panes. When you select an item in an overview pane the related data appears in the other panes, for example the *Details* and *Instant Timing* pane.

To view WiMedia Frame information:

1. Select an item in the *WiMedia Overview* pane.

The selected item's information is displayed in the *Details* pane and can be further browsed for example, by using the *Raw Data* pane:



The *Details* pane displays information on the selected item, which is decoded into several protocol layers. The *WiMedia Frame* area contains all fields that are related to WiMedia Frame such as the PHY Header, and the MAC Header. The Frame Payload contains the payload of the frame and is decoded if the software knows the protocol utilized.

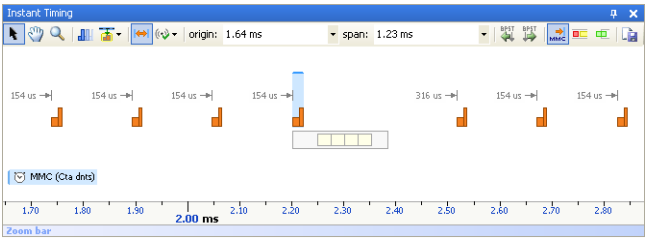
The *Wireless USB* area, if present, shows a decoded display of the payload specific to the Wireless USB protocol. The *MMC* contains *Information Elements (IEs)*. The *Channel Time Allocation IE* is an important element of the Wireless USB protocol because it schedules the data transmissions.

Depending on the type of frame selected the *Details* pane will display different information. Select a number frames to understand what information is display for each type of frame.

3.7 Exploring Traffic Using Instant Timing

The *Instant Timing* pane can be used to view an overview of the traffic and to measure timings precisely.

The zoom bar, located at the bottom of the view, can be dragged to the left to zoom out, or dragged to the right to zoom in. Similarly, you can scroll through the view by dragging the scale bar.

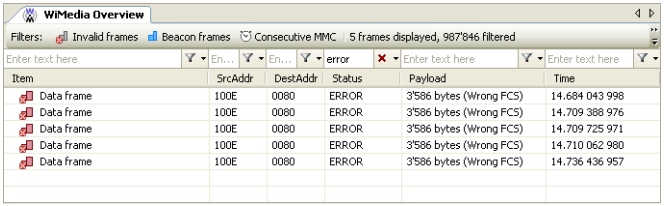


Click on a frame to highlight it in the *WiMedia Overview* pane. Double-click on a frame to highlight and select it in the *WiMedia Overview* pane and update all other panes, including the *Details* pane.

3.8 Filter Out Unwanted Information

Smart filter controls located in the overview panes toolbar can be used to de-clutter the screen by removing information that is not relevant to the current task. For example, click on **Consecutive MMC** Consecutive MMC to filter out unnecessary MMCs from the pane.

Instant Filters can also be applied on any column by using the filter field at the top of that column.



To filter data by column:

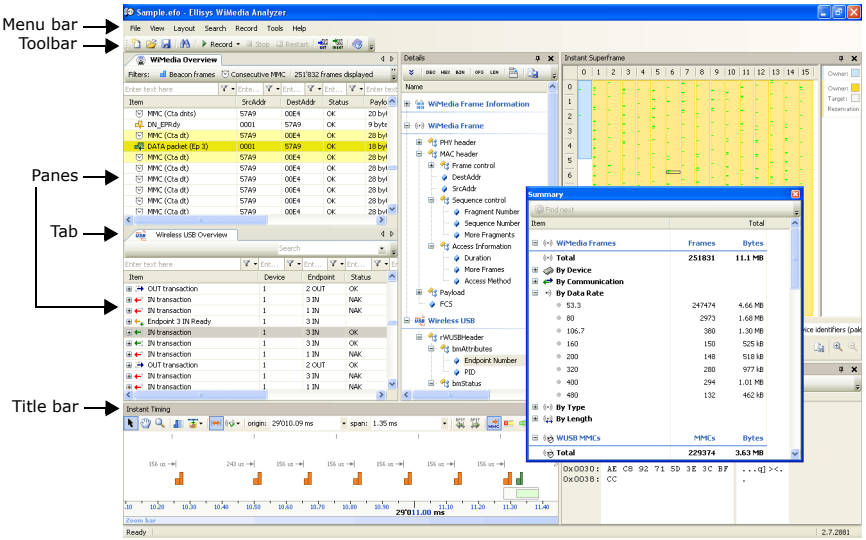
1. Type what you want filtered in the relevant filter field. For example, type `error` in the *Status* column to keep only error packets.
2. Press ENTER.

The display updates to show only chosen packets.

A filter can be removed by clearing its contents or by clicking on the red cross ✖ beside the filter field.

4 User Interface Reference

The user interface of the Ellisys WiMedia Explorer 300 Analyzer software contains a number of panes, menus, toolbars and other visual elements.



The WiMedia Explorer 300 Analyzer has several default panes. Each pane displays specific information or allows you to interact with the software for a given task:

- ***WiMedia Overview*** - Shows WiMedia frames.
- ***Wireless USB Overview*** - Shows Wireless USB packets, transactions and transfers.
- ***Details* pane** - Shows a decoded display of the raw data. The following values can be displayed for each field:
  - Numeric values in decimal
  - Numeric values in hexadecimal
  - Numeric values in binary
  - Fields' bit offset
  - Fields' bit count

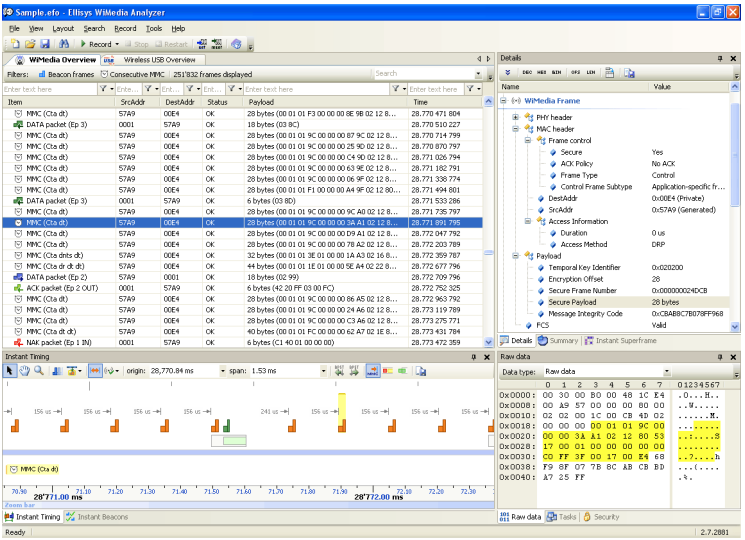
- ***Raw Data*** - Shows the bytes of an element.
- ***Instant Timing*** - Shows a graphical representation of the traffic.
- ***Instant Beacons*** - Shows devices recognition status by other devices.
- ***Instant Superframe*** - Shows devices traffic and reservations.
- ***Summary*** - Shows a summary of analyzed traffic data.
- ***Security*** - Shows current security keys and allows modifying them.

4.1 Selecting and Creating Layouts

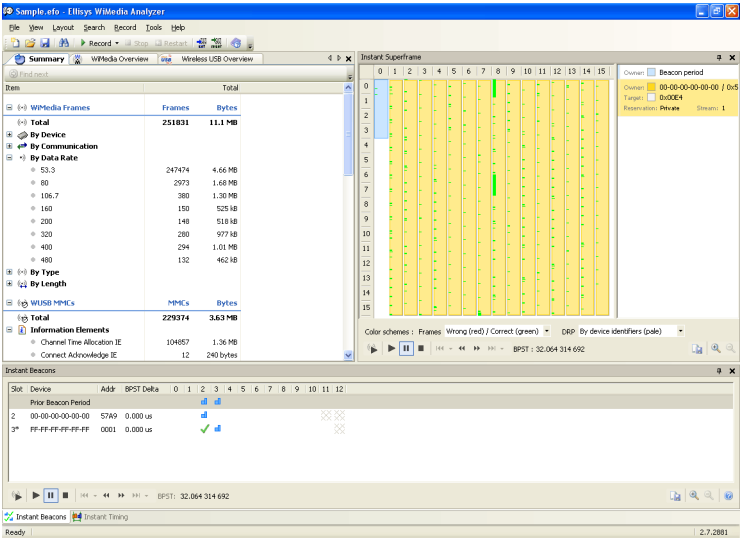
Panes can be moved around the screen or resized to suit different working and viewing requirements. A pane's configuration is called a layout.

The Ellisys WiMedia Explorer 300 Analyzer software implements three default layouts:

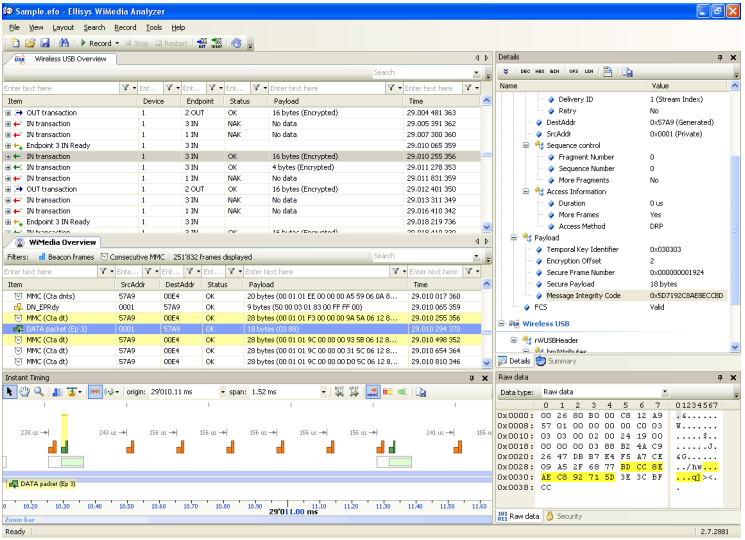
- **WiMedia Standard** is best suited for post-analysis, search operations and detailed analysis:



- **WiMedia Live** is best suited for live usage, for example to check real-time devices recognition, throughput or error rate:



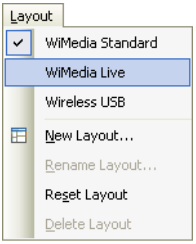
- **Wireless USB** is best suited for post-analysis of Wireless USB devices:



You can customize standard layouts and also create new layouts to meet specific requirements.

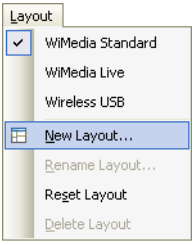
To select an existing layout:

1. Select **Layout** in the menu and click on the required layout:

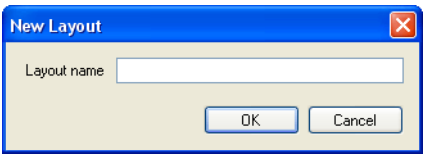


To create a new layout:

1. Modify the layout to fit your needs.
2. Select **Layout** in the menu and click on **New Layout**:



3. A dialog box appears:

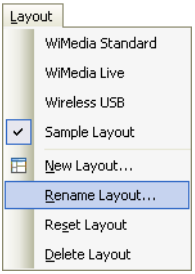


4. Enter a name for the new layout and click on **OK**.

A new layout is created.

To rename a layout:

1. If it is not already selected, select **Layout** in the menu and click on the layout you want to rename.
2. Select **Layout** in the menu and click on **Rename Layout**:

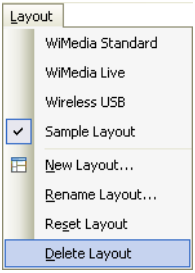


3. Enter a name in the dialog box that appears and click on **OK**.

The layout is renamed.

To delete an existing layout:

1. If it is not already selected, select **Layout** in the menu and click on the layout you want to delete.
2. Select **Layout** in the menu and click on **Delete Layout**:



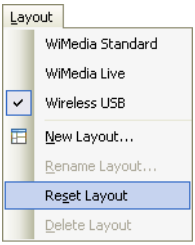
The layout is deleted and another layout is selected.

Standard layouts cannot be deleted.

If you modify a layout and you want to discard the modifications you can restore the layout to its original state.

To reset a layout:

1. If it is not already selected, select **Layout** in the menu and click on the layout you want to reset.
2. Select **Layout** in the menu and click on **Reset Layout**:



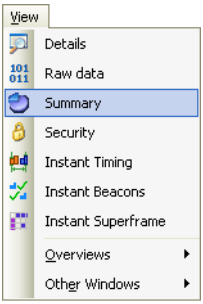
The layout is restored to its original state.

4.2 Organizing Panes

You can customize a layout by opening or closing panes, placing them and sizing them to suit your requirements.

To open or display a pane:

1. Select **View** in the menu and click on the pane required in the **View** menu.



The selected pane opens.

To close a pane:

1. Click on **Close** positioned on the top right-hand corner of the title bar of the pane.

The pane closes.

To hide a pane:

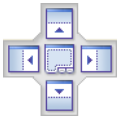
1. Click on **Auto Hide** positioned on the top right-hand corner of the title bar.

The pane is hidden and the pane's name appears as a tab at the side of the screen.

To move a pane or window:

1. Click on the title bar of a pane or window.
2. Press and hold the left mouse button and drag the pane or window.

A window placer appears:



3. Keep the mouse button pressed and point to one of the following:

- **Center** to open a pane as a floating window in the screen.
- **Top** to move the pane to the top of the screen or pane group.
- **Right** to move the pane to the right of the screen or pane group.
- **Left** to move the pane to the left of the screen or pane group.
- **Bottom** to move the pane to the bottom of the screen or pane group.

4.3 Main Toolbar

The table below shows the WiMedia Explorer 300 Analyzer toolbar buttons and their actions.

New Document (CTRL + N)	Creates a new file.
Open Document (CTRL + O)	Opens a previously saved file.
Save Document (CTRL + S)	Saves a file.
Search	Opens an advanced search window.
Start Record	Starts recording traffic from the analyzer hardware.

	**Stop**	Stops recording traffic.
	**Restart**	Discards any data recorded so far and restarts the recording.
	**Set Time Reference**	Sets a time reference to a selected item. All timing information is updated to use this item as the zero reference.
	**Reset Time Reference**	Resets the time reference to its original value.

4.4 Main Menu

The table below shows the WiMedia Explorer 300 Analyzer main menu options and their actions.

File

	**New** (CTRL + N)	Creates a new file.
	**Open** (CTRL + O)	Opens a previously saved file.
	**Save as** (CTRL + S)	Saves a file.
	Load sample	Opens a sample file.
	Export (CTRL + E)	Opens the *Ellisys Export Wizard* that allows exporting traffic to various file formats.
	Switch Workspace	Allows you to create a workspace or switch to a different one.

	Import and Export Settings	Allows you to import settings, export them or restore them to their default values.
	Page Setup	Opens the Page Setup dialog box that lets you set the page margins and other parameters.
	Print Preview	Opens a submenu that lets you choose the pane to show in the print preview.
	Print	Opens a submenu that lets you choose the pane to print.
	Exit	Exits the software.

View

	**Details**	Opens the *Details* pane.
	**Raw Data**	Opens the *Raw Data* pane.
	**Summary**	Opens the *Summary* pane.
	**Security**	Opens the *Security* pane.
	**Instant Timing**	Opens the *Instant Timing* pane.
	**Instant Beacons**	Opens the *Instant Beacons* pane.
	**Instant Superframe**	Opens the *Instant Superframe* pane.

View | Overviews

	**WiMedia Overview**	Opens the *WiMedia* overview pane.
	**Wireless USB Overview**	Opens the *Wireless USB* overview.

View | Other Windows

	**Tasks**	Opens the *Tasks* window.
	**Recording Activity**	Opens the *Recording Activity* window.

Layout

	WiMedia Standard	Updates the layout to WiMedia Standard.
	WiMedia Live	Updates the layout to WiMedia Live.
	Wireless USB	Updates the layout to Wireless USB.
	**New Layout**	Creates a new layout based on the current pane organization.
	Rename Layout	Changes the name of the current layout.
	Reset Layout	Resets the current layout to its original state.
	Delete Layout	Deletes the current layout.

Search

	Search (CTRL + F)	Opens the Search window.
	Search in WiMedia frames	Opens the WiMedia Frames Search window.
	Search in Wireless USB	Opens the Wireless USB Search window.
	**Instant Search** (CTRL + I)	Activates the *Instant Search* field in the *WiMedia* overview or *Wireless USB* overview pane.
	Go To (CTRL + G)	Opens a dialog that allows you to go to a specified frame number or frame time, or to go to the highlighted frame.
	Go To Next	Opens a list to find the next; PHY, MAC, Error, Packets and MMC points.
	Find Next (F3)	Finds the next, previously searched item.

Record

	**Start Recording** (CTRL + R)	Starts recording traffic from the analyzer hardware.
	**Stop Recording** (CTRL + SHIFT+R)	Stops recording traffic.
	**Restart Recording**	Discards any data recorded so far and restarts the recording.
	Select an analyzer	Opens the Available analyzers window.
	**Recording Options**	Opens the Recording options window.

Tools

	**Set time reference** (CTRL + T)	Sets a time reference to a selected item. All timing information is updated to use this item as the zero reference.
	**Reset time reference** (CTRL + SHIFT + T)	Resets the time reference to its original value.
	**WiMedia Traces Merger**	Opens the *WiMedia Traces Merger* window.
	**WiMedia Protocol Examiner**	Opens the *WiMedia Protocol Examiner* window.
	**WiMedia Channels Scanner**	Opens the *WiMedia Channels Scanner* window.
	Options	Opens the *Options* window.

Help

	User Guide	Opens the online user guide.
	Features Tour Video	Opens the features tour video.
	Ellisys website	Opens the Ellisys website in your default internet browser.
	Contact support	Opens a form to contact the technical support.
	**About**	Opens the About window.

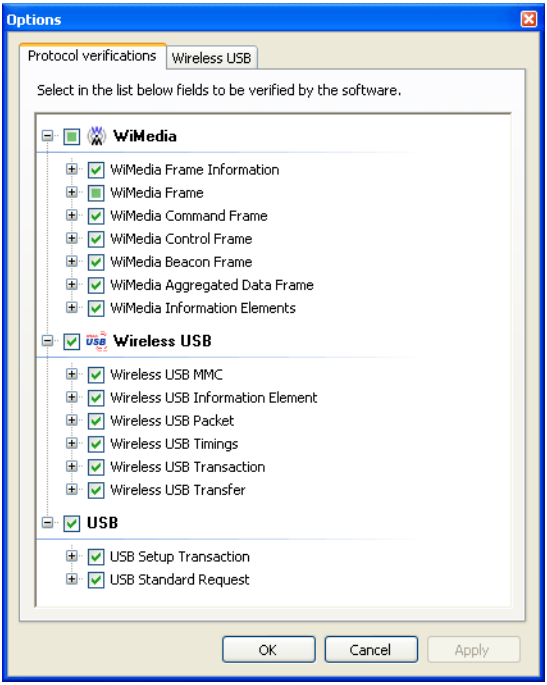
4.5 Using the Options Pane

The *Options* pane allows you to select the protocol verifications and Wireless USB options for the WiMedia Explorer 300 Analyzer to check.

To change protocol verifications or Wireless USB options:

1. Select **Tools | Options** in the menu.

The *Options* pane opens:

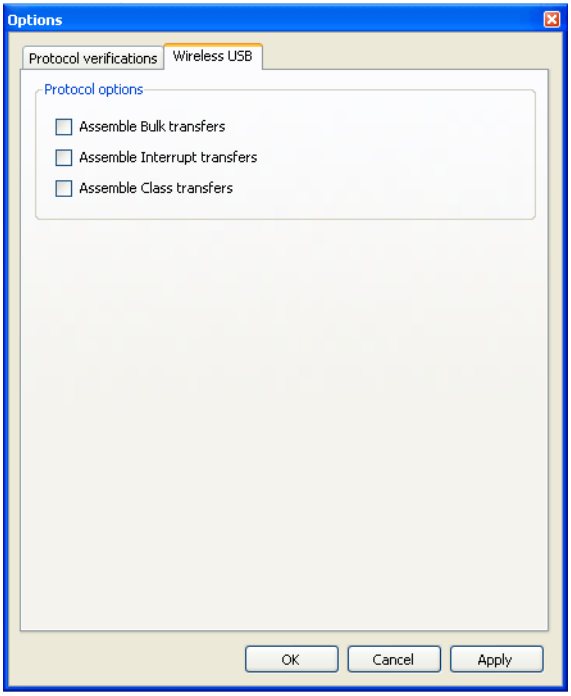


The *Options* pane shows a list of available options for selection.

2. Click on **Plus** beside any of the options to expand the options list.
3. Select the check box beside the option required.

4. Click on the **Wireless USB** tab.

The *Wireless USB options* appears:

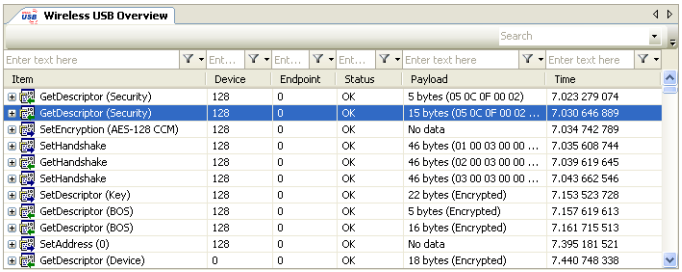


5. Select the check box beside the option required.
6. Click on **Apply**.

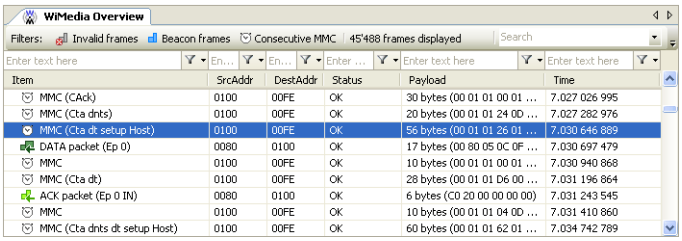
Your selection is applied.

5 Traffic Overview Panes

Each of the traffic overview panes show information related to a specific protocol layer. The *WiMedia Overview* pane shows a list of all recorded WiMedia frames:

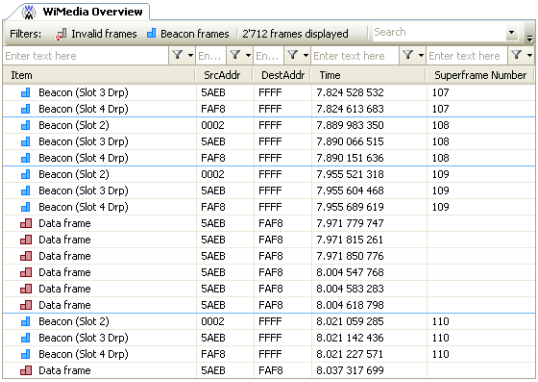


The *Wireless USB Overview* pane shows only Wireless USB transactions:



Each pane is divided in several columns, allowing you to easily arrange fields that are of interest, filter information as required and search for specific elements.

The *WiMedia overview* pane displays a horizontal light blue line at each Beacon Period boundary. Superframe Numbers can be dragged to a new column from the *Details* pane. As a result all superframes are clearly identified:



5.1 Traffic Overview Pane Symbols and Icons

When a device is being recorded or when a file is opened the analyzed elements displayed in the *WiMedia Overview* pane show an icon beside each element. The icon helps to identify an element at a glance.

The Generic symbols listed below can appear in any overview pane along with an icon to provide additional information for specific cases:

Error	Indicates an element that does not comply with the specifications.
Warning	Indicates an element that should be manually checked for compliance with the specifications.
Information	Indicates an element that should be reviewed.

If an error, warning or information symbol appears beside an item, move the pointer over the symbol to read the error message.

The *WiMedia Overview* pane icons are described below:

	**Beacon Frame**	Indicates a frame used for devices synchronization and information management.
	**Data Frame**	Indicates a frame that contains data that may be part of a higher-level protocol.
	**Control Frame**	Indicates an undecoded control frame.
	**Imm ACK Control Frame**	Indicates that a frame previously sent was properly received.
	**B-ACK Control Frame**	Indicates that a burst of frames previously sent was properly received.
	**DRP Request Command Frame**	Indicates a frame that contains a request for a DRP reservation.
	**DRP Response Command Frame**	Indicates a frame that contains a response for a DRP reservation.
	**RTS Control Frame**	Indicates a frame that contains Request To Send data.
	**CTS Control Frame**	Indicates a frame that contains Clear To Send data.
	**UDA Control Frame**	Indicates a frame that contains an announcement of an unused DRP.
	**UDR Control Frame**	Indicates a frame that contains a response to an unused DRP.

	**GTK Control Frame**	Indicates a frame that contains a Group Temporal Key.
	**WiMedia Frame**	Indicates an unrecognized frame, which was most probably not properly transmitted.
	**WUSB MMC Packet**	Indicates a Micro-scheduled Management Command sent by a Wireless USB host.
	**WUSB Notification Packet**	Indicates a notification packet sent by a Wireless USB device.
	**WUSB Data IN Frame**	Indicates a Wireless USB frame sent from a device to a host.
	**WUSB Data OUT Frame**	Indicates a Wireless USB frame sent from a host to a device.
	**WUSB ACK IN Frame**	Indicates that a packet previously sent by a device was properly received by the host.
	**WUSB ACK OUT Frame**	Indicates that a packet previously sent by the host was properly received by a device.
	**WUSB NAK IN**	Indicates a Wireless USB NAK packet sent by a device to the host.
	**WUSB NAK OUT**	Indicates a Wireless USB NAK packet sent by the host to a device.

The *Wireless USB Overview* pane icons are described below:

	**Setup Packet**	Indicates a SETUP packet sent by the host to a device.
	**Data In Packet**	Indicates a DATA packet sent by a device to the host.

	**Data Out Packet**	Indicates a DATA packet sent by the host to a device.
	**ACK Packet IN**	Indicates a ACK packet sent by a device.
	**ACK Packet OUT**	Indicates a ACK packet sent by the host.
	**NAK Packet IN**	Indicates a NAK packet sent by a device.
	**NAK Packet OUT**	Indicates a NAK packet sent by the host.
	**Endpoint In Ready**	Indicates a notification of a device endpoint that is now ready to send data.
	**Endpoint OUT Ready**	Indicates a notification of a device endpoint that is now ready to receive data.
	**Invalid Packet**	Indicates an unrecognized packet, which was most probably not properly transmitted.
	**Transaction IN**	Indicates a successful transaction with data sent from a device to the host.
	**Transaction OUT**	Indicates a successful transaction with data sent from the host to a device.
	**Transaction IN NAK**	Indicates a delayed transaction with data sent from a device to the host.
	**Transaction OUT NAK**	Indicates a delayed transaction with data sent from the host to a device.
	**Malformed Element**	Indicates an element that contains an invalid sequence of subelements.

	**Control Transfer IN**	Indicates a successful control transfer with high-level data sent from a device to the host.
	**Control Transfer OUT**	Indicates a successful control transfer with high-level data sent from the host to a device.
	**Control Transfer STALL**	Indicates a failed control transfer.
	**Mass Storage Transfer IN**	Indicates a successful transfer of Mass Storage data sent from a device to the host.
	**Mass Storage Transfer OUT**	Indicates a successful transfer of Mass Storage data sent from the host to a device.

5.2 Status Column

The Status column gives an indication of the result of a transaction or transfer. If it indicates any kind of failure it is advised to check inner packets or frames.

The following status can occur with USB transactions:

UNKNOWN	Token packet is missing.
INCOMPLETE	Data or handshake packet is missing.
SMASHED	Some packets were properly received and acknowledged but some were not.
FAILED	No packets were properly received and acknowledged.
OK	All packets were properly received and acknowledged.
NAK	Handshake code of the handshake packet is NAK.
STALL	Handshake code of the handshake packet is STALL.

The following status can occur with USB transfers:

INCOMPLETE	Last transaction does not have a valid handshake packet.
SMASHED	Some data packets were not received or acknowledged, or last packet flag is missing.
OK	Handshake code of the last transaction is ACK and all data packets were properly received and acknowledged.
STALL	Handshake code of the last transaction is STALL.

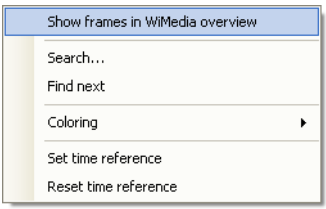
5.3 Synchronizing WiMedia and Wireless USB Items

WiMedia frames related to Wireless USB items can be highlighted in the *WiMedia Overview* pane.

To synchronize WiMedia frames and Wireless USB data:

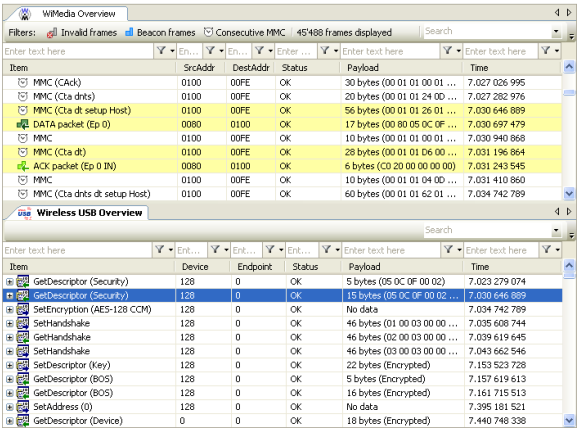
1. Select an item in the *Wireless USB Overview* pane.
2. Right click.

A menu appears:



3. Click **Show frames in WiMedia overview**.

The select item in the *Wireless USB Overview* pane is synchronized with *WiMedia Overview* pane:



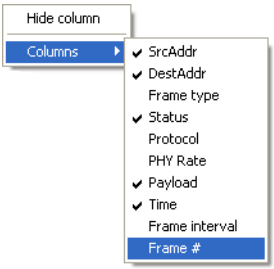
5.4 Adding, Removing and Arranging Columns

It is possible to add and remove columns in the overview panes. The software defines several standard columns that can be shown or hidden with a menu and supports customs columns that can be defined as needed.

To add a standard column:

1. Right click on the column title of an overview pane.

A menu appears:



Column names that appear with a tick beside their name are already added to the pane, while column names without the tick are standards columns available to be added to the pane.

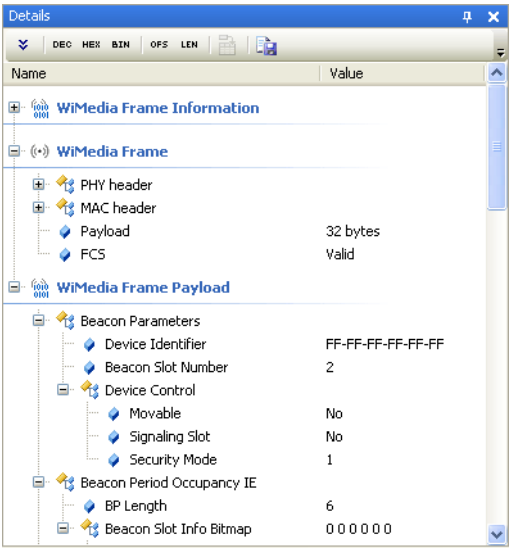
2. Click on a column without a tick to add it.

The column is added to the overview pane.

To add a custom column:

1. Open the *Details* pane.

Fields are listed in the *Details* pane.



For more information about using the *Details* pane, see *Details Pane* on page 67.

2. Select the field that you want to add as a column in the overview.
3. Click on **Display this field in the overview** to add this field to a new column

or

4. Press and hold the left mouse button and drag the field to the overview pane where you want the new column to appear.
5. Release the mouse button.

The field is added to a new column in the overview pane.

To remove columns:

1. Right click on the column title of an overview pane.

A menu appears:

2. Click on **Hide column** to remove that column from the pane.

The column is removed from the overview pane.

Columns can be moved using your mouse. Click on a column header and drag it left or right next to another column.

Columns can be resized by dragging the vertical line that appears between the columns headers.

5.5 Instant Filters

The Instant Filters facility allows you to instantly filter data in the overview panes. The *Instant Filters* fields are situated under the column name.

To filter data using the Instant Filters facility:

1. Select an Instant Filter from one of the available columns in the overview pane.

2. Type the required filter in the *Filter* field.

Wildcards can be used to perform advanced filtering operations. Use an interrogation point `?` to match any character or an asterix `*` to match any suites of characters. An asterix is always implied at the end of any search string.

Examples:

`0?FE` will match all addresses that start with 0 and end with FE
`*data` will match any line that contains the word data
`E*r` will match any line that starts with `E` and contains a `r`.
`*dnts` will match any line that contains `dnts`.

Filters also accept advanced criteria. For example you can type `0..0.1` in the *Time* column to keep only frames that occurred between 0 and 100 milliseconds.

Several criteria can be combined with a logical OR operation using a comma. For example typing `00FE,00FF` in the DestAddr column will keep devices with either address 00FE or 00FF.

A criteria can be inverted by using an exclamation point ! as the first character of the filter. In this case, all elements that would have been hidden will be shown and vice versa.

3. Click on **Filter** 

   or
   Press ENTER.

The display is updated and will only show elements that match the specified criteria and hide all others.

Filters can be used on more than one column simultaneously. They are combined with a logical AND operation, which means that only elements that match all filters will be shown.

Filter examples

If you want to hide device 03F5 and show only errors on other devices you can use the following filters:

- Enter `!03F5` in the *SrcAddr* column filter;
- Enter `err` in the *Status* column filter.

If you want to keep only devices 7FB1 and C49E, and display only valid data frames that occurred between 5.27 seconds and 8.34 seconds you can use the following filters:

- Enter `7FB1,C49E` in the *SrcAddr* column filter;
- Enter `OK` in the *Status* column filter;
- Enter `Data` in the *Item* column filter;
- Enter `5.27..8.34` in the *Time* column filter.

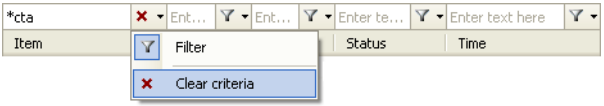
When you are finished working with a filter and want to view all the elements again, remove the filter.

To remove a filter:

1. Click on the red cross  next to the filter you would like to remove

   or

2. Click on the down arrow next to the red cross  .
3. A menu appears:



4. Click on **Clear criteria**.

The filter is removed and the display updated.

5.6 Automatic Filters

Automatic Filters buttons appear in the overview panes when the Ellisys WiMedia Explorer 300 Analyzer software recognizes that redundant protocol elements exist. When the software detects redundant data, the data type is displayed as a button at the top of the overview pane. Clicking this button hides related protocol elements.

To use an automatic filter:

1. Select the required overview pane.

2. Click on the required automatic filter button.

The display is updated to automatically filter unnecessary data. The number of elements filtered is displayed beside the buttons.

5.7 Setting and Resetting a Time Reference

It is possible to offset all timings or verify packet timing by using the Set time reference facility.

A time reference can also be used to check timing differences between frames.

To set a time reference:

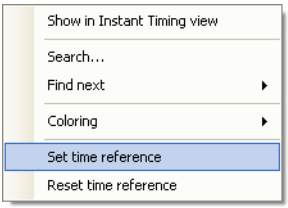
1. Select an item in one of the overview panes.

2. Click on **Set Time Reference** .

or

3. Right click an item in one of the overview panes.

A menu appears:



4. Click **Set time reference**.

The selected frame time is reset to *0.000 000 000*.

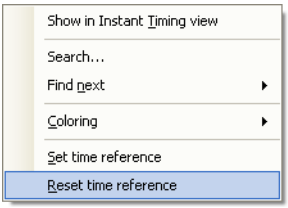
To reset the time reference:

1. Click on the item that has had its time reference set.
2. Click on **Reset Time Reference**  .

or

3. Click on the item required and right click.

A menu appears:



4. Click **Reset time reference**.

The selected time reference is reset to it's original time reference.

6 Details Pane

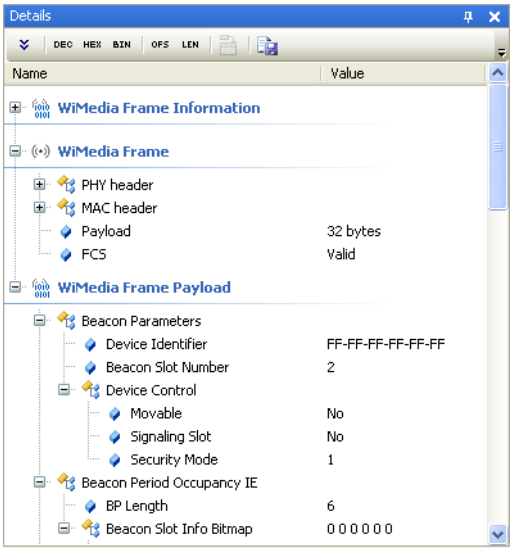
The *Details* pane shows a decoded display of a selected item in the *WiMedia Overview* or the *Wireless USB Overview* panes. It is commonly used simultaneously with the overview panes. Clicking on any item in the overview pane will update the *Details* pane.

6.1 Displaying Fields

To display fields in the *Details* pane:

1. Click on an item in an overview pane.

The item's decoded details is displayed in the *Details* pane:



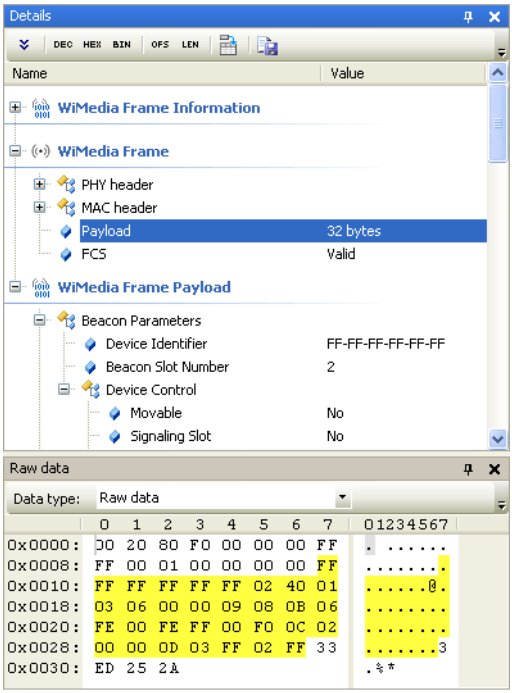
The details shown in the *Details* pane are related to the item selected in an overview pane. Selecting a similar item in another overview pane will show different details.

6.2 Selecting Fields

To select fields in the *Details* pane:

1. Click on a field in the *Details* pane.

The item is selected and appears as highlighted in the *Raw Data* pane:



Some fields do not have corresponding raw data, for example all the fields in the WiMedia Frame Information section. Selecting one of these fields will not highlight anything in the *Raw Data* pane.

6.3 Adding a Column to an Overview Pane

You can add a field as a new column in an overview pane to show its contents for a series of items. Drag a field to the overview to add item and then right-click on the column header to change display options. See *5.4, Adding, Removing and Arranging Columns,* on page 60 for more information.

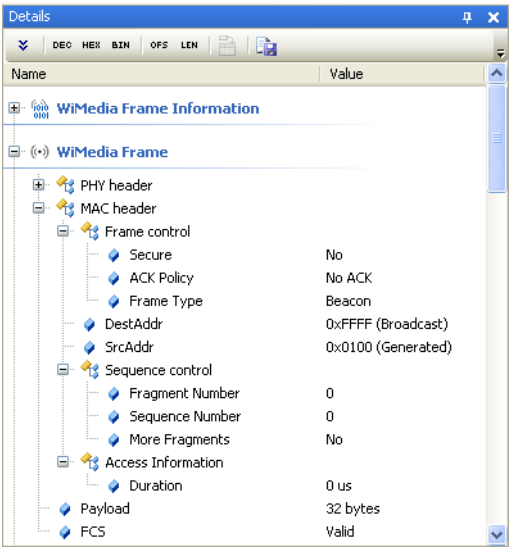
6.4 Expanding and Collapsing Fields

To expand fields in the *Details* pane:

A **Plus** button appears beside a field that contains extra detail.

1. Click on **Plus** to expand the field.

The expanded fields details are displayed:



To collapse fields in the *Details* pane:

A **Minus** button appears beside an extended field.

1. Click on **Minus** to collapse the fields.

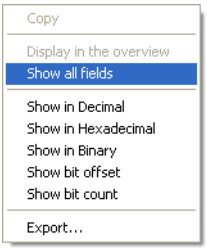
The expanded fields collapse.

6.5 Displaying Hidden Fields

The software hides some rarely-used fields by default in order not to overload the screen with too much information. Although they are rarely used these fields may be displayed in some specific cases.

To display hidden fields in the *Details* pane:

1. Right click in the *Details* pane. A menu appears:

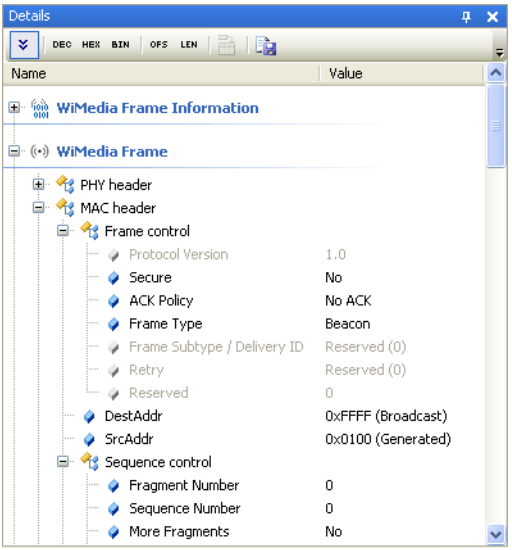


2. Click **Show all fields**.

or

3. Click on **Show All**  in the toolbar.

All hidden fields are displayed.



6.6 Displaying Additional Numeric Representations

Fields in the *Details* pane can be viewed in the following numeric representations:

- Decimal
- Hexadecimal
- Binary

To display additional numeric representations:

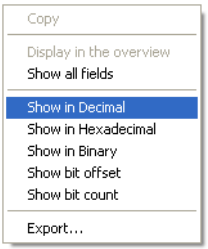
1. Click on the required option:

- **Show numeric values in Decimal** DEC .
- **Show numeric values in Hexadecimal** HEX .
- **Show numeric values in Binary** BIN .

or

2. Right click in the *Details* pane.

A menu appears:



3. Click the numeric representation required.

The numeric value is displayed in a new column in the *Details* pane.

6.7 Displaying Fields Offset and Length

To view fields offset and length:

1. Click on the required option:

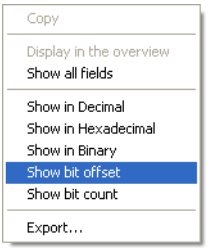
- **Show fields' bit offset** 

.
- **Show fields' bit count** 

.

or

2. Right click. A menu appears:



3. Click the option required, **Show bit offset** or **Show bit count**.

The fields offset and length are displayed in a new column in the *Details* pane.

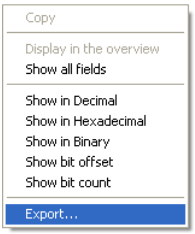
6.8 Exporting the Contents

To export the contents of the *Details* pane to a file:

1. Expand or collapse fields to show only the fields you want to export.
2. Click on **Export**  .

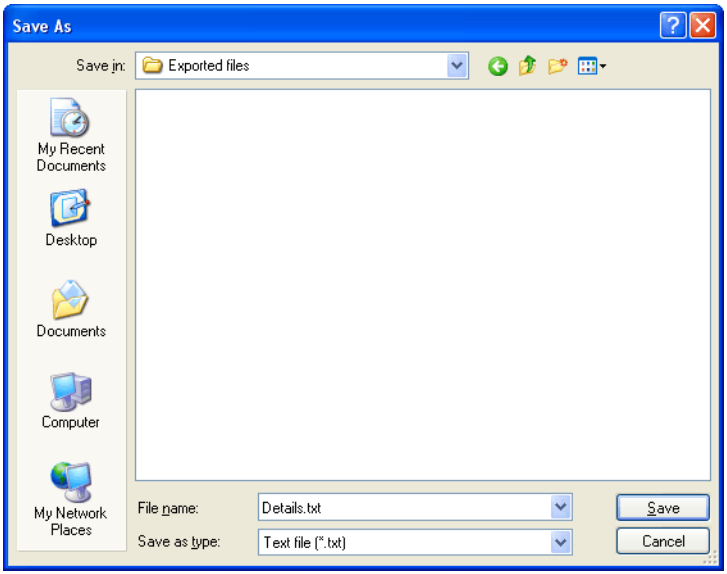
or

3. Right click. A menu appears:



4. Click **Export**.

A *Save As* screen appears:



5. Navigate to the folder where the file is to be saved.
6. Type the required name of the file in the *File name* field.
7. Choose the file format in the *Save as type* field.
8. Click on **Save**.

If the file is saved as a `.txt` file it will contain the name and the value of all displayed fields, as in the example below:

```
Name                              Value

WiMedia Frame Information
  RX Quality
    Link Quality (LQI)            Excellent
    Signal Strength (RSSI)        Excellent
  RX Error
  Timing
WiMedia Frame
  PHY header
  MAC header
  Payload                         32 bytes
  FCS                             Valid
WiMedia Frame Payload
  Beacon Parameters
    Device Identifier             FF-FF-FF-FF-FF-FF
    Beacon Slot Number            2
    Device Control
      Movable                     No
```

```
      Signaling Slot            No
      Security Mode             1
  Beacon Period Occupancy IE
  Distributed Reservation Protocol IE
  MAC Capabilities IE
  PHY Capabilities IE
```

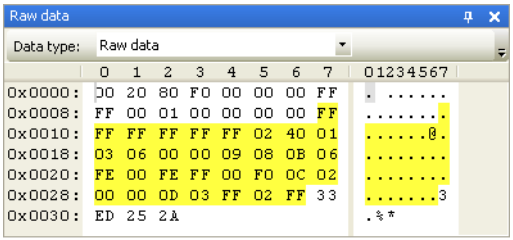
If the file is exported as a `.xml` file it will contain all fields, their values and other useful information such as errors:

```
<?xml version="1.0"?>
<Details>
 ...
 <Item name="WiMedia Frame" offset="0" length="408">
  <Item name="PHY header" offset="0" length="40">
   <Item name="Reserved" value="0" offset="0" length="3" hex="0x0" />
   <Item name="Data rate" value="53.3 Mbit/s"offset="3"length="5" hex="0x00"/>
   <Item name="Length" value="32" offset="8" length="12" hex="0x020" />
   <Item name="Reserved" value="0" offset="20" length="2" hex="0x0" />
   <Item name="Scrambler" value="2" offset="22" length="2" hex="0x2" />
   <Item name="Reserved" value="0" offset="24" length="2" hex="0x0" />
   <Item name="Burst mode" value="No" offset="26" length="1" hex="0x0" />
   <Item name="Preamble type" value="Std Pre" offset="27" length="1" />
   <Item name="TF Code" value="7" offset="28" length="3" hex="0x7" />
   <Item name="Band group" value="1,3,5" offset="31" length="1" hex="0x1"/>
   <Item name="Reserved" value="0" offset="32" length="8" hex="0x00" />
  </Item>
  ...
  <Item name="Payload" value="32 bytes" offset="120" length="256" />
  <Item name="FCS" value="Valid" offset="376" length="32" hex="0x2A25ED33" />
 </Item>
 ...
</Details>
```

The text format is useful for printing or for sending details to colleagues. The XML format is useful for running a piece of software to automatically find specific information.

7 Raw Data Pane

The *Raw Data* pane shows the raw data related to a selected item in an overview pane. Selected fields in the *Details* pane are highlighted in the *Raw Data* pane.

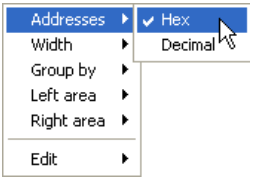


7.1 Changing Addresses Representation

To change addresses representation:

1. Right click anywhere in the *Raw Data* pane.

A menu appears:



2. Click **Addresses**.
3. Click **Hex** or **Decimal**.

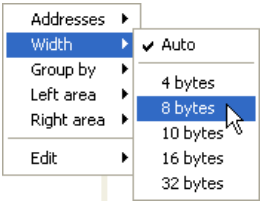
The addresses representation is changed.

7.2 Changing Bytes Grouping

To change bytes grouping:

1. Right click anywhere in the *Raw Data* pane.

A menu appears:



2. Click **Width**.
3. Click the required bytes size on the submenu.

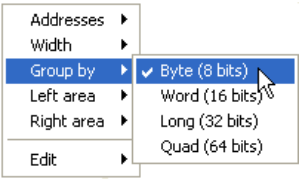
The bytes grouping is changed.

7.3 Changing Groupings

To change groupings:

1. Right click anywhere in the *Raw Data* pane.

A menu appears:



2. Click **Group by**.
3. Click the required grouping option on the submenu.

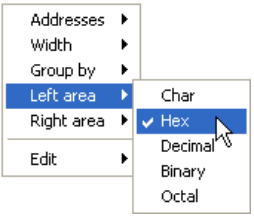
The grouping is changed.

7.4 Changing the Left or Right Area Display

To change the left or Right area display:

1. Right click anywhere in the *Raw Data* pane.

A menu appears:



2. Click **Left area** or **Right area**.
3. Click the required display type on the submenu.

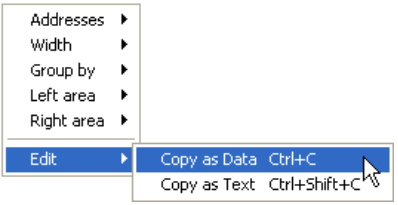
The *Left area* or the *Right area* of the *Raw Data* pane display is changed to the selected format.

7.5 Copy Data to the Clipboard

To copy raw data as data:

1. Select the required data in the *Raw Data* pane and right click.

A menu appears:



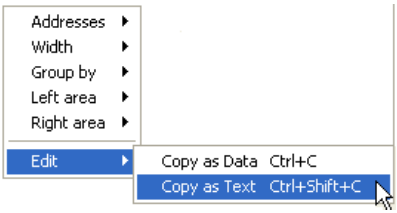
2. Click **Edit**.
3. Click **Copy as Data**.

The selected raw data is copied as data. The copied data can be pasted as text however the pasted data may produce characters the target application may not be able to recognize.

To copy raw data as text:

1. Select the required data in the *Raw Data* pane and right click.

A menu appears:



2. Click **Edit**.
3. Click **Copy as Text**.

The selected raw data is copied as text. The copied data can be pasted to another application and will appear in the target application exactly as copied.

The whole content of the *Data* pane is copied if there is no selection.

8 Searching

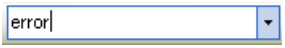
The software contains several search options that allow you to quickly and reliably find any kind of element. Some search features can be used to easily jump to the required element, while other search options allow several entries to find more specific information.

8.1 Using the Instant Search Facility

It is possible to quickly search for items by using the *Instant Search* field situated on the top of the *WiMedia Overview* and *Wireless USB Overview* panes.

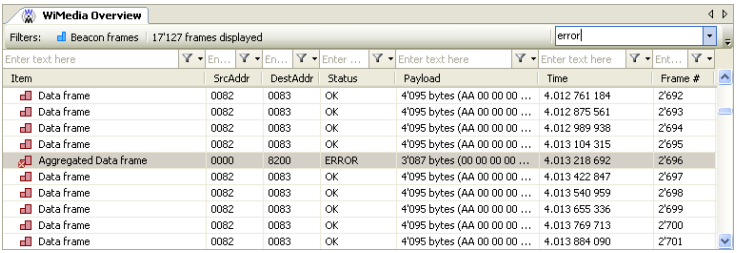
To search for an item using the Instant Search facility:

1. Enter what you want to search for in the *Instant Search* field.



2. Press ENTER to search all columns of the active overview pane for the specified text.

The search results are highlighted.



3. Continue to press ENTER to find the next entry.

Wildcards can be used to perform advanced search operations. Use an interrogation point `?` to match any character or an asterix `*` to match any suites of characters. An asterix is always implied at the end of any search string.

Examples:

`0?FE` will match all addresses that start with 0 and end with FE
`*data` will match any line that contains the word data
`E*r` will match any line that starts with `E` and contains a `r`.
`*dnts` will match any line that contains `dnts`.

8.2 Using the Go to Facility

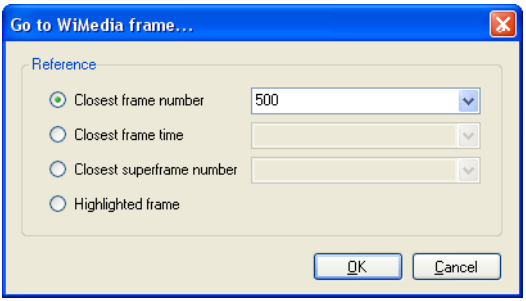
The Go to facility can be used to quickly retrieve a known frame or a frame close to a known event.

To use the go to facility:

1. Select **Search | Go to** in the menu.

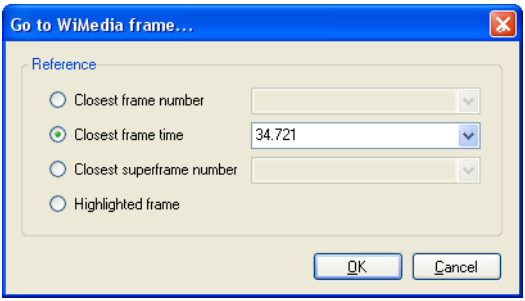
A dialog box appears.

2. Select *Closest frame number* to jump to the frame that has the nearest number to the one specified:



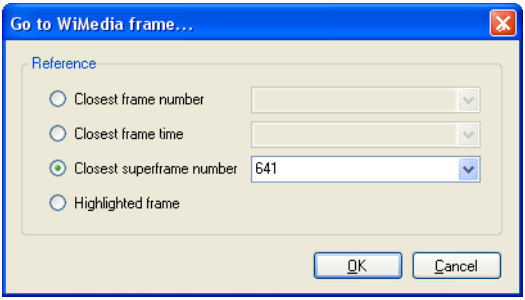
or

Select *Closest frame time* to jump to the frame that has the nearest time to the one specified:



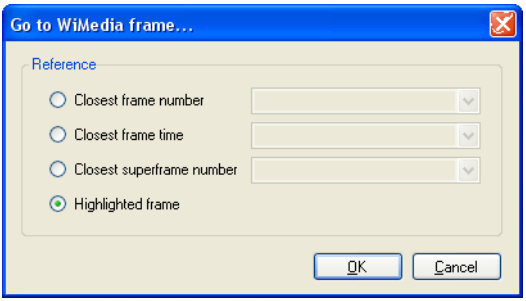
or

Select *Closest superframe number* to jump to the superframe that has the nearest number to the one specified:



or

Select *Highlighted* to jump to the currently highlighted frame:



3. Click on **OK**.

The frame is selected and displayed when the Go To facility finds the frame.

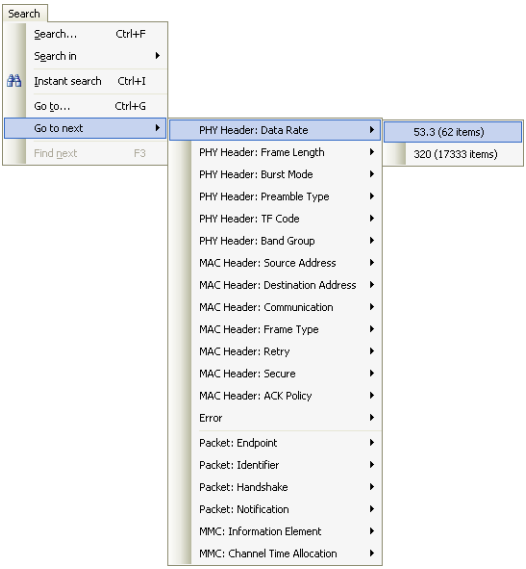
8.3 Using the Go to Next Facility

The Go to Next facility can be used to quickly search for frames that match a given criteria.

To navigate within frames using the go to next facility:

1. Select **Search | Go to next** in the menu.

The **Go to next** menu and submenus appears:



2. Select what you require from the *Go to next* menu and the submenus.

The selected item is highlighted.

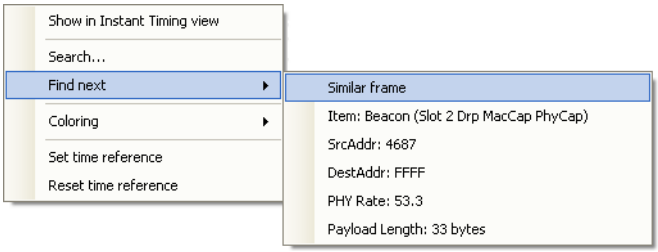
8.4 Using the Find Next Facility

The Find Next facility allows you to search for frames that have similar characteristics to a selected frame.

To search for a frame similar to the selected frame:

1. Select an item in the *WiMedia Overview* pane.
2. Right click.

A menu appears:



3. Click **Find Next**.
4. Click the required option in the sub menu.

If you select **Similar frame**, the next frame with similar characteristics to the selected frame is highlighted. A frame is considered similar if the Item column, SrcAddr and DestAddr are the same.

If you select another sub menu only the displayed criteria are taken into account to find the next frame.

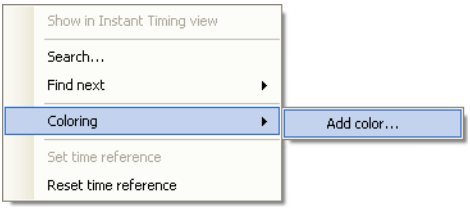
8.5 Using the Coloring Facility

The Coloring facility allows you to colorize frames that meet specific criteria.

To colorize frames:

1. Right click in the overview pane.

A menu appears:



2. Click **Coloring**.
3. Click **Add color**.
4. A Search dialog box appears.

The Coloring facility reuses the Search dialog. Refer to the next sections for a description of the search functionality.

5. Click the tabs to access the different search criteria options and complete the required options.
6. Click on **Colorize** 

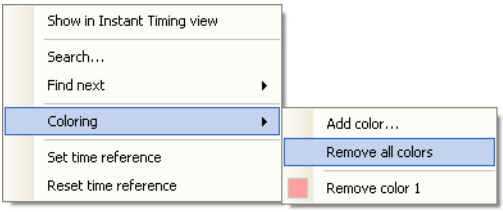
to colorize all matching frames. You can select the color from the drop-down list on the left side of the button.

All matching frames are colorized with the specified color.

To remove all colors:

1. Right click in the overview pane.

A menu appears:



2. Click **Coloring**.
3. Click **Remove all colors**.

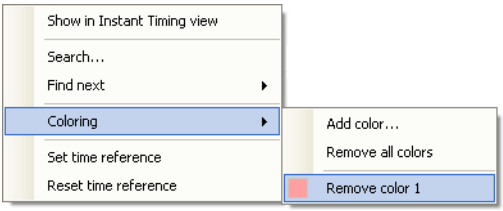
All colors are removed.

If you added several different colors and want to remove only one you can remove a single color.

To remove a single color:

1. Right click in the overview pane.

A menu appears:



2. Click **Coloring**.
3. Click **Remove color *N***, where N is a number.

The specified color is removed.

8.6 Searching in WiMedia Overview Pane

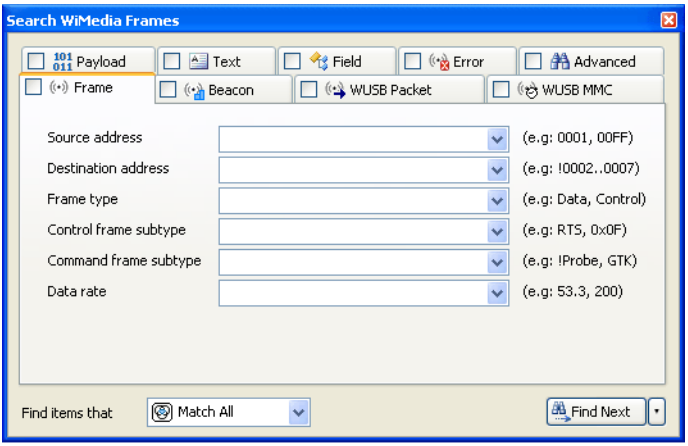
The Search facility is a powerful search tool that allows you to search for any piece of data or a combination of search criteria.

To use the Search Facility:

1. Select the *WiMedia Overview* pane.
2. Click on 
   or
   Press CTRL+F.

You can also select **Search in | WiMedia Overview** in the menu.

The *Search WiMedia Frames* window appears:



3. Click the tabs to access the different search criteria options and fill in required options.

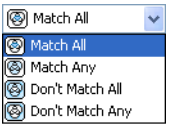
The *Search WiMedia Frames* window contains the following tab search area options:

- **Frame** tab - allows searching for common WiMedia fields.
- **Beacon** tab - allows searching for common Beacon fields.
- **WUSB Packet** tab - allows searching for common Wireless USB fields.
- **WUSB MMC** tab - allows searching for Wireless USB MMC fields.
- **Payload** tab - allows searching for payload data.

- **Text** tab - allows searching for columns text.
- **Field** tab - allows searching any field content.
- **Error** tab - allows searching for specific errors or status.
- **Advanced** tab - allows searching for PHY or MAC Header field values.

When you enter or make a selection in more than one tab, the tab's check box is automatically selected. This indicates that more than one search criteria will be combined using the selected *Find items that* option.

4. Click on the ***Find items that*** arrow and select the required combination option, if needed.



- **Match All** - Finds items that matches all selected search criteria.
- **Match Any** - Finds items that matches any of the selected search criteria.
- **Don't Match All** - Finds items that do not match all of the selected search criteria (opposite of Match All).
- **Don't Match Any** - Finds items that do not match any of the selected search criteria (opposite of Match Any).

5. Click on **Find Next** Find Next to perform a search and highlight the next matching frame.

   Click on the arrow next to the **Find Next** button and select **Colorize** Colorize to colorize all matching frames. You can select the color from the drop-down list that appears on the left side of the button.

   Click on the arrow next to the **Find Next** button and select **Count** Σ Count to count all matching frames.

8.7 Searching in Wireless USB Overview Pane

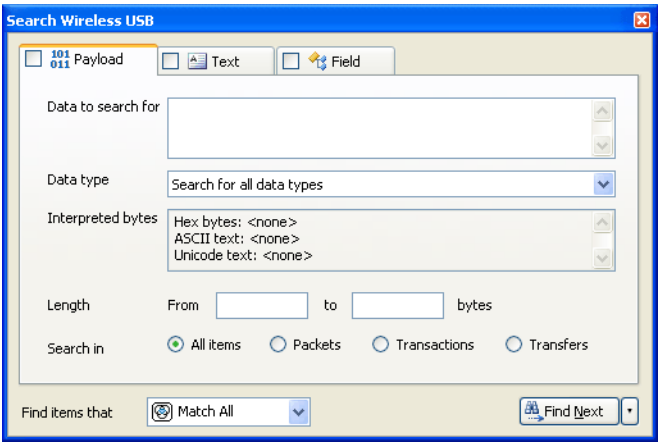
The Search Wireless facility allows you to search for any type of analyzed data or information within the *Wireless USB Overview* pane.

To search for data or information:

1. Select the *WiMedia Overview* pane.
2. Click on 
   or
   Press CTRL+F.

You can also select **Search in | Wireless USB Overview** in the menu.

The *Search Wireless USB* window appears:



3. Click the tabs to access the different search criteria options and fill in required options.

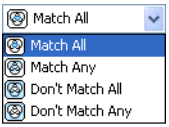
The *Search WiMedia Frames* window contains the following tab search area options:

- **Payload** tab - allows searching for payload data.
- **Text** tab - allows searching for columns text.

- **Field** tab - allows searching any field content.

When you enter or make a selection in more than one tab, the tab's check box is automatically selected. This indicates that more than one search criteria will be combined using the selected *Find items that* option.

4. Click on the ***Find items that*** arrow and select the required combination option, if needed.



- **Match All** - Finds items that matches all selected search criteria.
- **Match Any** - Finds items that matches any of the selected search criteria.
- **Don't Match All** - Finds items that do not match all of the selected search criteria (opposite of Match All).
- **Don't Match Any** - Finds items that do not match any of the selected search criteria (opposite of Match Any).

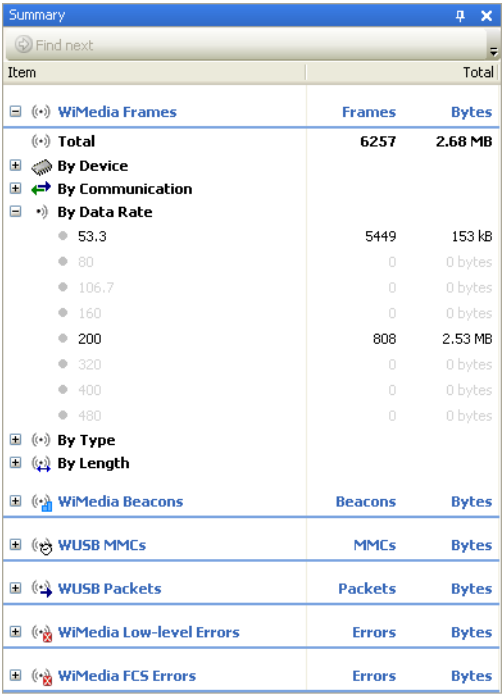
5. Click on **Find Next** Find Next to perform a search and highlight the next matching frame.

Click on the arrow next to the **Find Next** button and select **Colorize** Colorize to colorize all matching frames. You can select the color from the drop-down list that appears on the left side of the button. See

Click on the arrow next to the **Find Next** button and select **Count** Σ Count to count all matching frames.

9 Summary Pane

The *Summary* pane shows a summary of the traffic being recorded or loaded by reporting the type of communications that occurred and the amount of bytes transferred:



The *Summary* pane is organized into several sections, each section organized in several subsections:

- **WiMedia Frames**:
  - **By Device** - Frames sent by a device, based on its address.
  - **By Communication** - Frames sent by a device to another device.
  - **By Data Rate** - Frames grouped by their nominal bit rate.
  - **By Type** - Frames grouped by type (Beacon, Data, etc.).

    - **By Length** - Frames grouped by length.
- **WiMedia Beacons**:
    - **By Device Identifier** - Beacons grouped by identifier.
    - **By Slot Number** - Beacons grouped by slot number.
    - **By BP Length** - Beacons grouped by BP Length.
    - **By Information Elements** - Beacons grouped by Information Elements.
- **WUSB MMCs**:
    - **Information Elements** - IEs grouped by type.
    - **Channel Time Allocations** - CTAs grouped by type.
- **WUSB Packets**:
    - **By Endpoint** - Packets sent by a device, based on its endpoint.
    - **By Packet ID** - Packets grouped by type (DATA, HNDSHK, etc.).
    - **Handshakes** - Handshakes by type (ACK, NAK, STALL).
    - **Notifications** - Notifications by type (DN_Connect, etc.).
- **WiMedia Low-Level Errors**:
    - **HCS Errors** - Totalizes HCS Errors
    - **FCS Errors** - Totalizes FCS Errors
    - **Unsupported Rate** - Frames sent at an unsupported rate.
    - **Payload Reception Error** - Totalizes PHY hardware failures.
    - **Payload Length Mismatch** - Totalizes frames with more or less bytes received than expected.
- **WiMedia FCS Errors**:
    - **By Device** - Frames sent by a device, based on its address.
    - **By Data Rate** - Frames grouped by their nominal bit rate.
    - **By Length** - Frames grouped by length.

In addition, most main sections also shows the total count of all subsections.

9.1 Viewing Summary Data

To view an element's summary data:

1. Record a device or open a file.

The summary data for the recording appears in the *Summary* pane in real-time.

The *Summary* pane keeps updating itself until a recording session is stopped or until a file is fully opened.

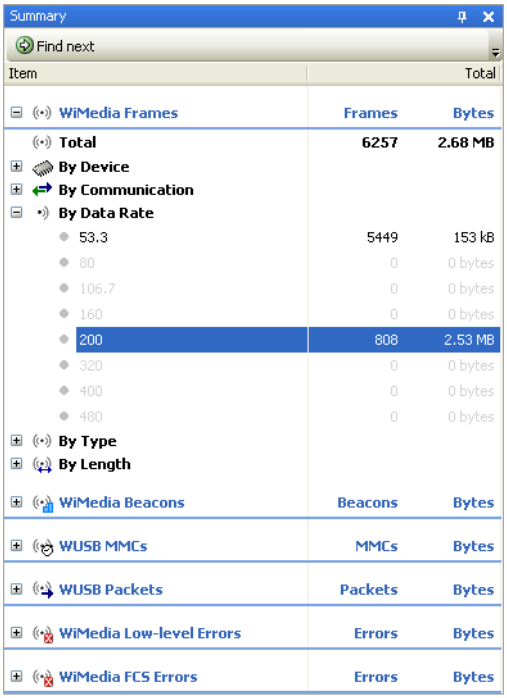
2. Click on **Plus** beside a section to expand that section's data list.
3. Click on **Minus** to collapse a section's list of data.

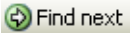
9.2 Find Next Frames

Each event counted in a section can be found in other panes using the **Find Next** button.

To find the next frame that produced a count:

1. Select the required item in the *Summary* pane:



2. Click on **Find Next** 

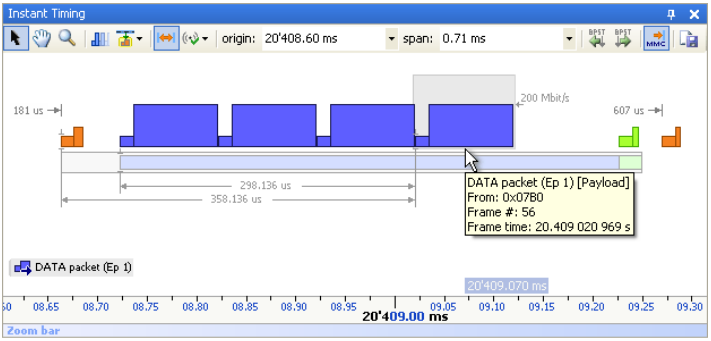
.

The next frame that produced a count in the selected section is highlighted and displayed in the *WiMedia Overview* pane.

You can select several criteria using the SHIFT key. Criteria are combined with a logical AND operation and the resulting frame, if found, is displayed in the overview.

10 Instant Timing Pane

The Ellisys *Instant Timing* pane graphically displays frames, allocations and reservations sequentially in time. It allows precise time measurement for all types of protocol elements.



The *Instant Timing* pane helps you to understand traffic sequences involved in WiMedia-based protocols. It also displays specific elements for Certified Wireless USB.

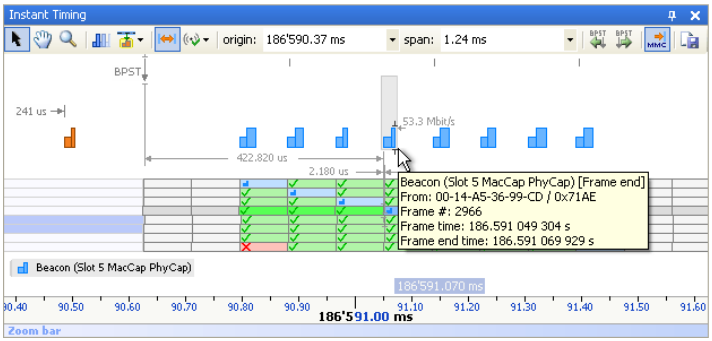
The following protocol elements are displayed:

- Superframes and MASs
- WiMedia frames (including Certified Wireless USB packets)
- BPO IEs for all received Beacon frames
- DRP reservations
- Wireless USB time allocations
- Timing violations

10.1 Understanding the Instant Timing Pane Contents

For more information on the terms and concepts used in this section please read the *Distributed Medium Access Control (MAC) for Wireless Networks* available from the WiMedia Alliance and the *Wireless USB Specification* available from the USB Implementers Forum.

The image below shows a common *Instant Timing* contents:



The main area is divided into several parts, which are described from top to bottom in the image above:

- **The toolbar** - Allows you to choose how you interact with the *Instant Timing* pane, selecting which elements are displayed, and moving back and forth time:

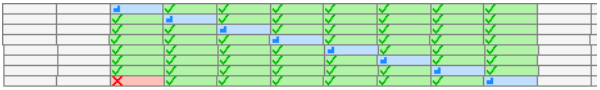
- **The main graphics area** - Displays several elements, depending on the contents of the trace. The example above shows:
  - a BPST indicator:

  - a Certified Wireless USB MMC packet with the next MMC time indicator of its predecessor:

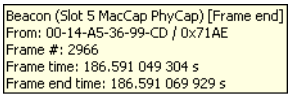
- several Beacon frames with the speed indicator:

- two time markers:

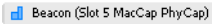
- a BPOIE summary with green marks, blue beacons and a red cross:



- a tooltip with contextual information:



- a Beacon frame summary:



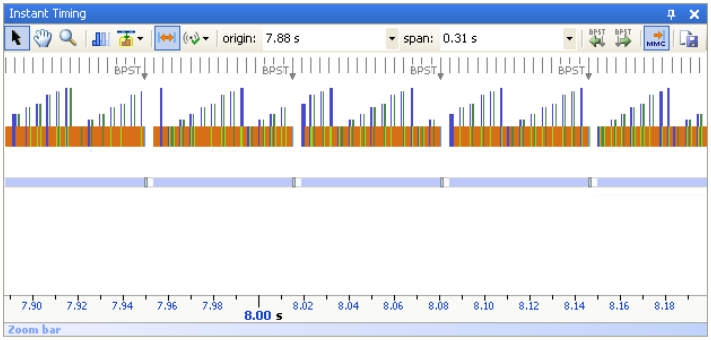
- the time indicator:

- **The scale bar** - Displays exact timing markers. Use the mouse on the scale bar to pan the contents of the main graphics area. Note that blue numbers exists to avoid the repetition of the black absolute time:

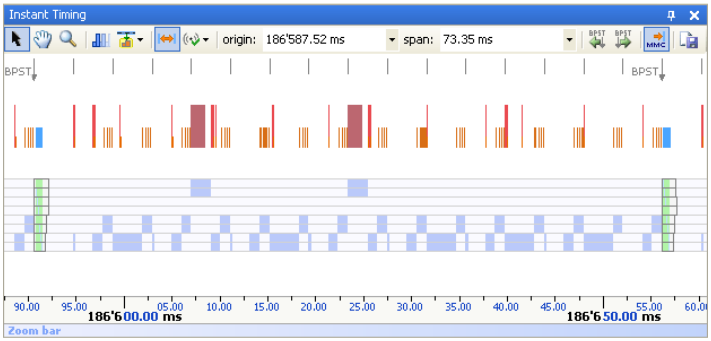
- **The zoom bar** - Allows you to quickly zoom-in and out on the display:

The main graphics area can display a broad range of different elements. Its contents can vary depending on the traffic it has to display.

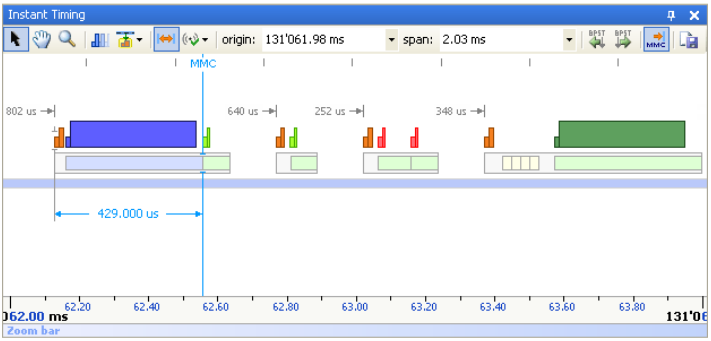
The following image shows a device that sends frames at different speeds. Frames sent at a lower speed are shown as small in height, while frames sent at a higher speed are shown as larger in height:



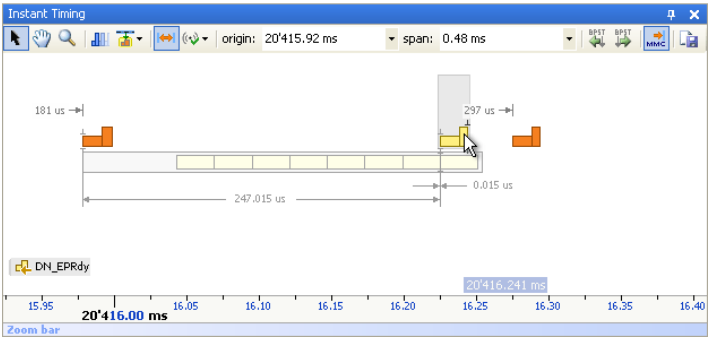
The following image show a series of DRPs (shown in light blue) reserved by many devices using several different protocols:



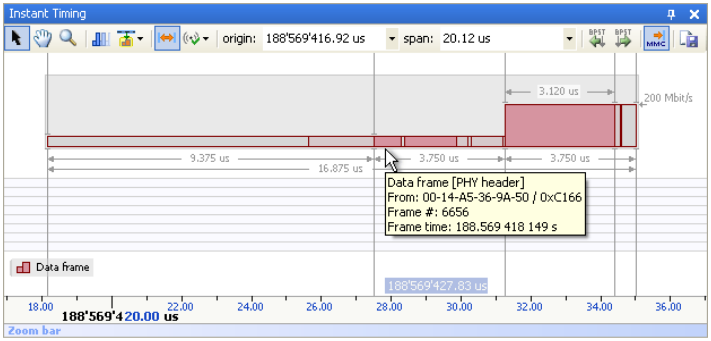
The following image show a series of MMCs (shown in orange) that each defines one or more CTAs. It also shows how to use an MMC cursor to measure the declared (or actual) time for an allocation:



The following image shows a MMC that declares a DNTS CTA with 8 slots. The last slot is occupied by a DN_EPRdy frame sent by a Wireless USB device. The image shows the exact relative time at which the frame was sent:



The following image shows a zoomed frame and its contents. Each part of the frame is displayed in a slightly different color. Placing the mouse over a part displays a tooltip that describes its contents. The image shows some manual measurements that have been placed to measure the duration of several parts:



Some of the types of packets you may encounter in the *Instant Timing* pane are listed below:

Beacon Frame

Data Frame

Data Frame received with an FCS error

Immediate Ack Frame

Wireless USB MMC Packet

Wireless USB Notification Packet

Wireless USB Data Out Packet

Wireless USB Data In Packet

Wireless USB Ack Packet

Wireless USB Nak Packet

10.2 Instant Timing Toolbar

The table below shows the *Instant Timing* toolbar buttons and their actions:

Pointer Mode - Switches to Pointer Mode.

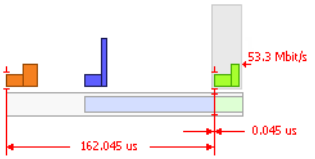
Pan Mode - Switches to Pan Mode.

Zoom Mode - Switches to Zoom Mode.

Enable/Disable Smooth Scrolling - Enables or disables the smooth scrolling.

Highlighting Options - Opens a menu that allows selecting wether the selected element in the overview is highlighted in the *Instant Timing* pane.

Show/Hide Automatic Markers - Enables or disables the automatic markers that are displayed when the mouse hovers a frame:

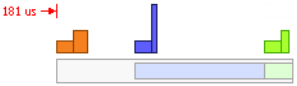


Timing Error Verifications - Opens a menu that allows enabling or disabling timing verifications.

Go one superframe backward - Scrolls the display one superframe backward.

Go one superframe forward - Scrolls the display one superframe forward.

Show/Hide Next MMC Time - Shows or hides Next MMC Time markers:



Export Image - Exports the *Instant Timing* pane to an image file.

10.3 Panning Left and Right

The *Instant Timing* pane Pan mode allows you to scroll left and right through the *Instant Timing* pane content, therefore moving back and forth in time.

To use the mouse to pan:

1. Click on the time scale display at the bottom of the *Instant Timing* pane (recommended).
   or
   Click on **Pan Mode** .

The pointer changes to a hand symbol.

2. Press and hold the left mouse button, and drag to the right or left to scroll through the *Instant Timing* pane content.

The mouse cursor automatically rolls around the screen so you can smoothly scroll large amounts of time without having to release the mouse button and press it again several times.

To use the keyboard to pan:

1. If no frame is selected press the LEFT or RIGHT ARROW keys to move incrementally to the left or right.
   or
   If a frame is selected these keys will jump to the previous or next frame.
   or
   Press ALT and the LEFT ARROW key, or ALT and the RIGHT ARROW key to scroll to the left or right superframe by one superframe.
   or

Press PAGE DOWN or PAGE UP to scroll a screen left or right.
or
Press HOME or END to jump to the beginning or end of the trace.

You can manually define a new time origin in the *Instant Timing* pane to jump to a time you know or at which you expect an event.

To define a new timing view origin:

1. Type the new timing origin in the *origin* field.

The following units are allowed:

- s - seconds
- ms - milliseconds
- us - microseconds
- ns - nanoseconds
- ps - picoseconds

If a unit is not specified then the previously displayed unit is used.

2. Press ENTER.

The *Instant Timing* pane is updated to display the new view origin.

The Ellisys WiMedia Explorer 300 Analyzer retains new timing origin entries. Click the **Down** arrow in the *origin* field to view and select previously entered timing origin entries.

10.4 Zooming In and Out

The *Instant Timing* pane Zoom Mode allows you to zoom-in and out on a particular point in the *Instant Timing* pane image.

Zooming-in will expand the selected point and show more detailed information, while zooming-out will contract the selected point and show more information in a screen.

To use the mouse to zoom:

1. Place the pointer over the *Zoom bar* positioned at the bottom of the *Instant Timing* pane (recommended).
   or

   Click on **Zoom** .

   The cursor changes to a spyglass symbol.
2. Press and hold the left mouse button, and drag the pointer to the right to zoom-in and expand the selected area, or drag to the left to zoom-out from and contract the selected point.

The mouse cursor automatically rolls around the screen so you can smoothly scroll large amounts of time without having to release the mouse button and press it again several times.

You can also use the mouse wheel to zoom-in and out by moving the wheel upwards to zoom-in, or moving the wheel downwards to zoom out. The zoom is centered where the mouse is located.

To use the keyboard to pan:

1. Press the PLUS key to zoom-in and the MINUS key to zoom out.

You can manually define a new time span in the *Instant Timing* pane to choose the total duration you want to see on screen.

To define a new timing view span:

1. Type the new timing span in the *span* field.

The following units are allowed:

- s - seconds
- ms - milliseconds

- us - microseconds
- ns - nanoseconds
- ps - picoseconds

If a unit is not specified then the previously displayed unit is used.

2. Press ENTER.

The *Instant Timing* pane is updated to display the new view span.

The WiMedia Explorer 300 Analyzer retains new timing span entries. Click the **Down** arrow in the *span* field to view and select previously entered timing span entries.

10.5 Navigating to Selected Locations

You can jump to different places of the *Instant Timing* contents to find specific places or elements.

To jump to selected locations:

1. Right-click in the white area of the *Instant Timing* main contents. A menu appears:

2. Choose one of the following options:
   - **Scroll one superframe backward** - Jumps exactly one superframe backwards. You can also use the toolbar, or press ALT and LEFT ARROW to do the same operation. Note if you plan to

repeat this operation it is recommended to disable the smooth scrolling.

- **Scroll to current superframe start** - Jumps to the beginning of the current superframe, near the Beacon Period of that superframe.
- **Scroll to current superframe end** - Jumps to the end of the current superframe, near the Beacon Period of the next superframe.
- **Scroll one superframe forward** - Jumps exactly one superframe forwards. You can also use the toolbar, or press ALT and RIGHT ARROW to do the same operation. Note if you plan to repeat this operation it is recommended to disable the smooth scrolling.
- **Go to Mmc cursor** - Jumps to the MMC cursor.
- **Go to cursor A** - Jumps to cursor A.
- **Go to cursor B** - Jumps to cursor B.

The display is scrolled to the new position.

10.6 Highlighting Selection

The *Instant Timing* pane allows highlighting selected elements in overview panes.

To highlight an overview selection:

1. Click on **Highlight sections**  . A menu appears:

2. Click on the required option:
   - **Highlight active overview selection** - Finds the frame currently selected in the *Instant Timing* pane and highlights it in the last used overview pane.
   - **Highlight WiMedia overview selection** - Finds the frame currently selected in the *Instant Timing* pane and highlights it in the *WiMedia* overview pane.

- **Highlight Wireless USB overview selection** - Finds the frame currently selected in the *Instant Timing* pane and highlights it in the *Wireless USB* overview pane.
- **Follow overview selection** - Finds the frame currently selected in the current overview pane and highlights it in the *Instant Timing* pane.

The selection highlight is updated accordingly to your choice.

The current selection in a pane is shown in blue and a selection that originates from another pane is shown in yellow.

To highlight or select a frame:

1. Move the mouse to hover over the frame you want to highlight or select. A gray rectangle appears around the frame.
2. Click on the frame to select it in the *Instant Timing* pane and highlight it in the *WiMedia* overview
   or
   Double-click on the frame to select it in both the *Instant Timing* pane and the *WiMedia* overview.

Double-clicking a frame selects it in the WiMedia overview; it also updates the *Details* and *Raw Data* panes. This is the preferred method to review element's details from the *Instant Timing* pane.

10.7 Verifying Timing

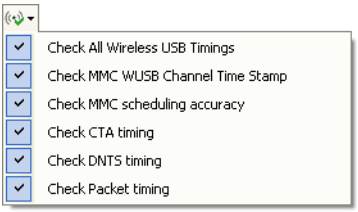
The Timing Error Verifications facility allows you to verify the following timings:

- **All Wireless USB Timings** - Enables or disables all Certified Wireless USB verifications.
- **MMC WUSB Channel Time Stamp** - Verifies that the channel time stamp declared in each MMC matches the expected time stamp.
- **MMC Scheduling Accuracy** - Verifies that each MMC occurs at the Next MMC time declared by its predecessor.
- **CTA Timing** - Verifies that CTAs are ordered in time and large enough to hold a minimum Certified Wireless USB packet.
- **DNTS Timing** - Verifies that DNTS CTAs are placed close enough to their MMC and that their duration is large enough to hold all declared slots.

- **Packet Timing** - Verifies that all packets are sent within a CTA.

To change timing verification settings:

1. Click on **Timing error verifications** . The Timing verification menu appears:



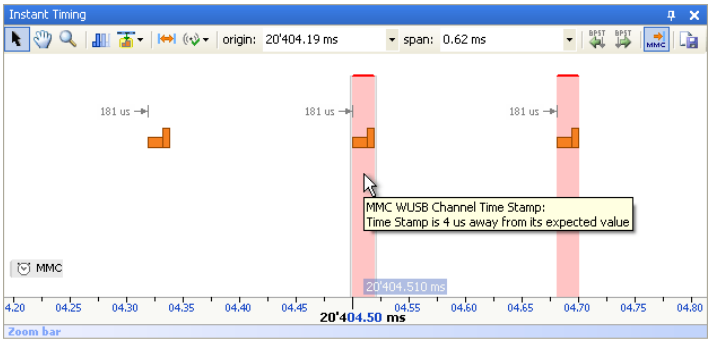
2. Click on the required timing verification option.

A tick appears beside the selected option, and the selected timing errors are displayed in the *Instant Timing* pane for the relevant objects.

The *Instant Timing* pane surrounds frames with timing errors with a light red rectangle topped with a rounded red rectangle.

To check for timing errors:

1. Place the pointer over the red rectangle.



A message describing the error is displayed in a tooltip. Review the timing fields or perform manual measurements to find the cause of the error.

10.8 Performing Measurements

Manual measurements can be performed by placing the following types of cursors:

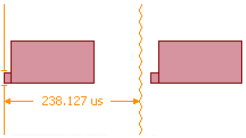
- Quote cursors
- A and B independent cursors
- MMC cursor

Cursors can be frozen in order to avoid moving them by mistake. They can also be duplicated to perform several measures on a single trace.

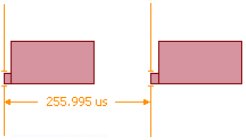
To insert a quote using the pointer mode:

1. Click on **Pointer Mode** .
2. Click in the required timing point in the *Instant Timing* pane.
3. Press and hold the left mouse button, and drag the pointer left or right to the required time point.

A marker line appears as a wave line if it is not attached to a frame or another timing element. The wave line shows that the measured value is not exact:



You can zoom in using the **Zoom** button or the mouse wheel to see that it is not exactly on the required position. Move the line until it transforms into a straight line. The line will appear as a straight line when it is attached to a frame or another timing element. Move the mouse cursor to different parts of the frame to find where it can be attached. As soon as it is attached the measured value is exact and can be trusted:



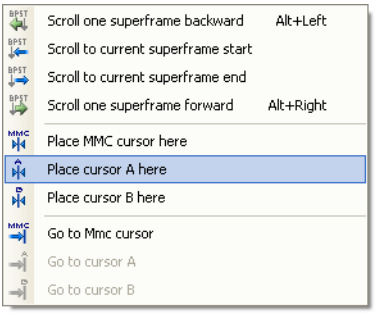
4. Release the mouse button when you find the required timing point.

The required time span is displayed between the two maker lines or beside one of them.

To insert A and B cursors:

1. Place the pointer where you want to insert the cursor.
2. Right click.

A menu appears:

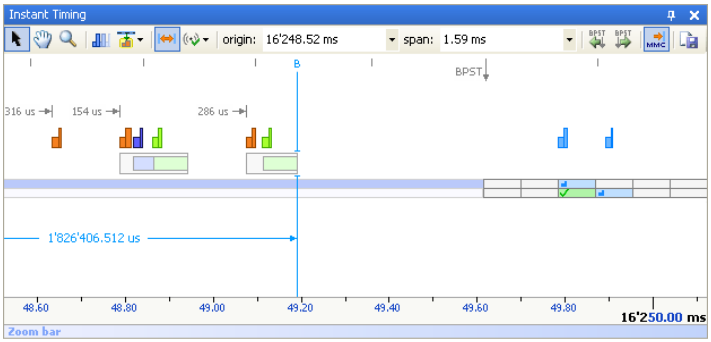


3. Click **Place cursor A here**.

A cursor A is inserted.

4. Place the pointer where you want to insert the second cursor.
5. Right click.
6. Click **Place cursor B here**.

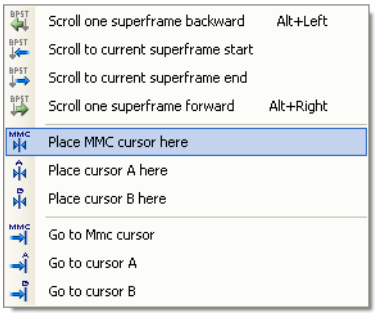
Cursors A and B are displayed and can be moved as required by placing the pointer over the line and dragging it to the required position:



To insert a MMC cursor:

1. Place the pointer where you want to insert the MMC cursor.
2. Right click.

A menu appears:



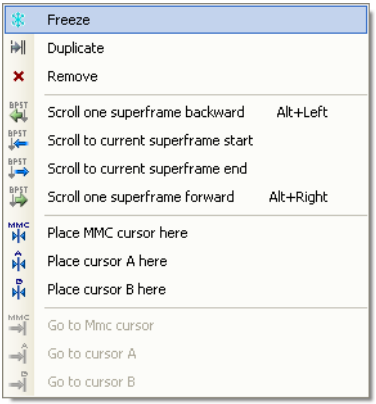
3. Click **Place MMC cursor here**.

The MMC marker line is inserted and can be moved as required by placing the pointer over the line and dragging it to the required position. MMC cursors measure the time elapsed between the MMC that was sent before the cursor up to that cursor. This is the best way to measure Wireless USB timing on a Wireless USB channel time base.

To freeze a cursor:

1. Place the pointer on an existing cursor.
2. Right click.

A menu appears:



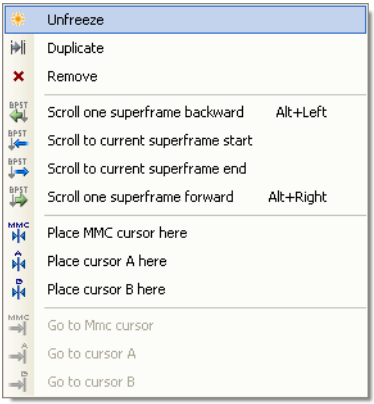
3. Click **Freeze**.

The cursor is frozen. Its color changes to gray and it can only be moved vertically.

To unfreeze a cursor:

1. Place the pointer on a frozen cursor.
2. Right click.

A menu appears:



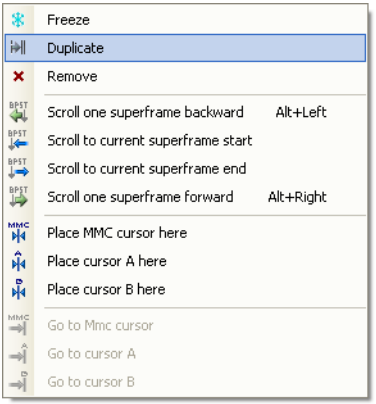
3. Click **Unfreeze**.

The cursor is unfrozen. Its color changes to light blue and it can now be moved freely.

To duplicate a cursor:

1. Place the pointer on an existing cursor.
2. Right click.

A menu appears:



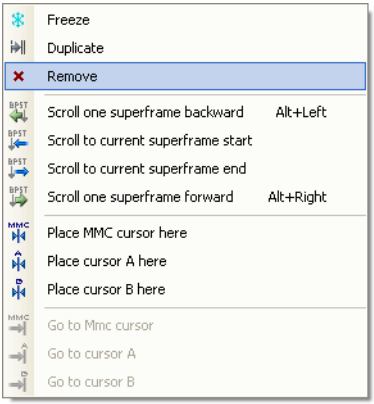
3. Click **Duplicate**.

The cursor is duplicated. The new cursor color changes to light blue and it can now be moved freely.

To remove a cursor:

1. Place the pointer on an existing cursor.
2. Right click.

A menu appears:



3. Click **Remove**.

The cursor is removed.

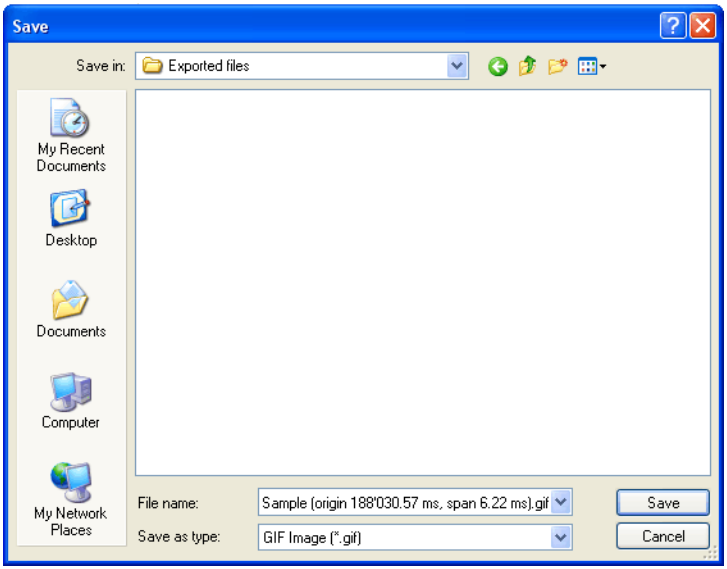
10.9 Exporting Instant Timing Contents

You can export the contents of the *Instant Timing* pane as an image file.

To export the contents of the *Instant Timing* pane to a file:

1. Update the contents of the *Instant Timing* pane to show what you want to export.
2. Click on **Save screenshot** .

A *Save As* window appears:

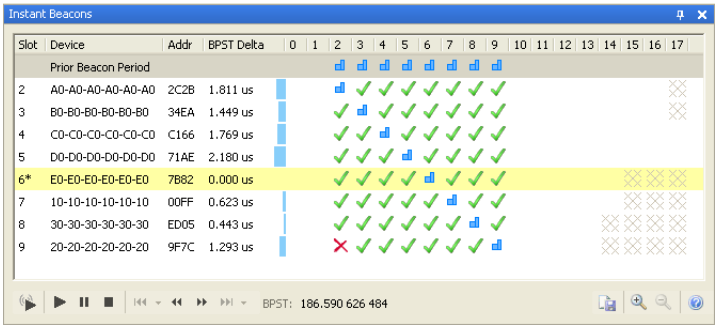


3. Navigate to the folder where the image is to be exported.
4. Type the required name of the image file in the *File name* field.
5. Select the required image format from the *Save as type* drop-down list.
6. Click on **Save**.

An image with the contents of the *Instant Timing* pane is saved.

11 Instant Beacons Pane

The *Instant Beacons* pane displays a table of all devices and their recognition status by other devices in a beacon group:



The *Instant Beacons* pane can be set up to reflect devices behavior in real-time. It can also be used to playback beacons during post-processing.

11.1 Understanding the Instant Beacons Pane Contents

For more information about the terms and concepts used in this section please read the *Distributed Medium Access Control (MAC) for Wireless Networks* available from the WiMedia Alliance.

Each numbered row in the *Instant Beacons* pane represents a beacon sent by a device and received on that slot number by the analyzer. Icons on numbered columns represent what was seen by the device on that slot number. This information is extracted from the BPO IE (Beacon Period Occupancy Information Element) declared by each device. The grayed area on the right represents beacon slots outside of the BP Length. The BP Length is a number that each device sets to define how many slots it will report.

A row may appear without a slot number. This occurs when a device "skips". All devices are required to skip beacon transmission from time to time.

The *Instant Beacons* pane also displays the BPST Delta for each device. A bar graph indicates how far that device was from the expected slot boundary, which is defined by the slowest device. An asterix * indicates the slowest device in the beacon group.

The *Instant Beacons* pane use the following symbols:

Valid frame received

Frame received with HCS/FCS error

Frame received with movable bit set

Beacon Slot Info: Occupied & non-movable

Beacon Slot Info: Occupied & movable

Beacon Slot Info: HCS/FCS error

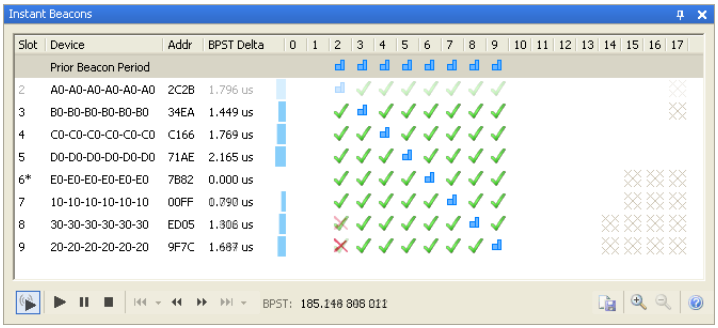
Slot out of the reported BP Length

11.2 Viewing Beacons in Real-Time

To view beacons in real-time:

1. Open the *Instant Beacons* pane.
2. Click on **Show last received beacons** .
3. Start recording.

The beacons that are currently received by the WiMedia Explorer 300 Analyzer hardware are displayed in the *Instant Beacons* pane in real time:



This mode also displays the contents of the *Instant Beacons* pane in real time when opening a file.

Click on **Zoom-In** and **Zoom-Out** to adjust the zoom level of the *Instant Beacons* pane, for example to display it on a video projector.

11.3 Navigating Among Beacons

To navigate among beacons during post-processing:

1. Open a file that contains recorded traffic.
2. Use the following controls to navigate through beacon periods:
   - Click on **Play**  to play back the traffic. Beacons are shown one beacon period after another.
   - Click on **Pause**  to pause the playback.
   - Click on **Stop**  to stop the playback and reset to the beginning of the file.
   - Click on **Previous Beacon Period**  to go back one beacon period. This is not available in Play mode.
   - Click on **Next Beacon Period**  to go forward by one beacon period. This is not available in Play mode.

Click a row in the *Instant Beacons* pane to highlight the corresponding beacon in the WiMedia overview. Double-clicking a row will highlight and select that row. You can also select a beacon frame in the WiMedia overview to highlight its row in the *Instant Beacons* pane.

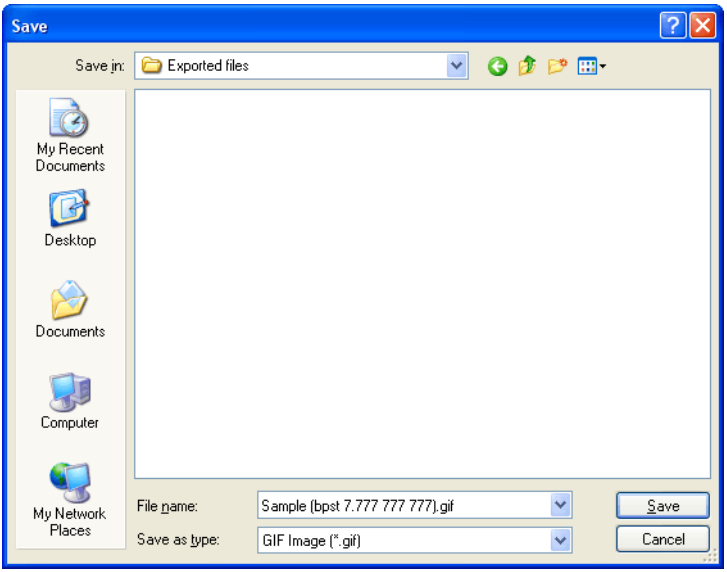
11.4 Exporting Instant Beacons Contents

You can export the contents of the *Instant Beacons* pane as an image file.

To export the contents of the Instant Beacons pane to a file:

1. Update the contents of the *Instant Beacons* pane to view what you want to export.
2. Click on **Save screenshot** .

A *Save As* window appears:

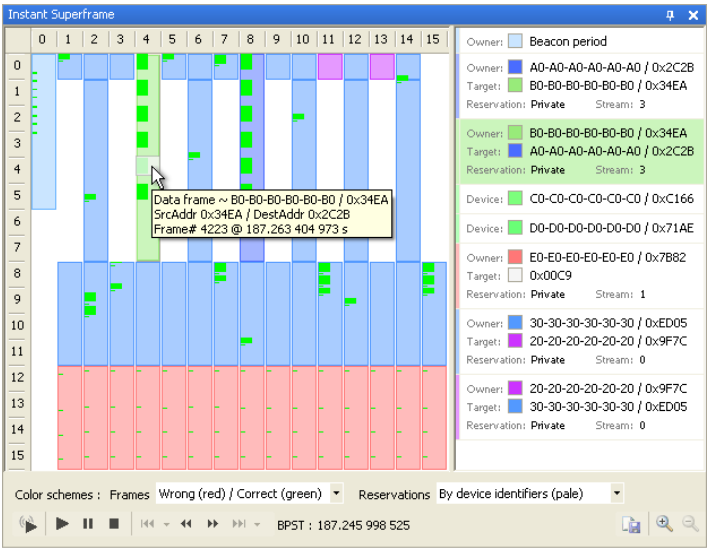


3. Navigate to the folder where the image is to be exported.
4. Type the required name of the image file in the *File name* field.
5. Select the required image format from the *Save as type* drop-down list.
6. Click on **Save**.

An image with the contents of the *Instant Beacons* pane is saved.

12 Instant Superframe Pane

The *Instant Superframe* pane displays all reservations and traffic received during a selected superframe and allows you to navigate back and forth between superframes.



The *Instant Superframe* pane can be setup to display superframes contents in real-time when an analyzer is connected and running. It can also be used to navigate back and forth between superframes.

12.1 Understanding the Instant Superframe Pane Contents

For more information on the terms and concepts used in this section please read the *Distributed Medium Access Control (MAC) for Wireless Networks* available from the WiMedia Alliance.

The main display shows a matrix of 16 rows by 16 columns. Time increases vertically from the top of the first column to its bottom and then continues on the next column. Each square at the intersection of a row and a column is called a MAS and lasts 256 microseconds.

The first MASs of the first column contains the Beacon Period. Other MASs can contain reservations, which are displayed with a background color. These reservations are extracted from the DRP IEs (Distributed Reservation Protocol Information Elements) declared by each device. Frames, when present are displayed over the reservations.

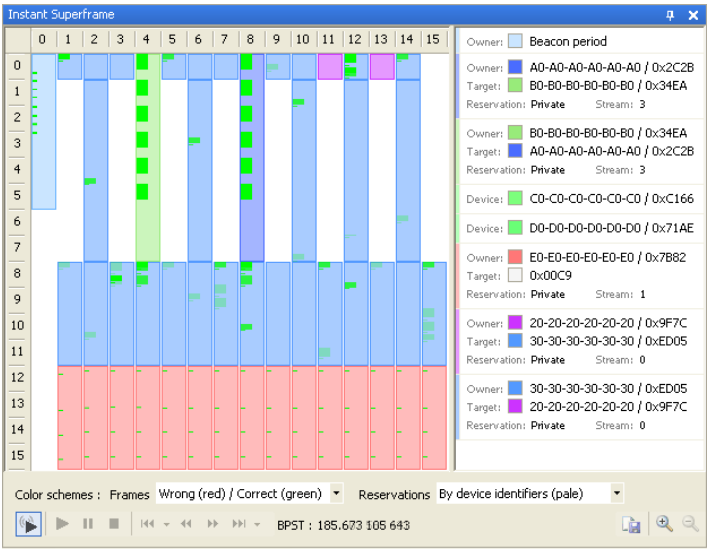
The rightmost part of the pane contains a checkable list of device pairs with their reservation parameters. A device can be an owner or a target for a reservation. Reservations without owner are drawn in the left area with a rounded border.

12.2 Viewing Instant Superframe in Real-Time

To view superframe contents in real-time:

1. Open the *Instant Superframe* pane.
2. Set up a device to be analyzed by the WiMedia Explorer 300 Analyzer.
3. Click on **Show last received beacons** .
4. Start recording.

The *Instant Superframe* pane displays reservations and frames in real-time:



Click on **Zoom-In** and **Zoom-Out** to adjust the zoom level of the *Instant Beacons* pane, for example to display it on a video projector.

12.3 Navigating Among Superframes

To navigate among superframes during post-processing:

1. Open a file that contains recorded traffic.
2. Use the following controls to navigate between superframes:
   - Click on **Play** to play back the traffic. Superframes contents are shown one superframe after another.
   - Click on **Pause** to pause the playback.
   - Click on **Stop** to stop the playback and reset to the beginning of the file.
   - Click on **Previous Superframe** to go back one superframe. This is not available in Play mode.
   - Click on **Next Superframe** to go forth one superframe. This is not available in Play mode.

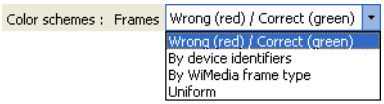
You can place the pointer over a frame to view a pop-up with the frame's details.

You can click a frame in the *Instant Superframe* pane to highlight it in the WiMedia overview. Double-clicking a frame will highlight and select that frame. You can also select a frame in the WiMedia overview to highlight it in the *Instant Superframe* pane.

12.4 Changing Frames' Colors

To change frames' colors:

1. Open the *Instant Superframe* pane.
2. Click the **Down** arrow beside the *Color schemes: Frames* field to open the menu below:

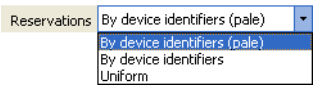


3. Select the required color scheme from the following options:
   - **Wrong (red) / Correct (green)** - Each frame is shown in green if it is in an allowed reservation and in red if it is outside an allowed reservation.
   - **By device identifiers** - Each frame is shown with the color of the device to which it belongs.
   - **By WiMedia frame type** - Each frame is shown with a color that represents its type.
   - **Uniform** - All frames are shown with the same color.

The *Instant Superframe* pane is updated with the new color scheme.

To change reservations' colors:

1. Open the *Instant Superframe* pane.
2. Record a device.
3. Click the **Down** arrow beside the *Reservations* field to open the menu below:



4. Select the required color scheme from the following options:
   - **By device identifiers (pale)** - Each reservation is shown with the color of the device to which it belongs. The tone of the color is appears pale to increase the contrast with the frames.
   - **By device identifiers** - Each reservation is shown with the color of the device to which it belongs.
   - **Uniform** - All reservations are shown with the same color.

The *Instant Superframe* pane is updated with the new color scheme.

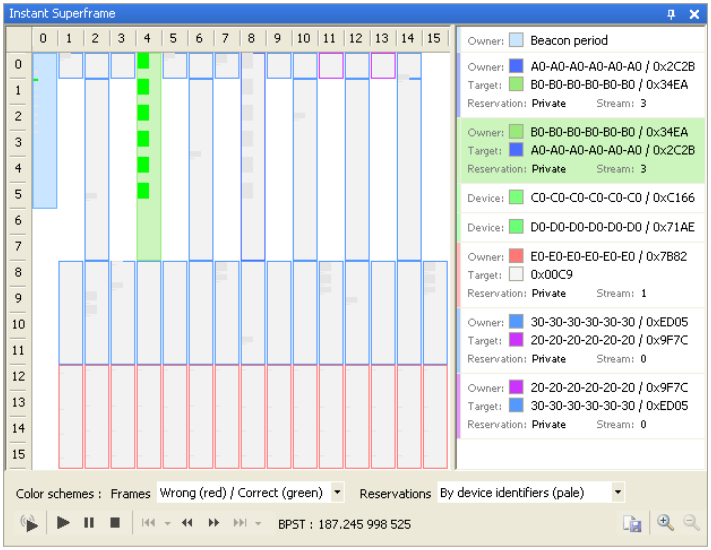
12.5 Highlighting Device's Reservations

You can highlight reservations and frames for a device or a group of devices, and gray out everything else. By doing this you can focus-in on the devices of interest without other devices being strongly displayed.

To highlight device's reservations:

1. Open the *Instant Superframe* pane.
2. Click on a device pair on the right of the *Instant Superframe* pane to select or deselect it. If none are selected, all devices are highlighted. If one or more are selected, only selected devices will be highlighted.

The *Instant Superframe* pane is updated showing your selection:



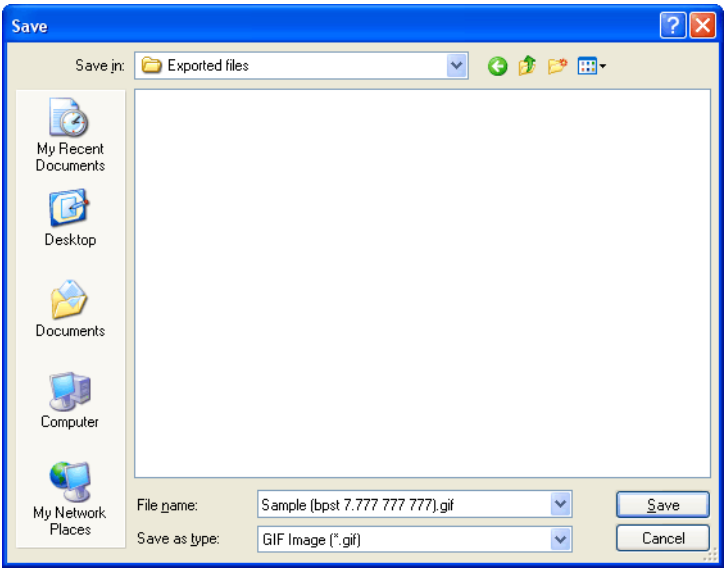
12.6 Exporting Instant Superframe Contents

You can export the contents of the *Instant Superframe* pane as an image file.

To export the contents of the Instant Superframe pane to a file:

1. Update the contents of the *Instant Superframe* pane to view what you want to export.
2. Click on **Save screenshot** .

A *Save As* window appears:

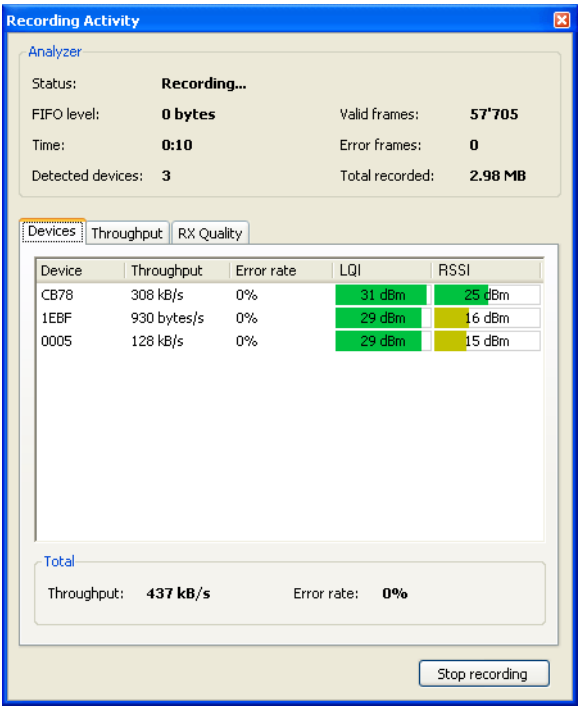


3. Navigate to the folder where the image is to be exported.
4. Type the required name of the image file in the *File name* field.
5. Select the required image format from the *Save as type* drop-down list.
6. Click on **Save**.

An image with the contents of the *Instant Superframe* pane is saved.

13 Recording Activity Pane

The *Recording Activity* pane shows real-time information provided by the Ellisys WiMedia Explorer 300 Analyzer hardware. It can be used to view throughput of devices in real-time or to check reception quality of devices.



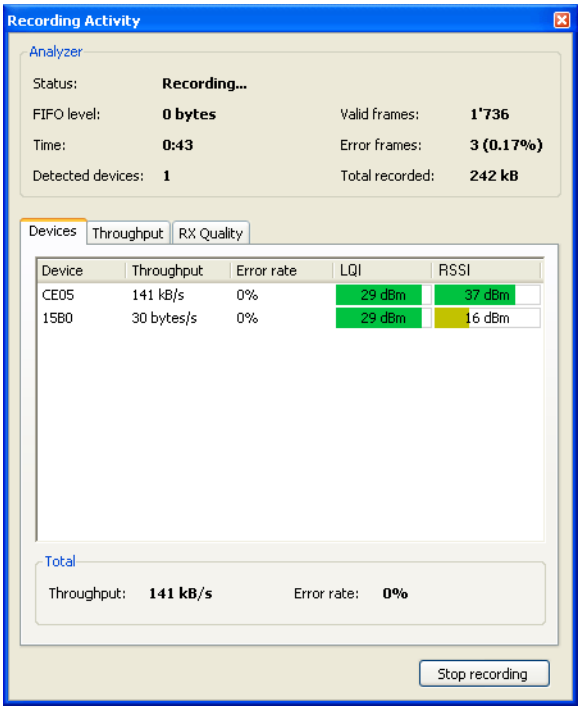
13.1 Using the Recording Activity Pane

To run the Recording Activity facility:

1. Select **View | Other Windows | Recording Activity** in the menu.

The *Recording Activity* pane appears.

2. Click on **Start Recording** Start recording to start an analysis session. The *Recording Activity* pane starts updating in real time:



The *Recording Activity* pane is updated only when the Ellisys WiMedia Explorer 300 Analyzer is running.

The contents of the pane is populated with information taken from all recognized devices.

The following general information is displayed in the *Analyzer* group:

- **Status** - Running status of the analyzer hardware.
- **FIFO level** - Filling level of the memory of the analyzer hardware.
- **Time** - Time since the recording session started.
- **Detected devices** - Number of detected devices.
- **Valid frames** - Number of valid frames recorded.
- **Error frames** - Number of invalid frames recorded.
- **Total recorded** - Amount of data recorded since the beginning of the recording session.

The following information is displayed in the device list, for each device:

- **Device** - Address of that device.
- **Throughput** - Throughput of that device.
- **Error rate** - Error rate of that device.
- **LQI** - Link quality for that device.
- **RSSI** - Received signal strength for that device.

The following information is displayed in the *Total* group:

- **Throughput** - Total throughput for all devices.
- **Error rate** - Average error rate of all devices.

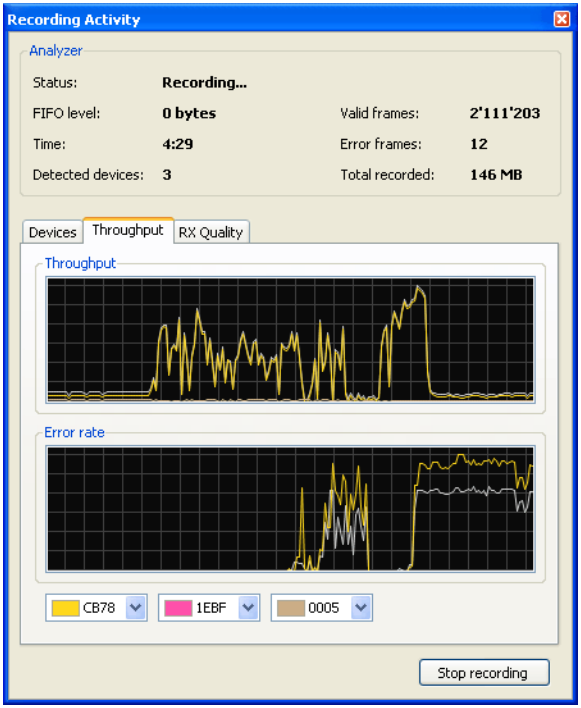
13.2 Reviewing Device Throughput and RX Quality

You can use the **Throughput** tab and the **RX Quality** tab to review parameters for one device. To do this you must first select a device.

To review the throughput of a device:

1. Open the *Recording Activity* pane and ensure the analyzer is recording.
2. On the **Devices** tab click on a device in the list to select it.
3. Click on the **Throughput** tab.

The throughput graphs appears:

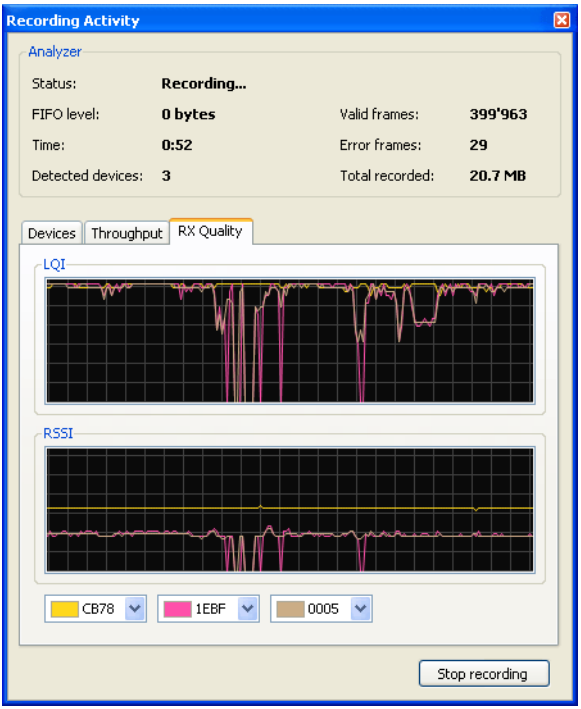


The top graph shows a history of the throughput for the selected device and the bottom graph shows a history of the device's error rate.

To review the RX quality of a device:

1. Open the *Recording Activity* pane and ensure the analyzer is recording.
2. On the **Devices** tab click on a device in the list to select it.
3. Click on the **RX Quality** tab.

The *RX Quality* graphs appears:



The top graph shows a history of the LQI for the selected device and the bottom graph shows an history of the device's RSSI.

LQI and RSSI can also be reviewed in the trace during post-processing. Go to the *Details* pane and review *RX Quality* under the section *WiMedia Frame Information*.

14 Security Pane

WiMedia frames are sent wirelessly and therefore need to be secured to ensure a third-party cannot access any information transmitted. WiMedia implements all the mechanisms needed to encrypt sensitive information. It uses the AES-128 symmetric encryption/decryption algorithm, which is extremely robust.

WiMedia devices involved in secure transmissions require a security key to encrypt or decrypt frames. The software needs the security key to display decrpyted frames. Without the security key the software will not be able decoded encrypted frames.

Certified Wireless USB devices exchange encrypted frames. Certified Wireless USB devices must be associated with a host before they can use wireless communications. One possible association type is called wired association. With wired association a host and a device define a security context by exchanging transactions on the USB cable. This security context includes the master key required to decrypt ciphered wireless frames. Use an *Ellisys USB Explorer 260 Analyzer* to automatically extract the master key from the security context.

14.1 Extracting the Master Key from a Wired Association

The procedure below is specific to the *Ellisys USB Explorer 260 Analyzer*. Please contact Ellisys or go to **www.ellisys.com/products/usbex260/** for more information on this product.

To extract the master key:

1. Prepare a setup to record a single device with the *Ellisys USB Explorer 260 Analyzer*. Ensure that the device is disconnected from the analyzer. The host can be connected.
2. Select **Record** | **Start recording** in the menu or press CTRL-R to start recording.
3. Connect the device to the analyzer.

4. Follow the instructions on the host to associate the device.
5. Once completed click on **Save** on the analyzer software to save recorded packets in a trace.

The trace appears and should appear similar to the one below:

Item	Device	Endpoint	Payload	Time
Enter text here	Ent…	Ente…	Enter text here	Enter text …
GetDescriptor (Device)	0 (2)	0	18 bytes (12 01 00 02 E…	6.748 463 783
SetAddress (2)	0 (2)	0	No data	6.935 963 550
GetDescriptor (Device)	2	0	18 bytes (12 01 00 02 E…	6.998 461 283
GetDescriptor (Configuration)	2	0	9 bytes (09 02 12 00 01…	37.199 328 067
GetDescriptor (Configuration)	2	0	18 bytes (09 02 12 00 0…	37.199 631 617
SetConfiguration (1)	2	0	No data	37.199 879 550
GetAssociationInformation	2	0	25 bytes (19 00 02 00 0…	37.345 176 300
SetAssociationResponse	2	0	84 bytes (00 00 02 00 0…	37.503 616 533
GetAssociationRequest	2	0	44 bytes (02 00 04 00 6…	37.524 701 167
GetAssociationRequest	2	0	108 bytes (02 00 04 00 …	37.525 328 133
SetAssociationResponse	2	0	78 bytes (00 00 02 00 0…	61.311 526 950
SetAssociationResponse	2	0	78 bytes (00 00 02 00 0…	70.612 335 133

6. Review the trace to find the last `SetAssociationResponse` request and click on it to select it.

The *Details* pane is updated and shows the Connection Key:

Details

SetAssociationResponse

Response data	
AssociationTypeId	Certified Wireless USB
AssociationSubTypeId	0x0001
Length	78 bytes
CHID	13 C7 4D 41 52 49 4F 30 30 30 30 30 4F D6 9B 4A
CDID	D8 5C F0 DF B1 35 85 82 09 59 5E C8 BD 22 DC 24
Connection Key	64 FB 9F BB C1 92 62 9E 41 90 8C 7A 77 9F 9F E6
BandGroups	00000000 00000001

The Connection key is the master key that will be used to encrypt and decrypt all secured frames. It can be set in the Ellisys WiMedia Explorer 300 Analyzer software to decrypt secured frames.

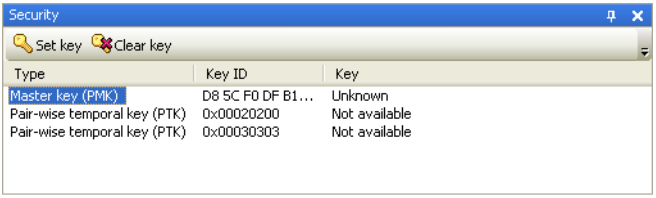
14.2 Setting a Security Key

A security key is required to display unencrypted data for secured payloads. If the correct security key is not set, the software will replace the payload with the word *Encrypted* in the overview panes:

Item	Device	Endpoint	Status	Payload	Time
Endpoint 3 IN Ready	1	3 IN			30.554 071 279
IN transaction	1	3 IN	OK	16 bytes (Encrypted)	30.554 261 533
IN transaction	1	3 IN	OK	4 bytes (Encrypted)	30.555 284 531
IN transaction	1	1 IN	NAK	No data	30.555 525 542
OUT transaction	1	2 OUT	OK	16 bytes (Encrypted)	30.556 407 527

To set a security key:

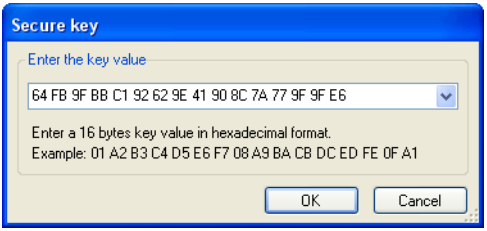
1. Open the *Security* pane.
2. Click on the required security key in the *Security* pane:



3. Click on **Set Key** 

.

The *Secure key* window appears:

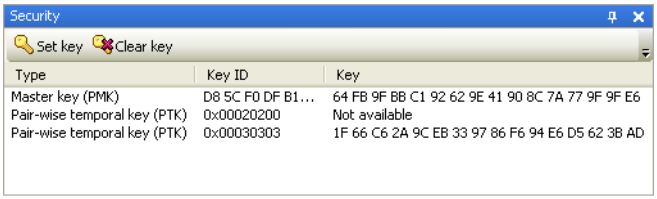


4. Type the 16 bytes of the security key.

You can use the drop-down list to retrieve previously used keys.

5. Click on **OK**.

The Security key appears in the *Security* pane. Note that the software automatically computes *Pair-wise temporal keys* that matches the *Master key*.



All panes are refreshed to display decrypted payloads:

Item	Device	Endpoint	Status	Payload	Time
Endpoint 3 IN Ready	1	3 IN			30.554 071 279
IN transaction	1	3 IN	OK	16 bytes (10 83 1E ...	30.554 261 533
IN transaction	1	3 IN	OK	4 bytes (00 FA 03 00)	30.555 284 531
IN transaction	1	1 IN	NAK	No data	30.555 525 542
OUT transaction	1	2 OUT	OK	16 bytes (10 81 1E ...	30.556 407 527

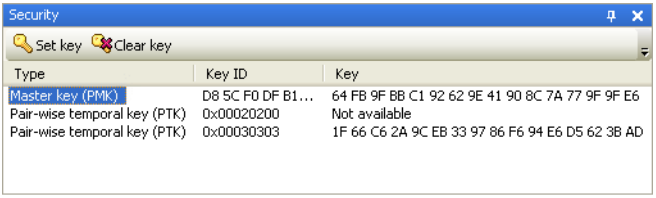
Decrypted payloads are displayed only if the keys match. If you enter a key and payloads are not decrypted check the key to ensure it is correct.

All keys that are set are stored by the software and associated with the Key ID. They are retained by the software in order to retrieve them automatically later. Therefore you do not have to set a key more than once for a given Key ID.

14.3 Clearing a Security Key

To clear a security key:

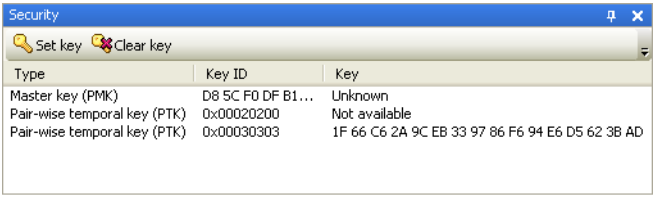
1. Open the *Security* pane.
2. Click on the required security key in the *Security* pane:



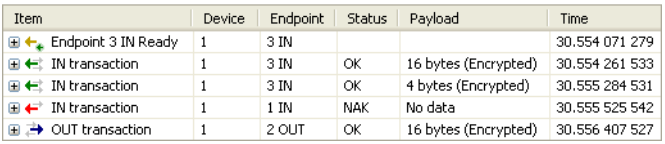
3. Click on **Clear Key** 

.

The selected security key is cleared:



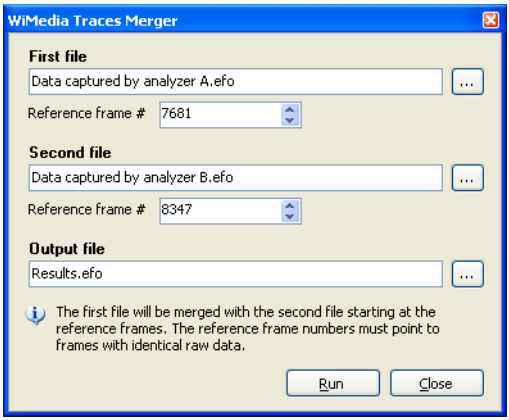
All panes are refreshed to display encrypted payloads:



Item	Device	Endpoint	Status	Payload	Time
Endpoint 3 IN Ready	1	3 IN			30.554 071 279
IN transaction	1	3 IN	OK	16 bytes (Encrypted)	30.554 261 533
IN transaction	1	3 IN	OK	4 bytes (Encrypted)	30.555 284 531
IN transaction	1	1 IN	NAK	No data	30.555 525 542
OUT transaction	1	2 OUT	OK	16 bytes (Encrypted)	30.556 407 527

15 WiMedia Traces Merger Utility

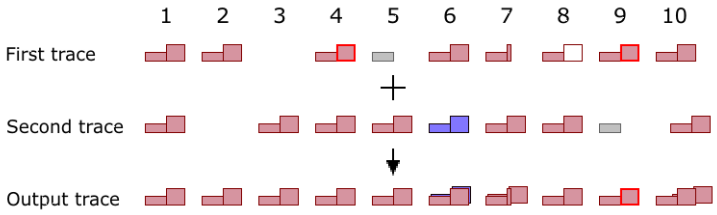
The WiMedia Traces Merger Utility allows merging traces recorded simultaneously by two analyzers:



Merging traces reduces the probability of receiving frames with errors when each of the two analyzers capture traffic from two distant groups of WiMedia devices. In this configuration each analyzer will capture the nearest group of devices, and capture most of the other group frames although several will be in error. The *WiMedia Traces Merger Utility* can consolidate both traces into a single trace.

15.1 Understanding the Merge Process

The figure below presents 10 cases of merge operations:



These 10 cases are detailed below:

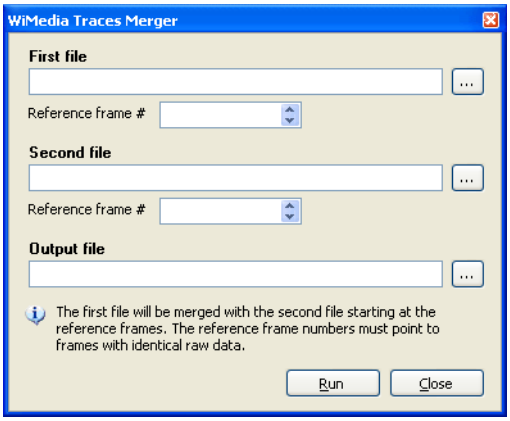
Case	First trace	Second trace	Output trace
1	Valid frame	Same valid frame	Valid frame
2	Valid frame	No frame	Valid frame
3	No frame	Valid frame	Valid frame
4	Frame with FCS error	Valid frame	Valid frame
5	Frame with HCS error	Valid frame	Valid frame
6	Valid frame	Different valid frame	Both frames
7	Small valid frame	Large valid frame	Both frames
8	Valid frame with payload filtered	Valid frame	Valid frame
9	Frame with FCS error	Frame with HCS error	Frame with FCS error
10	Valid frame	Same valid frame but comes later	Both frames

15.2 Using the WiMedia Traces Merger Utility

To merge traces:

1. Select **Tools** | **WiMedia Traces Merger** in the menu.

The *WiMedia Traces Merger* dialog box appears:

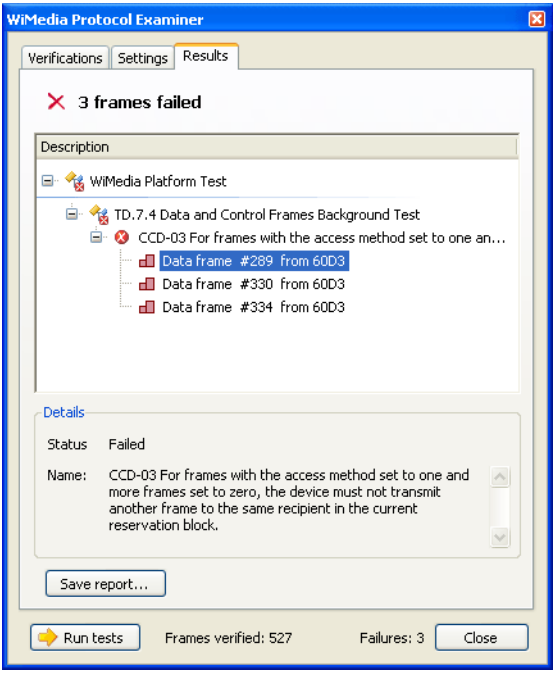


2. Click on **Browse** ... beside the *First file* field and navigate to select the first file.
3. Enter the reference frame number for the first file in the *Reference frame* field.
4. Click on **Browse** ... beside the *Second file* field and navigate to select the second file.
5. Enter the reference frame number for the second file in the *Reference frame* field.
6. Click on **Browse** ... beside the *Output file* field and navigate to where the file is to be saved.
7. Click on **Run**.

The *WiMedia Trace Merger Utility* merges the traces.

16 WiMedia Protocol Examiner Pane

The Ellisys WiMedia Protocol Examiner executes a comprehensive set of checks for the test scenarios defined in the *WiMedia Platform Test Specification*. Any detected issues can then be easily debugged using all the features available in the WiMedia protocol analysis software:



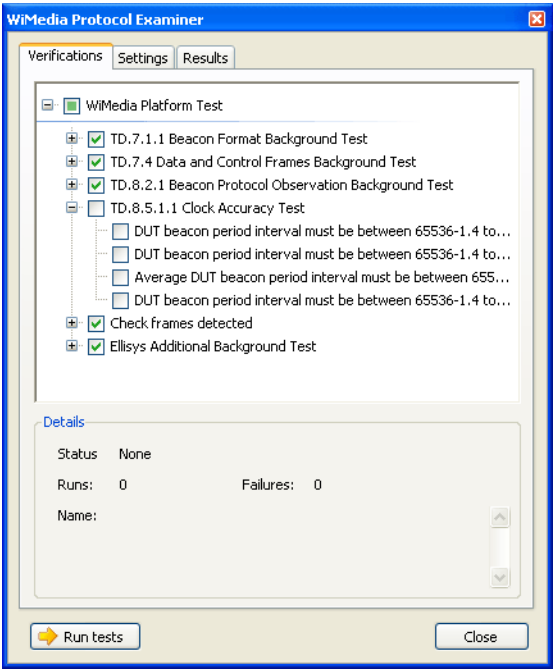
The verifications are designed to be run on compliance traces but will also work on any trace. In this case, errors that are only relevant during a compliance session should be ignored.

16.1 Selecting Verification Settings

To select the verification settings:

1. Select **Tools | WiMedia Protocol Examiner** in the menu.

The *WiMedia Protocol Examiner* window appears:



2. Click on **Plus** to expand a category.
3. Select or unselect check boxes to respectively enable or disable a given check in its category.

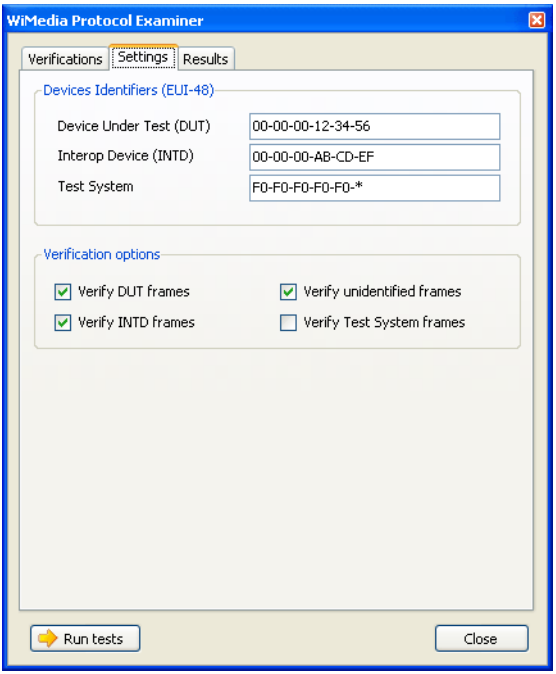
16.2 Selecting the WiMedia Protocol Examiner Settings

To select the WiMedia Protocol Examiner settings:

1. Select **Tools | WiMedia Protocol Examiner** in the menu.

The *WiMedia Protocol Examiner* window opens.

2. Click the **Settings** tab, the *Settings* window opens:



3. Update the addresses for the Device Under Test, Interop Device and Test System in the Device Identifiers area. The device identifiers can be found in the *Device Identifier* field of the beacon frames sent by the devices.

4. Select or unselect the check boxes beside the Verification options to respectively enable or disable that setting. During a compliance session all frames are verified except the frames sent by the test system itself.

16.3 Running WiMedia Protocol Examiner

To run checks and view test results:

1. Select **Tools | WiMedia Protocol Examiner** in the menu.

The *WiMedia Protocol Examiner* window opens.

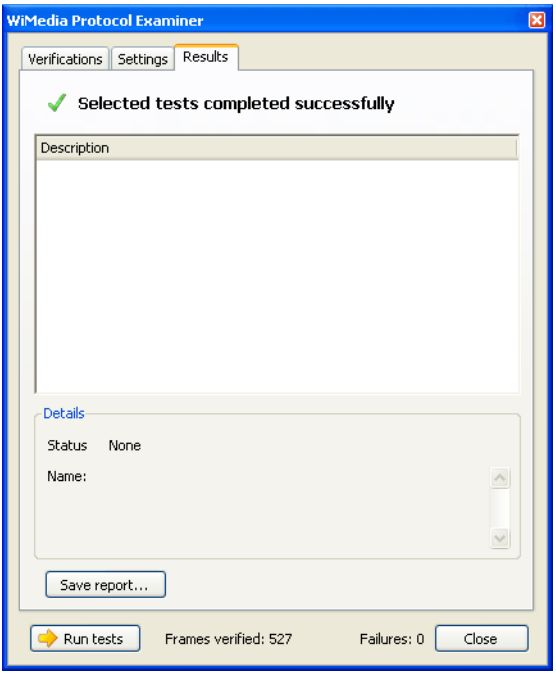
2. Ensure test verification, settings and options are set as described above.

3. Click on **Run** 

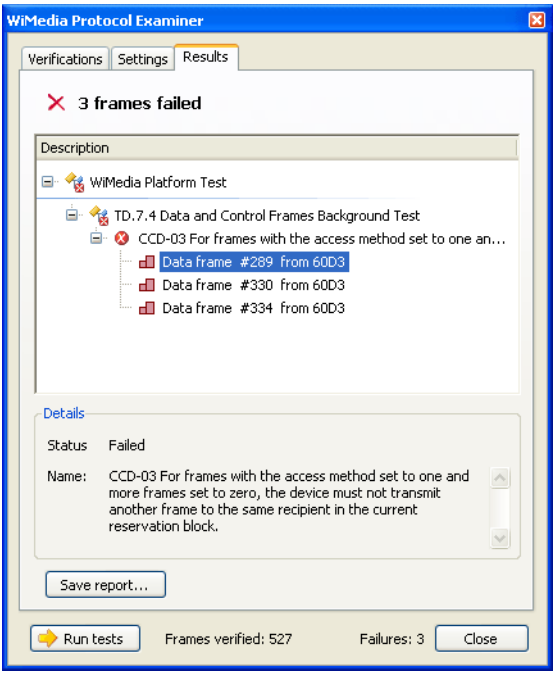
.

The WiMedia Protocol Examiner runs all selected checks and displays the test results in the *Results* window.

If no errors were detected the following window will appear:



If one or more check failed the following window will appear:



Select an error to view the error's description at the bottom of the window. Double-click on an error to highlight and select the corresponding frame in the *WiMedia* overview.

4. Click on **Save report** if you to save the report in a text file.
5. Click on **Close** to close the window.

The complete *WiMedia Platform Test Specification* is available from the WiMedia Alliance and contains a detailed description of all test scripts, checks and procedures. Please refer to that specification for more information.

Although this feature of the Ellisys WiMedia Explorer 300 Analyzer software checks numerous details of the Device Under Test it does not replace the official certification. Please contact Ellisys for more information on the Certification Program.

17 Channel Scanner Pane

The *WiMedia Channel Scanner* scans selected ultrawideband channels and displays an overview of the traffic for each channel.

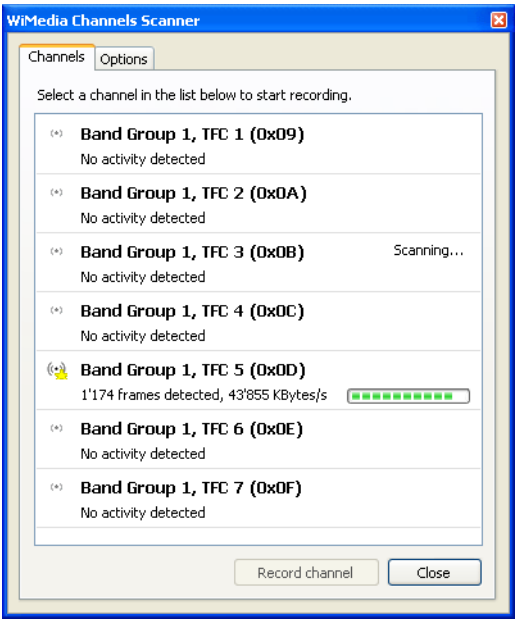
Make sure that at least one analyzer has been installed before using the Scan Channels facility. If you own several Ellisys WiMedia Explorer 300 Analyzers you may simultaneously use one for scanning channels and another one for recording.

17.1 Scanning Channels

To scan WiMedia channels:

1. Select **Tools | Scan** channels in the menu.

The *WiMedia Channels Scanner* window appears:



The *WiMedia Channels Scanner* automatically scans the default Analyzer and displays the results. Once the traffic is summarized it is discarded.

It is possible to set the default recording channel and start recording traffic from this window. Select the required channel and click on **Record channel** or double-click it.

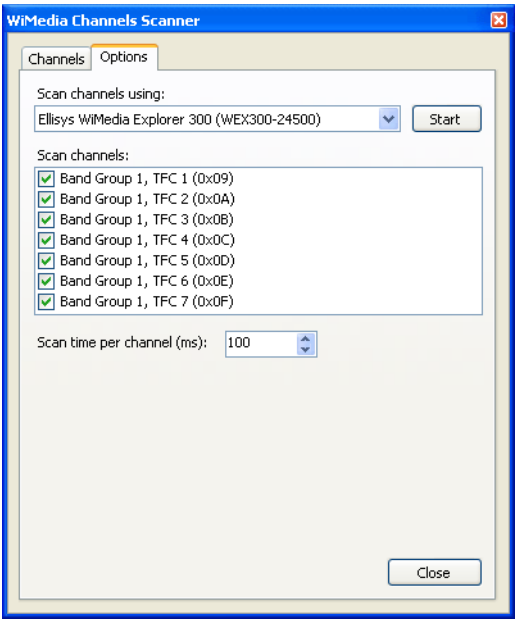
Since the *WiMedia Channels Scanner* cannot record all channels simultaneously it may miss frames sent on a channel when recording on another channel. Select a channel and record it to reliably capture all frames sent on this channel or use several Ellisys WiMedia Explorer 300 Analyzers to capture frames on several channels simultaneously.

You can change scan parameters in the *Options* pane.

To change the options of the Channel Scanner:

1. Click the **Options** tab.

The *Ultrawideband channels options* window appears:



2. Click the **Down**  arrow beside the *Scan channels using* field and select an analyzer from the drop-down list.
3. Select the check box beside the channel to be scanned in the *Scan channels* list.
4. Type the required scan time per channel in the *Scan time per channel* field. The time is specified in milliseconds.
5. Click on **Start**  to scan the channels with the selected options.

18 Exporting

The WiMedia Explorer 300 Analyzer export facility allows you to create files based on the data currently loaded in the software.

Data can be exported to various file formats:

- WiMedia overview - Exports selected columns of the WiMedia overview to a CSV file or a XML file.
- WiMedia frames and data - Exports frames payload to a CSV file, a text file, an XML file or a binary file.
- Wireless USB overview - Exports selected columns of the Wireless USB overview to a CSV file or a XML file.
- Ellisys WiMedia Generator Script - Exports frames to a Script file which the Ellisys WiMedia Explorer 300 Generator can load.
- Ellisys Trace File - Exports frames to a Trace file which the Ellisys WiMedia Explorer 300 Analyzer can load. This feature can be used to discard some information in order to reduce the size of the exported file.

Most export file formats cannot be imported. They are intended to be used in third-party application software to perform custom tasks. Examples include exporting frames to a spreadsheet processor in order to compute or verify timing or exporting a Script file to generate recorded traffic using an Ellisys WiMedia Explorer 300 Generator.

It is also possible take a screenshot of the contents of various panes and export it as an image file. The step by step procedure to take screenshots of these panes are explained in their respective sections:

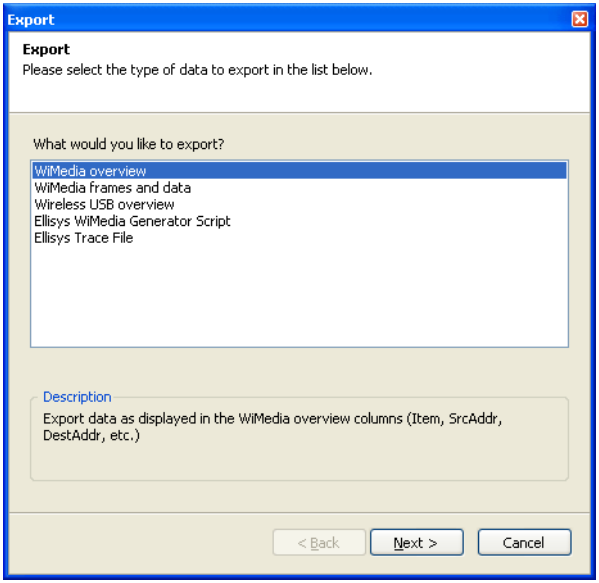
- For more information on how to create a screenshot of the *Instant Timing* pane see *10.9 Exporting Instant Timing Contents* on page 118.
- For more information on how to create a screenshot of the *Instant Beacons* pane see *11.4 Exporting Instant Beacons Contents* on page 123.
- For more information on how to create a screenshot of the *Instant Superframe* pane see *12.6 Exporting Instant Superframe Contents* on page 131.

18.1 WiMedia Overview

To export recorded data in WiMedia overview:

1. Select **File | Export** in the menu.

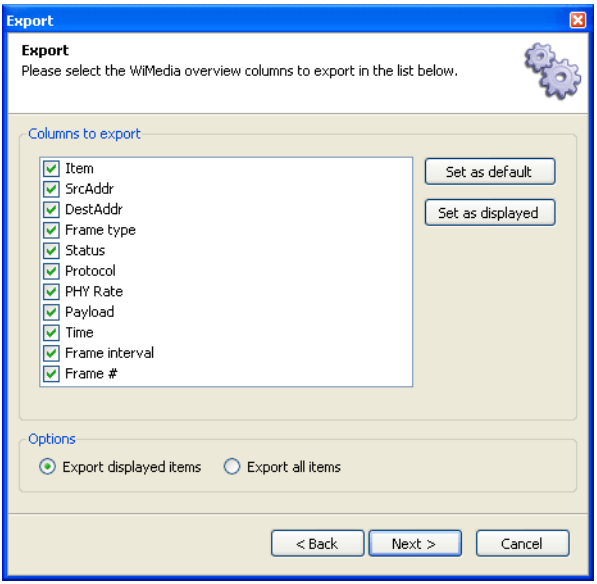
The *Export Type window* appears:



2. Select **WiMedia overview** in the list.

3. Click on **Next**.

The *Export Options* window appears:



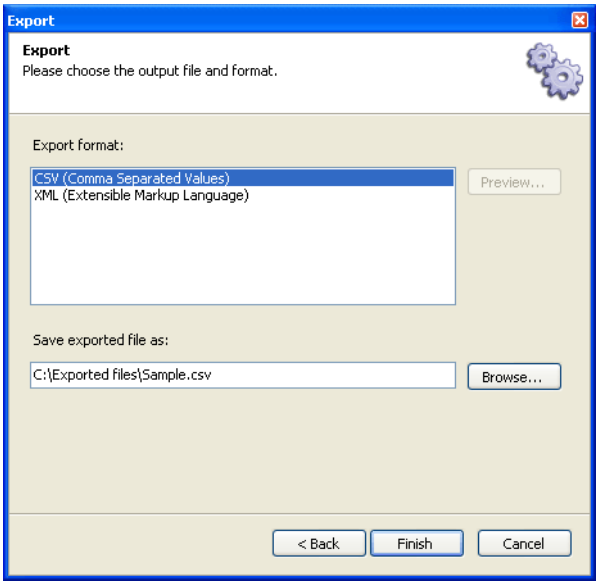
4. Click on the required columns to export check boxes in the **Columns to export** list to select the required columns.
5. Click **Export displayed items** to export the selected items in the **Columns to export** list.

or

6. Click **Export all items** to export all the items in the **Columns to export** list.

7. Click on **Next**.

The *Export Format* window appears:



8. Click on the required format in the **Export format** list, CSV or XML.
9. Click on **Browse** and navigate to where the file is to be saved.
10. Click on **Finish**.

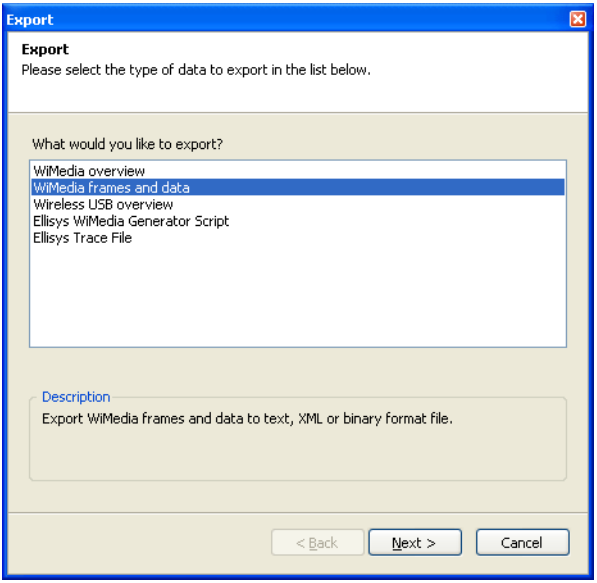
The recorded data is exported in the selected format.

18.2 WiMedia Frames and Data

To export recorded data in WiMedia frames and data format:

1. Select **File | Export** in the menu.

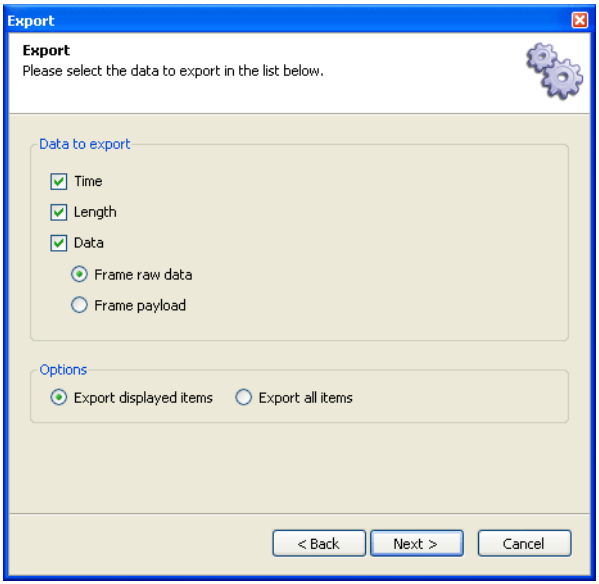
The *Export Type* window appears:



2. Select *WiMedia frames and data* in the list.

3. Click on **Next**.

The *Export Options* window appears:



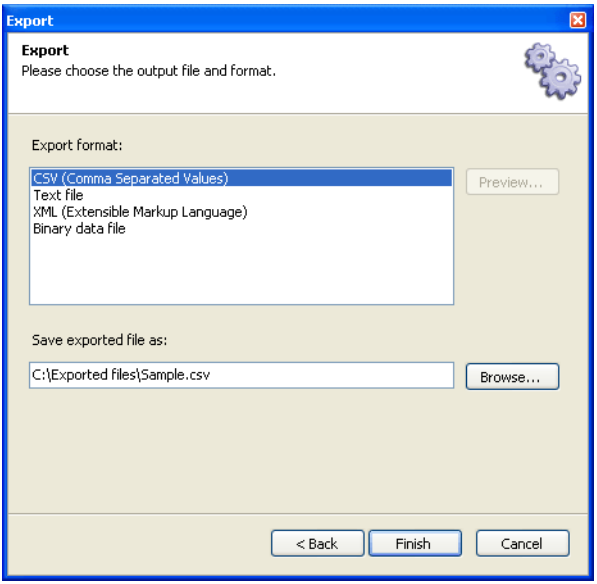
4. In the **Data to export** list select one or all of the following check boxes:
   - **Time**
   - **Length**
   - **Data**
5. If you select **Data**, select **Frame raw data** to export frame raw data.
   or
   Select **Frame payload** to export frame payload data.
6. Click **Export displayed items** to export the selected items in the **Data to export** list.

or

7. Click **Export all items** to export all the items in the **Data to export** list.

8. Click on **Next**.

The *Export Format* window appears:



9. Select the required format in the **Export format** list.
10. Click on **Browse** and navigate to where the file is to be saved.
11. Click on **Finish**.

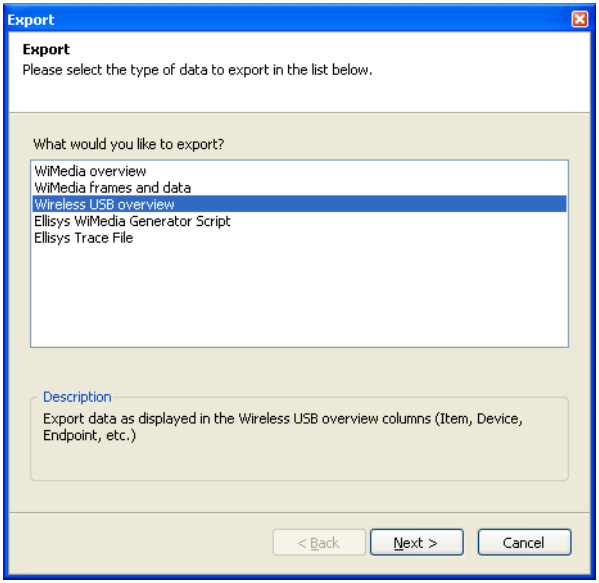
The recorded data is exported in the selected format.

18.3 Wireless USB Overview

To export recorded data in Wireless USB overview format:

1. Select **File | Export** in the menu.

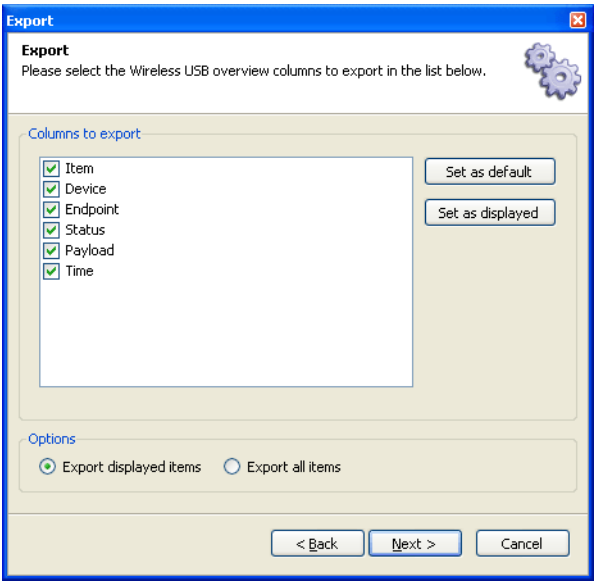
The *Export Type* window appears:



2. Select **Wireless USB overview** in the list.

3. Click on **Next**.

The *Export Options* window appears:



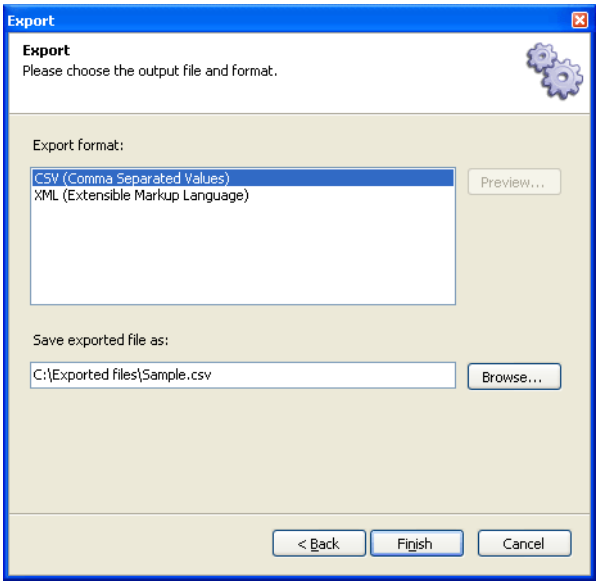
4. Click on the required columns to export check boxes in the **Columns to export** list to select the required columns.
5. Click **Export displayed items** to export the selected items in the **Options** list.

or

6. Click **Export all items** to export all the items in the *Options* list.

7. Click on **Next**.

The *Export Format* window appears:



8. Select on the required format in the **Export format** list.
9. Click on **Browse** and select where the file is to be saved.
10. Click on **Finish**.

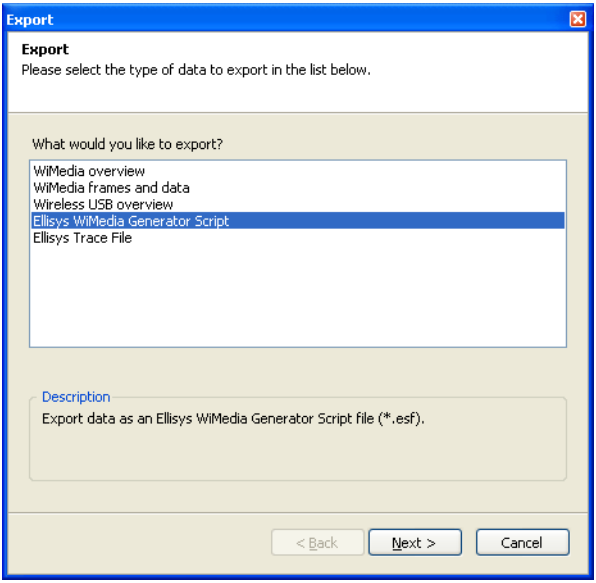
The recorded data is exported in the selected format.

18.4 Ellisys WiMedia Explorer 300 Generator Script

To export recorded data in Ellisys WiMedia Explorer 300 Generator Script format:

1. Select **File | Export** in the menu.

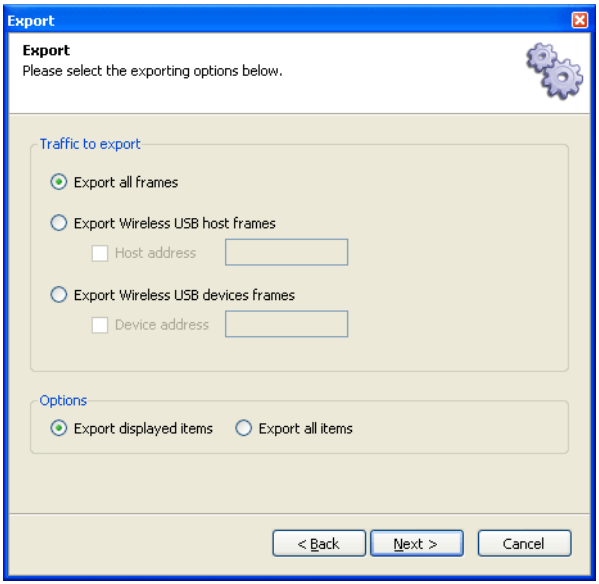
The *Export Type* window appears:



2. Select **Ellisys WiMedia Explorer 300 Generator Script** in the list.

3. Click on **Next**.

The *Export Options* window appears:



4. Click **Export all frames** to export all frames.

or

5. Click **Export Wireless USB host frames**.
6. Select **Host Address** and type the host address in the *Host address* field if required.

or

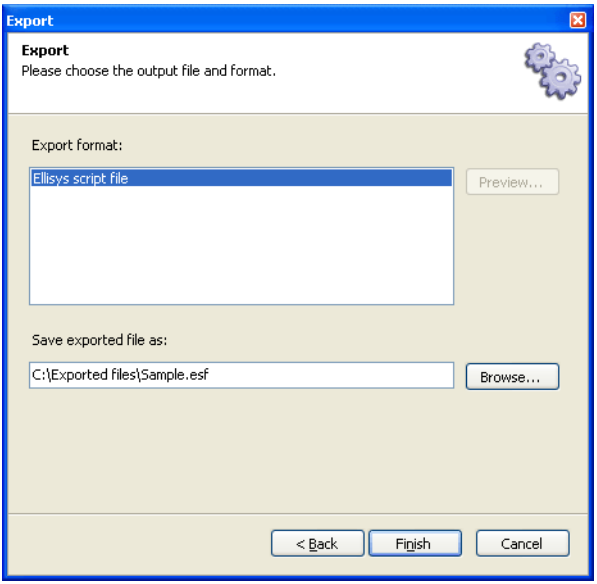
7. Click **Export Wireless USB device frames**.
8. Select **Device address** and type the device address in the *Device address* field if required.
9. Click **Export displayed items** to export the selected items in the **Options** list.

or

10. Click **Export all items** to export all the items in the **Options** list.

11. Click on **Next**.

The *Export Format* appears:



12. Select **Ellisys script file** in the **Export format** list.
13. Click on **Browse** and navigate to where the file is to be saved.
14. Click on **Finish**.

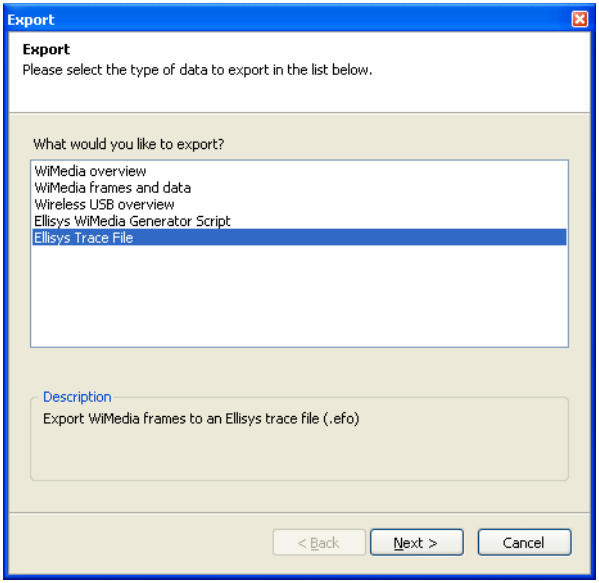
The recorded data is exported in the selected format.

18.5 Ellisys Trace File

To export recorded data in Ellisys Trace file format:

1. Select **File | Export** in the menu.

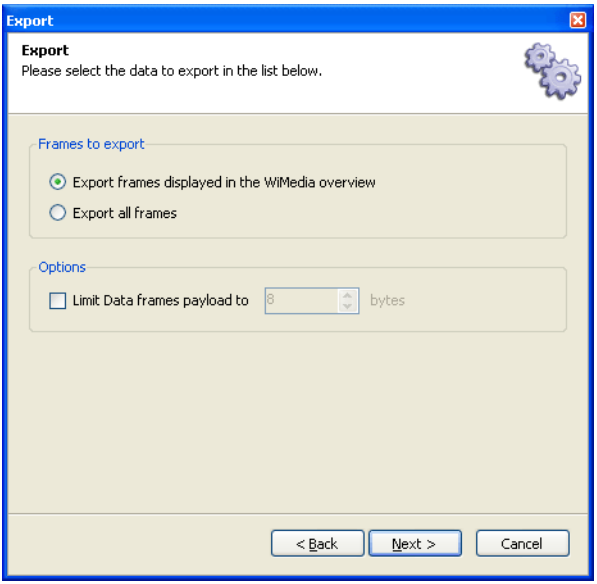
The *Export Format* window appears:



2. Select **Ellisys Trace File** in the list.

3. Click on **Next**.

The *Export Options* window appears:



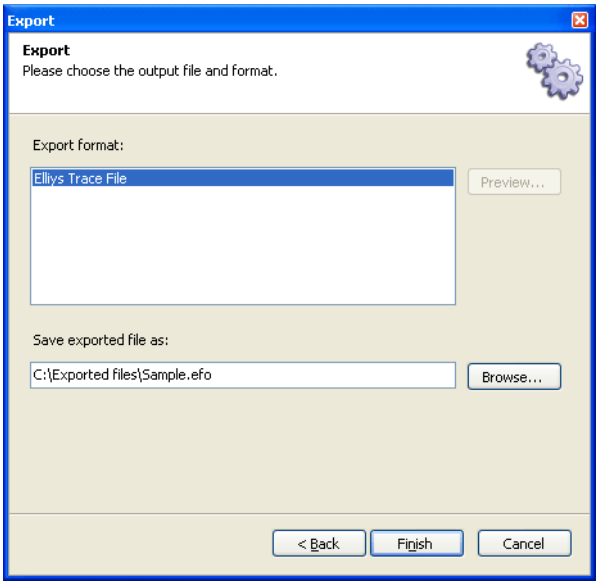
4. Click **Export frames displayed in the WiMedia overview** to export frames in the *WiMedia Overview* pane.

or

5. Click **Export all frames** to export all frames.
6. Click on **Limit Data frames payload to *N* bytes** and enter a value for *N* if you do not want to keep all the payload and want to reduce the size of the exported file.

7. Click on **Next**.

The *Export Format* window appears:



8. Click on **Browse** and navigate to where the file is to be saved.
9. Click on **Finish**.

The recorded data is exported in the selected format.

You can filter out frames in the *WiMedia overview* and export its contents to a new file using this option to reduce the size of the file or hide specific information. The resulting file is directly readable by the software and will contain only the frames that were displayed in the *WiMedia overview.*

Frequently Asked Questions

Q **The WiMedia Explorer 300 transmits data using a USB 2.0 connection. Do I need a USB 2.0 host controller?**

A Although the WiMedia Explorer 300 can upload or download data on a full speed USB 1.1 connection, Ellisys strongly recommends that you connect it to a high speed USB 2.0 port to obtain optimal performance. If you experience problems with the WiMedia Explorer 300, please ensure it is connected on a high speed USB 2.0 enabled host controller before contacting technical support.

Q **What is the maximum amount of data that I can analyze with the Ellisys WiMedia Explorer 300 Analyzer?**

A The Analyzer uses the host-computer memory and hard disk to store analyzed data. The maximum quantity of data is therefore limited by the size of the analysis computer's central memory (RAM) and hard disk.

Q **What is the maximum amount of data that I can generate with the Ellisys WiMedia Explorer 300 Analyzer?**

A The Generator uses its internal memory to store data to be generated. The maximum quantity of data is therefore limited by the size of the internal memory.

Q **I have been told that Ultrawideband or WiMedia has not yet been regulated in my country. Can I start developing UWB or WiMedia devices without causing unauthorized interferences?**

A Wireless information is transmitted over the air between devices through electromagnetic fields. These fields must stay within certain limits that have already been defined and accepted in the USA but regulations are still in progress in many other countries. Ellisys proposes a Wired Kit to connect the system under test with high frequency cables. Please contact the Ellisys sales team for more information.

Q **Is it possible to upgrade the firmware of the WiMedia Explorer 300?**

A Yes, the firmware is automatically updated with each new software release. No user intervention is required; the latest version of the firmware will be downloaded when you run the most recent version of the software.

Q **What can I connect to the large connector on the back of the product?**

A The Auxiliary Equipment connector enables hardware extensions. Several options are currently available and others may be provided in the future. Please contact the Ellisys sales team for more information.

Q **I cannot run the software installation file, why?**

A The software installation file requires Microsoft Windows Installer 3.0 or higher, which is available for download from the Microsoft web site.

Q **When my wireless devices are not generating frames the WiMedia Explorer 300 records a few invalid frames. What are these frames?**

A The invalid frames are observing are called false detects. These sporadic false detects are caused by ambient noise. They can be safely ignored or filtered.

Q **The frame error rate is quite high. What can I do?**

A Please follow the WiMedia Explorer 300 placement recommendations in *2.7 Placing the WiMedia Explorer 300*, on page 25. If the frame error rate continues to be high, bring the transmitting units closer and/or try working at a lower data rate.

Need more help?

Go to the Ellisys web site and the following pages for the latest information:

- Ellisys products page - Go to **www.ellisys.com/products** for the latest product information and documentation.
- Application notes and white papers - Go to **www.ellisys.com/technology** to find up-to-date information about the technology.
- Distributors - Go to **www.ellisys.com/sales/** to find a list of Ellisys distributors.
- Technical support - Go to **www.ellisys.com/support/** to send a question directly to the Ellisys support team.

Glossary

This glossary lists terminology terms, abbreviations and acronyms that you may come across while reading this User Guide and working with Ellisys products.

ACK	Acknowledgment code - Usually sent at the end of successful transaction.
Addr	Address - A field used to identify a given device.
Analyzer	An instrument that capture traffic exchanged between devices.
Antenna	An apparatus for sending or receiving electromagnetic waves.
API	Application Programming Interface - A set of functions used by a program to communicate with another.
Bandwidth	The transmission capacity of an electronic pathway such as a communication line, computer bus or computer channel.
Beacon	A data structure sent periodically to enable device discovery, dynamic network organization and support for mobility.
BIN	Binary - A representation of values that uses two symbols, typically 0 and 1.
BER	Bit Error Rate - The number of bits in error divided by the total number of bits.
BNC	Bayonet-Neill-Concelman - A connector for coaxial cables.
Bookmark	A stored location for quick retrieval at a later date.
bps	Bits per second - The measurement of the speed of data transfer in communication systems.
Breakpoint	The location in a program used to temporarily halt the program for testing and debugging.
Code Snippet	A small piece of program code usually used to guide the user.
CSV	Comma-separated Values - A delimited data format that has fields separated by the comma character and records separated by new lines.
CTA	Channel Time Allocation - An amount of time during which a Wireless USB device is allowed to use the channel for transmission or reception.

Dec	Decimal - A representation of values that uses ten symbols, typically 0 to 9.
DestAddr	Destination Address - A field that identifies the recipient of a packet of information.
DNTS	Device Notification Time Slot - Used to let a Wireless USB device send a notification, as for example to emulate wired USB signaling events.
DR	Device Receive - Used to send data to a Wireless USB device.
DT	Device Transmit - Used to let a Wireless USB device transmit data.
DUT	Device Under Test - A device that is being analyzed or debugged.
EDX	Ellisys index file - A file format used to index information found in another file.
EFO	Ellisys file format - A file format used to store information captured by an analyzer.
ESE	Ellisys settings file - A file format used to store user settings.
EUI-48	Unique identifier partly assigned by the IEEE RAC and partly defined by the manufacturer of an equipment to uniquely identify a networking device.
FCS	Frame Check Sequence - A number added to a stream of information that is used for error detection.
FIFO	First In First Out - A storage method that retrieves first the item stored for the longest time.
FER	Frame Error Rate - A measure of the number of frames in error divided by the total number of frames.
Frame	A block of data transmitted over a communication link. A frame can usually encapsulate one or more packets.
Gbps	Gigabits per second - 1,073,741,824 bits per second.
GByte	Gigabytes - 1,073,741,824 bytes.
HCS	Header Check Sequence - A number added to a header that is used for error detection.
Hex	Hexadecimal - A representation of values that uses sixteen symbols, typically 0 to 9 and A to F.
Handshake	The resulting status of a data exchange.

Host	A computer that acts as a source of information or signals.
IDE-type connector	A type of electric connector usually attached to a flat ribbon cable.
IE	Information Elements - A data structure that contains one or several fields that can be decoded using the corresponding specification.
LED	Light Emitting Diode - Display and lighting technology commonly used on electronic equipment to indicate their status.
Kbps	Kilobits per second - 1,024 bits per second.
KByte	Kilobytes - 1,024 bytes.
Loop	A repetition within a program or script.
MAC	Media Access Control - Usually an electronic component that performs protocol-level encapsulation, decapsulation, integrity checking and scheduling.
MAC address	A number that identify the recipient of a packet of information. MAC addresses are commonly coded using EUI-48.
Mbps	Megabits per second - 1,048,576 bits per second.
MByte	Megabytes - 1,048,576 bytes.
MIC	Message Integrity Check - A cryptographic checksum used in the handshaking process to verify the integrity of the packet.
MIFS	Minimum Inter Frame Spacing - The minimum time between two consecutive frames.
MMC	Micro-scheduled Management Command - A structure for maintaining Wireless USB channel and accomplishing data communications.
NAK	Negative Acknowledgement - An answer to a request that can express anything but acceptance.
OFDM	Orthogonal Frequency Division Multiplexing - OFDM's spread spectrum technique distributes the data over a large number of carriers that are spaced apart at precise frequencies.
Packet	A block of data that is transmitted over a communication link. A packet can be encapsulated in a lower-level frame.
Payload	The actual data in a packet minus all headers attached for transport and minus all descriptive metadata.

PHY	In wireless communications, the PHY enables the actual transmission by transforming over-the-air frames into electrical signals that are transmitted to a MAC, or vice-versa.
Protocol	The format and procedures that govern the transmitting and receiving of data.
RX	A communication abbreviation for receive.
Scambler	A device or software program that encrypts data.
ScrAddr	Source Address - A field that identifies the sender of a packet of information.
Script	A set of instructions that is executed without user interaction.
Security key	A numeric code that is used for encryption and security purposes.
SIFS	Standard Inter Frame Spacing - The time that is expected between two frames.
Snippet	A small piece of program code that guides the user in how to write a specific instruction.
SOF	Start of Frame - A packet used for USB time synchronization.
Stream	The continuous flow of data from one place to another.
Time Slot	Interval of time in which a device is allowed to transmit or receive data.
TX	A communication abbreviation for transmit.
Ultra wideband	A technology for transmitting information spread over a large bandwidth (>500 MHz) aimed to share spectrum with other users. WiMedia UWB is an UWB protocol defined by the WiMedia Alliance.
USB	Universal Serial Bus - An interface that connects between a computer and peripheral devices (such as a keyboard, game controllers, telephone, printer, etc.).
UWB	Ultra wideband - A technology for transmitting information spread over a large bandwidth (>500 MHz) aimed to share spectrum with other users. WiMedia UWB is an UWB protocol defined by the WiMedia Alliance.
WdntsCTA	Device Notification Time Slot - Used to let a Wireless USB device send a notification, as for example to emulate wired USB signaling events.
WdrCTA	Device Receive - Used to send data to a Wireless USB device.

WdtCTA Device Transmit - Used to let a Wireless USB device transmit data.

WiMedia WiMedia is an ISO-published radio platform standard for high-speed ultra wideband (UWB) wireless connectivity. With efficient power consumption and high data rates.

Wireless A radio transmission that does not use cable and can possibly transmit information over the air.

WUSB Wireless USB - An evolution of USB that enables wireless communication over WiMedia Ultra-wideband.

XML Extensible Markup Language - A reasonably human-legible structured language aimed to facilitate the sharing of data across heterogeneous information systems.

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ellisys

Chemin du Grand-Puits 38 ▪ 1217 Meyrin Geneva ▪ Switzerland
Email: info@ellisys.com ▪ Phone: +41 22 777 77 89 ▪ Fax: +41 22 777 77 90