

WiMedia Explorer 300 Analyzer

User Guide

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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.

Date	Revision	Changes
2005-09-04	1.0	Initial release.
2006-06-20	2.0	Major edits to all chapters.
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Document Revision History

Ellisys Contact Details

Ellisys	Phone:	+41 22 777 77 89
Chemin du Grand-Puits 38	Fax:	+41 22 777 77 90
CH-1217 Meyrin Geneva	Email:	info@ellisys.com
Switzerland	Web:	http://www.ellisys.com

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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.

 $\ensuremath{\mathsf{Fixed}}$ 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.

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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:

🥵 Ellisys WiMedia Explorer 3	00 Analyzer	
License Agreement		ellisys
Please take a moment to read the lic Agree", then "Next". Otherwise click		ccept the terms below, click "I
Ellisys WiMedia Explor	er End-User License	Agreement 🔷
READ CAREFULLY: Th a legal agreement between legal entity, who will be rel In the following, "this prod agreement, accompanying documentation, as well as	you (either an individua ferred to in the following luct" refers to the softwa software, associated pr	il person or a single g as "you") and Ellisys. are displaying this int and electronic
OIDo Not Agree		
	Cancel	< <u>B</u> ack <u>N</u> ext >

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

4. Click on Next.

The Select Installation Folder screen appears:

🛱 Ellisys WiMedia Explorer 300 Analyzer	
Select Installation Folder	ellisys
The installer will install Ellisys WiMedia Explorer 300 Analyzer to the following folder To install in this folder, click "Next". To install to a different folder, enter it below or	
Eolder: C:\Program Files\Ellisys\Ellisys WiMedia Explorer 300 Analyzer\	B <u>r</u> owse Disk Cost
Install Ellisys WiMedia Explorer 300 Analyzer for yourself, or for anyone who uses ⓒ Everyone ◯ Just me	this computer:
Cancel < <u>B</u> ack	<u>N</u> ext >

- 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:

👹 Ellisys WiMedia Explorer 300 Analyzer	
Confirm Installation	llisys
	1113 y 3
The installer is ready to install Ellisys WiMedia Explorer 300 Analyzer on your computer.	
Click "Next" to start the installation.	
Cancel < <u>B</u> ack	<u>N</u> ext >

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

An Installation Progress screen appears.

🐻 Ellisys WiMedia Explorer 300 Analyzer	
Installing Ellisys WiMedia Explorer 300 Analyzer	ellisys
Ellisys WiMedia Explorer 300 Analyzer is being installed.	
Please wait	
Cancel < Back	<u>N</u> ext >

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

🛃 Ellisys WiMedia Explorer 300 A	nalyzer		
Installation Complete		e	lisys
Ellisys WiMedia Explorer 300 Analyzer has Click "Close" to exit.	been successfully ii	nstalled.	
Please use Windows Update to check for	any critical updates	to the .NET Framework	
[Cancel	< <u>B</u> ack	<u>C</u> lose

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 <i>Power</i> LED is illuminated constant green when connected to a USB 2.0 host controller and working normally.
• Power	The <i>Power</i> LED is illuminated constant red when connected via a USB 1.1 host controller and working normally. Performance may not be optimal.
Power	The <i>Power</i> LED blinks green when connected to a USB 2.0 host controller and the driver is not yet fully installed.
ever	The <i>Power</i> 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 <i>Activity</i> LED blinks red when traffic is recorded or generated.
💓 Trigger	The <i>Trigger</i> LED blinks green when waiting for an event to occur.
🜔 Trigger	The <i>Trigger</i> 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:

	Image: Constraint of the second system Model: WiMedia Explorer 300 Image: Constraint of the second system S/N: WEX300-00001 Image: Constraint of the second system S/N: WEX300-00001 Rev: A S/N: WEX300-00001					
Computer	Auxiliary equipment					

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



When connecting the USB cable <u>DO NOT</u> 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 overtightening 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:

- 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:

Hardware Update Wizard							
	Welcome to the Hardware Update Wizard						
	Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). <u>Read our privacy policy</u>						
	Can Windows connect to Windows Update to search for software?						
	<u> Y</u> es, this time only						
	Yes, now and every time I connect a device						
	💿 No, not this <u>t</u> ime						
	Click Next to continue.						
	< <u>B</u> ack Next > Cancel						

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:

Hardware U	pdate Wizard
Please wa	it while the wizard installs the software
¢	Ellisys WiMedia Explorer 300
	Setting a system restore point and backing up old files in case your system needs to be restored in the future.
	< <u>B</u> ack <u>N</u> ext > Cancel

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:



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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:

Available Analyzers	×
Please select an analyzer:	
Ellisys WiMedia Explorer 300 (WEX300-00001) Ellisys WiMedia Explorer 300 (WEX300-00002) Ellisys WiMedia Explorer 300 (WEX300-00003)	
Use this analyzer by default OK Cancel)

- 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.

To set recording options:

1. Select Record | Recording options in the menu.

The General Recording options window appears:

Recording options
General Filter
WiMedia Ultrawideband
PHY Channel Band Group 1, TFC 5 (0x0D) V Scan channels
RX Sensitivity Low High
Follow WiMedia Channel Change IE announce
From any device
Only from device with
DevAddr 0000 v
O Device Identifier 00-00-00-00 🗸
Limits Stop after 512 MBytes Stop after 300 Seconds Stop after 10'000 frames
OK Cancel Apply

 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:

Recording options
General Filter
Basic
Keep all frames
○ Keep frames by type
✓ Beacon
Data
Aggregated Data
Control
Command
◯ Keep frames by addresses
SrcAddr 0000 v Mask FFFF v
DestAddr 0000 v Mask FFFF v
Limit Data frames payload to 🛛 💭 bytes
OK Cancel Apply

- **6.** Select **Keep all frames** to disable all filtering. This will ensure that you see all captured frames.
- Select Keep frames by type and select one or more type to keep only these types of frame.
- 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:

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 [5]** 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:

Save As						? 🛛
Save in:	🚞 Samples		G) 🧊	ڬ 😕	-
My Recent Documents		nple mass storage with errors.ef nple mass storage.efo	D			
Desktop						
My Documents						
My Computer						
	File name:	Wireless USB sample mass stora	ge.efo		*	Save
My Network	Save as type:	Ellisys Trace Files (*.efo)			~	Cancel

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

The file is saved as a .efo file.

Ellisys WiMedia Explorer 300 Analyzer

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:

Details 🦊 🗙											
V DEC HEX BIN OFS LEN											
Name								Val			
🖙 🐘 WiMedia Frame Information											
KX Quality KX Quality KY Quality (LOT) Evcellent											
 Link Quality (LQI) Excellent Signal Strength (RSSI) Excellent 											
		LXC	Excoloric								
· · · · · ·											
🖻 (•) WiMedia Frame											
🗐 😚 PHY header											
🗄 🕂 🕂			r								
¢		10						Valio	4		
								V GII			
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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.

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Click on a frame to highlight it in the *WiMedia Overview* pane. Doubleclick 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** 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.

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💋 Data frame	100E	0080	ERROR		3'586 bytes (Wrong FC	5)	14.709 725 971		
💋 Data frame	100E	0080	ERROR		3'586 bytes (Wrong FC	5)	14.710 062 980		
💋 Data frame	100E	0800	ERROR		3'586 bytes (Wrong FC	5)	14.736 436 957		

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.

User Guide

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.

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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:

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



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

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1 日 日 日 日 日 日 日 日 日 日 日 日 日 日 日 日 日	2016 0 → 155 0 → 15	28 u = 4 38 u = 4 18 u = 4							φx		
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2월요~	2월 6 년 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	23 1 1 4 2 4 2 4 4 5 1 5 1 4 5 1 5 1 5 1 5 1 5 1 5 1 5					1			0 1 2 3 4 5	5 7 01234567
28 a - 1 3 a -		2Ha H 3Ha H H 0.00010 0.00 0.00 2.00 2.41 1.00	-							0x0000: 00 26 80 80 00 C8 1	2 19 . 6
		d d d d <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0x0008: 57 01 00 00 00 00</td> <td>0 03 ₩</td>								0x0008: 57 01 00 00 00 00	0 03 ₩
DX0020 / 26 47 BB B7 24 75 AT CE 60 DX0020 / 26 47 BB B7 24 75 AT CE 60 DX0020 / 26 27 F5 07 BD C 28 2 DX003 / AE C8 27 T5 05 25 C BP	Dx00201 26 47 DB B7 24 75 A7 CE 46 Dx00201 26 47 DB B7 24 75 A7 CE 46 Dx00201 26 47 DB B7 CE 27 BB CC 87 Dx00201 26 97 150 92 50 57002-5 Dx00201 26 97 150 92 50 57002-5	Db.00021 26 44 75 87 72 Co.	238 us -+ 243	US - + 156 (us → 156 u	i → 15	6 us → 156 us → 156 us →	241 us →	156 u	0X0010: 03 03 00 02 00 24 1	9 00\$
0x0028: 09 Å5 2F 68 77 8D CC 8Z/hw 0x0030: AE C8 92 71 5D 3E 3C BFq)×.	0x0028: 09 A5 2F 68 77 BD CC 8E/hv 0x0030: AE C6 92 71 5D 3E 3C BFql>	DATA padwr#2 3 DCATA padwr #2 3 DCATA p									
0x0030: kE C8 92 71 5D 3E 3C BFq]><.	0x0030: AE C8 92 71 5D 3E 3C BFq] ><.	0ATA pasket (5p.3) 0x00301: kE C6 92 71 50 3E 3C BFq)≻.		-	_	_		_	-		
		DATA pulot (Ep 3) 0x0038: CC .									
	Dx D038 : CC .		Lours								C BFq]><.

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:
 - Layout

 WiMedia Standard

 WiMedia Live

 Wireless USB

 E
 New Layout...

 Rename Layout...

 Reget Layout

 Delete Layout
- 3. A dialog box appears:

New Layout	
Layout name	
	OK Cancel

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:

Lay	out				
	WiMedia Standard				
	WiMedia Live				
	Wireless USB				
~	Sample Layout				
Ħ	New Layout				
	Rename Layout				
	Reset Layout				
	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:

 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:

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

	Stop	Stops recording traffic.
4	Restart	Discards any data recorded so far and restarts the recording.
set	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

ľ	New (CTRL + N)	Creates a new file.
Ä	Open (CTRL + O)	Opens a previously saved file.
W	Save as (CTRL + S)	Saves a file.
	Load sample	Opens a sample file.
	Export (CTRL + E)	Opens the <i>Ellisys Export Wizard</i> 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.
1	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		
<u>_</u>	Details	Opens the Details pane.

<u>j</u>	Details	Opens the <i>Details</i> pane.
101 011	Raw Data	Opens the Raw Data pane.
9	Summary	Opens the Summary pane.
8	Security	Opens the Security pane.
ind	Instant Timing	Opens the Instant Timing pane.
*	Instant Beacons	Opens the Instant Beacons pane.
1 2	Instant Superframe	Opens the <i>Instant Superframe</i> pane.

View | Overviews

	WiMedia Overview	Opens the <i>WiMedia</i> overview pane.
Use	Wireless USB Overview	Opens the Wireless USB overview.
View O	ther Windows	
₽	Tasks	Opens the Tasks window.
New	Recording Activity	Opens the <i>Recording Activity</i> 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

4

-

Restart Recording

Select an analyzer

Recording Options

	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.
畚	Instant Search (CTRL + I)	Activates the <i>Instant Search</i> field in the <i>WiMedia</i> overview or <i>Wireless USB</i> 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.

Discards any data recorded so far and restarts the recording.

Opens the Available analyzers

Opens the Recording options

window.

window.

Tools

set	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	Reset time reference (CTRL + SHIFT + T)	Resets the time reference to its original value.
9	WiMedia Traces Merger	Opens the <i>WiMedia Traces Merger</i> window.
(••)	WiMedia Protocol Examiner	Opens the <i>WiMedia Protocol</i> Examiner window.
(1)	WiMedia Channels Scanner	Opens the <i>WiMedia Channels</i> Scanner window.
Help	Options	Opens the Options window.
	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:

Options	X				
Protocol verifications	Wireless USB				
Select in the list belo	w fields to be verified by the software.				
 ■ WiMedia ♥ WiMedia ♥ WiMedia ♥ WiMedia ♥ WiMedia ♥ WiMedia ♥ WiMedia 	Frame Information Frame Command Frame Control Frame				
🖃 🔽 📆 Wireles	ss USB				
 ♥ Wireless ♥ Wireless ♥ Wireless ♥ Wireless ♥ Wireless 	V Wireless USB MMC Wireless USB Information Element Wireless USB Packet V Wireless USB Packet V Wireless USB Transaction V Wireless USB Transaction V Wireless USB Transfer				
🖮 🗹 USB					
😟 🔽 USB Setu 🕀 🔽 USB Star					
	OK Cancel Apply				

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:

Options 🛛 🛛 🛛 🛛
Protocol verifications Wireless USB Protocol options Assemble Bulk transfers Assemble Interrupt transfers Assemble Class transfers
OK Cancel Apply

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

Your selection is applied.

User Guide

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:

😼 Wireless USB Overview											<	1 Þ
								Se	arch		-	•
Enter text here	γ.	Ent	γ.	Ent	γ.	Ent	γ.	Enter text here	Υ.	Enter text here	Υ.	T
Item		Device		Endpo	oint	Status		Payload		Time		1
🗉 🕎 GetDescriptor (Security)		128		0		OK		5 bytes (05 0C 0F 00)	02)	7.023 279 074		
🗉 🙀 GetDescriptor (Security)		128		0		OK		15 bytes (05 0C 0F 00	02	7.030 646 889		1
🗄 🕎 SetEncryption (AES-128 CCM)		128		0		OK		No data		7.034 742 789		
🗉 🚾 SetHandshake		128		0		OK		46 bytes (01 00 03 00	00	7.035 608 744		
🗄 🙀 GetHandshake		128		0		OK		46 bytes (02 00 03 00	00	7.039 619 645		
🗉 🕎 SetHandshake		128		0		OK		46 bytes (03 00 03 00	00	7.043 662 546		
🗉 🧱 SetDescriptor (Key)		128		0		ОК		22 bytes (Encrypted)		7.153 523 728		
🗉 🙀 GetDescriptor (BOS)		128		0		ОК		5 bytes (Encrypted)		7.157 619 613		
🗄 🔯 GetDescriptor (BOS)		128		0		ОК		16 bytes (Encrypted)		7.161 715 513		
🗉 🧱 SetAddress (0)		128		0		ОК		No data		7.395 181 521		
GetDescriptor (Device)		0		0		ОК		18 bytes (Encrypted)		7.440 748 338		

The Wireless USB Overview pane shows only Wireless USB transactions:

	WiMedia Overview										٥	Þ
Filter	s: 🥳 Invalid frames 🖬 Beac	on fr	ames 😇	Con:	secutive M	MC 45'488	fran	nes displayed	irch		-	Ţ
Enter	text here	γ.	En 🍸	▼ E	n 🍸 •	Enter	7 -	Enter text here	7.	Enter text here	7.	
Item			SrcAddr		DestAddr	Status		Payload		Time		^
1	MMC (CAck)		0100	(OOFE	OK		30 bytes (00 01 01 00 0	1	7.027 026 995		
0	MMC (Cta dnts)		0100	(OOFE	OK		20 bytes (00 01 01 24 0	D	7.027 282 976		-
0	MMC (Cta dt setup Host)		0100	(OOFE	OK		56 bytes (00 01 01 26 0	1	7.030 646 889		1
4	DATA packet (Ep 0)		0080	(0100	OK		17 bytes (00 80 05 0C 0	IF	7.030 697 479		
0	MMC		0100	(OOFE	OK		10 bytes (00 01 01 00 0	1	7.030 940 868		
1	MMC (Cta dt)		0100	(OOFE	OK		28 bytes (00 01 01 D6 0	i0	7.031 196 864		
4	ACK packet (Ep 0 IN)		0080	(0100	OK		6 bytes (C0 20 00 00 00	00)	7.031 243 545		
0	MMC		0100	(OOFE	OK		10 bytes (00 01 01 04 0	D	7.031 410 860		
1	MMC (Cta dnts dt setup Host)		0100	(OOFE	OK		60 bytes (00 01 01 62 0	1	7.034 742 789		v

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:

Filters: 🗐 Invalid frames 💼 Beacon frames 2'712 frames displayed Search 💌 🛫					
Enter text here	🍸 🕶 En 🍸	' • En 🍸 •	Enter text here	🍸 🔹 Enter text here 🗳	
Item	SrcAdd	r DestAddr	Time	Superframe Number	
Beacon (Slot 3 Drp)	SAEB	FFFF	7.824 528 532	107	
🚽 Beacon (Slot 4 Drp)	FAF8	FFFF	7.824 613 683	107	
Beacon (Slot 2)	0002	FFFF	7.889 983 350	108	
🚽 Beacon (Slot 3 Drp)	SAEB	FFFF	7.890 066 515	108	
🚽 Beacon (Slot 4 Drp)	FAF8	FFFF	7.890 151 636	108	
d Beacon (Slot 2)	0002	FFFF	7.955 521 318	109	
🚽 Beacon (Slot 3 Drp)	SAEB	FFFF	7.955 604 468	109	
🚽 Beacon (Slot 4 Drp)	FAF8	FFFF	7.955 689 619	109	
📶 Data frame	SAEB	FAF8	7.971 779 747		
📶 Data frame	SAEB	FAF8	7.971 815 261		
📶 Data frame	SAEB	FAF8	7.971 850 776		
📶 Data frame	SAEB	FAF8	8.004 547 768		
📶 Data frame	SAEB	FAF8	8.004 583 283		
📶 Data frame	SAEB	FAF8	8.004 618 798		
Beacon (Slot 2)	0002	FFFF	8.021 059 285	110	
🚽 Beacon (Slot 3 Drp)	SAEB	FFFF	8.021 142 436	110	
🚽 Beacon (Slot 4 Drp)	FAF8	FFFF	8.021 227 571	110	
Data frame	SAEB	FAF8	8.037 317 699		

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:

8	Error	Indicates an element that does not comply with the specifications.
1	Warning	Indicates an element that should be manually checked for compliance with the specifications.
(į)	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:

đ	Beacon Frame	Indicates a frame used for devices synchronization and information management.
40	Data Frame	Indicates a frame that contains data that may be part of a higher- level protocol.
đ	Control Frame	Indicates an undecoded control frame.
4	Imm ACK Control Frame	Indicates that a frame previously sent was properly received.
4V	B-ACK Control Frame	Indicates that a burst of frames previously sent was properly received.
P	DRP Request Command Frame	Indicates a frame that contains a request for a DRP reservation.
ę	DRP Response Command Frame	Indicates a frame that contains a response for a DRP reservation.
Q	RTS Control Frame	Indicates a frame that contains Request To Send data.
R	CTS Control Frame	Indicates a frame that contains Clear To Send data.
P	UDA Control Frame	Indicates a frame that contains an announcement of an unused DRP.
q	UDR Control Frame	Indicates a frame that contains a response to an unused DRP.

٩	GTK Control Frame	Indicates a frame that contains a Group Temporal Key.
Ы	WiMedia Frame	Indicates an unrecognized frame, which was most probably not properly transmitted.
0	WUSB MMC Packet	Indicates a Micro-scheduled Management Command sent by a Wireless USB host.
4	WUSB Notification Packet	Indicates a notification packet sent by a Wireless USB device.
4	WUSB Data IN Frame	Indicates a Wireless USB frame sent from a device to a host.
4	WUSB Data OUT Frame	Indicates a Wireless USB frame sent from a host to a device.
4	WUSB ACK IN Frame	Indicates that a packet previously sent by a device was properly received by the host.
4	WUSB ACK OUT Frame	Indicates that a packet previously sent by the host was properly received by a device.
а ў .	WUSB NAK IN	Indicates a Wireless USB NAK packet sent by a device to the host.
4	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.
Þ	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.

B R	Control Transfer IN	Indicates a successful control transfer with high-level data sent from a device to the host.
B	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.
8	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.
ок	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.
ок	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:

🖄 WiMedia Overview								4
Filters: 👩 Invalid frames 🖬 Bea	con frames	🗟 Consecu	tive MMC 45	'488 fran	nes displayed	Search		-
inter text here	Y • En	🍸 🕶 En	Y • Enter	. Y •	Enter text here	٧.	Enter text here	γ.
Item	SrcAd	idr Dest	Addr Status		Payload		Time	
MMC (CAck)	0100	00FE	OK		30 bytes (00 01 01 0	0 01	7.027 026 995	
MMC (Cta dnts)	0100	00FE	OK		20 bytes (00 01 01 2	4 0D	7.027 282 976	
MMC (Cta dt setup Host)	0100	OOFE	OK		56 bytes (00 01 01 2	6 01	7.030 646 889	
DATA packet (Ep 0)	0080	0100	OK		17 bytes (00 80 05 0	C 0F	7.030 697 479	
© MMC	0100	OOFE	OK		10 bytes (00 01 01 0	0 01	7.030 940 868	
MMC (Cta dt)	0100	OOFE	OK		28 bytes (00 01 01 D	6 00	7.031 196 864	
🕰 ACK packet (Ep 0 IN)	0080	0100	OK		6 bytes (C0 20 00 00	00 00)	7.031 243 545	
© MMC	0100	OOFE	OK		10 bytes (00 01 01 0	4 0D	7.031 410 860	
MMC (Cta dnts dt setup Host)	0100	OOFE	OK		60 bytes (00 01 01 6	2 01	7.034 742 789	
Wireless USB Overview								
will cless 050 over view						Search		_
						pearun		
nter text here	Y - Ent	Y . Ent.	🍸 🕶 Ent	7.	Enter text here	Y -	Enter text here	V.
							Enter text here	
	Devic		lpoint Sta		Payload		Time	
tem								
ltem i 🕎 GetDescriptor (Security)	Devic	e End	lpoint Sta		Payload	02)	Time	
Item GetDescriptor (Security) GetDescriptor (Security)	Device 128 128	e End	dpoint Sta OK		Payload 5 bytes (05 OC OF 00	02)	Time 7.023 279 074	
Item	Device 128 128	e End O O	lpoint Sta OK OK		Payload 5 bytes (05 0C 0F 00 15 bytes (05 0C 0F 0	0 02) 00 02	Time 7.023 279 074 7.030 646 889	
Item Cell GetDescriptor (Security) Cell GetDescriptor (Security) Cell GetDescriptor (Security) Cell GetDescriptor (AES-128 CCM) Cell GetTescriptor (AES-128 CCM) Cell GetTescriptor (Security)	Device 128 128 128	e End O O O	dpoint Sta OK OK OK		Payload 5 bytes (05 OC OF 00 15 bytes (05 OC OF 0 No data	0 02)	Time 7.023 279 074 7.030 646 889 7.034 742 789 7.035 608 744	
Item GetDescriptor (Security) SetDescriptor (Security) SetSetEncryption (AES-128 CCM) SetHandshake SetHandshake	Device 128 128 128 128 128	e End 0 0 0 0	dpoint Sta OK OK OK OK		Payload 5 bytes (05 0C 0F 00 15 bytes (05 0C 0F 0 No data 46 bytes (01 00 03 0	0 02) 00 02 10 00	Time 7.023 279 074 7.030 646 889 7.034 742 789 7.035 608 744	
Item 22 GetDescriptor (Security) 23 GetDescriptor (Security) 24 GetEncryption (AES-128 CCM) 25 SetHandshake 26 GetHandshake 26 SetHandshake	Device 128 128 128 128 128 128	e End 0 0 0 0 0 0	fpoint Sta OK OK OK OK OK		Payload 5 bytes (05 0C 0F 00 15 bytes (05 0C 0F 0 No data 46 bytes (01 00 03 0 46 bytes (02 00 03 0	0 02) 00 02 10 00 10 00 10 00	Time 7.023 279 074 7.030 646 889 7.034 742 789 7.035 608 744 7.039 619 645	
tem Content of the second of	Device 128 128 128 128 128 128 128	e End 0 0 0 0 0 0 0 0	fpoint Sta OK OK OK OK OK OK		Payload 5 bytes (05 0C 0F 00 15 bytes (05 0C 0F 0 No data 46 bytes (01 00 03 0 46 bytes (02 00 03 0 46 bytes (03 00 03 0	0 02) 00 02 10 00 10 00 10 00)	Time 7.023 279 074 7.030 646 899 7.034 742 789 7.035 608 744 7.039 619 645 7.043 662 546	
Item Construction (Security) Construction (Security) Construction (Security) Construction Const	Device 128 128 128 128 128 128 128 128	e End 0 0 0 0 0 0 0 0 0	fpoint Sta OK OK OK OK OK OK OK		Payload 5 bytes (05 0C 0F 00 15 bytes (05 0C 0F 0 No data 46 bytes (01 00 03 0 46 bytes (02 00 03 0 46 bytes (03 00 03 0 22 bytes (Encrypted	0 02) 00 02 10 00 10 00 10 00)	Time 7.023 279 074 7.030 646 889 7.034 742 789 7.035 608 744 7.039 619 645 7.043 662 546 7.153 523 728	
Item (a) GetDescriptor (Security) (a) GetDescriptor (Security) (a) SetEncryption (AES-128 CCM) (b) SetHandshake (c) GetHandshake (c) SetHandshake (c) SetDescriptor (Key) (c) SetDescriptor (RoS)	Devici 128 128 128 128 128 128 128 128 128 128	e End 0 0 0 0 0 0 0 0 0 0	tpoint Sta OK OK OK OK OK OK OK OK		Payload 5 bytes (05 0C 0F 00 15 bytes (05 0C 0F 0 No data 46 bytes (01 00 03 0 46 bytes (02 00 03 0 46 bytes (03 00 03 0 2 bytes (Encrypted)	0 02) 00 02 10 00 10 00 10 00)	Time 7.023 279 074 7.030 646 889 7.034 742 789 7.035 608 744 7.039 619 645 7.043 662 546 7.153 523 728 7.157 619 613	

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.

Details	₽ X
V DEC HEX BIN OFS LEN 1	Ŧ
Name Valu	<u>~</u>
🐨 🝿 WiMedia Frame Information	
🖃 🕪 WiMedia Frame	
🖮 🔧 PHY header	
🖃 🔩 MAC header	
Payload 32 by	es
🗸 🔶 FCS 🛛 🛛 Valid	
🖮 🝿 WiMedia Frame Payload	
🚊 🔧 Beacon Parameters	
Device Identifier FF-Ff	-FF-FF-FF
🧼 Beacon Slot Number 2	
🖮 🏤 Device Control	
🧼 Movable 🛛 No	
🗠 🧼 Signaling Slot 🛛 🛛 No	
Security Mode 1	
🖨 😤 Beacon Period Occupancy IE	
🖉 🖗 BP Length 6	
😑 🔧 Beacon Slot Info Bitmap 🛛 0 0 0	000 🔽



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.
- Click on Display this field in the overview
 to add this field to a new column

- **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.

Enter text here	Υ.						Υ.		Υ-
Item		SrcAd	dr	DestA	ddr	Status		Time	

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:

 $0\,{\tt ?FE}$ will match all addresses that start with 0 and end with FE ${\tt *data}$ 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 OOFE, OOFF 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.

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:

- 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 X .
- 3. A menu appears:

*cta	× -	Ent	Υ-	Ent	Y	 Enter te… 	Υ.	Enter text here	γ.
Item	Y	Filter				Status		Time	
	×	Clear	riteria						

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.

Filters: 🚮 Invalid frames ៅ Beacon frames 😳 Consecutive MMC

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:

Show in Instant Timing view					
Search					
Find next	•				
Coloring	•				
Set time reference					
Reset time reference					

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:

Show in Instant Timing view	
Search	
Find next	•
<u>C</u> oloring	×
Set time reference	
Reset time reference	

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:

Details		џ	×
V DEC HEX BIN OFS LEN			
Name	Value		^
🕒 🍿 WiMedia Frame Information			
🖃 (•) WiMedia Frame			
🖮 🔩 PHY header			
😟 🔩 MAC header			_
🧼 Payload	32 bytes		
🗸 🧳 FCS	Valid		
🖃 🎆 WiMedia Frame Payload			
🚔 🔧 Beacon Parameters			
🧼 🥏 Device Identifier	FF-FF-FF-FF-FF		
🧼 🧼 Beacon Slot Number	2		
😑 🔩 Device Control			
🧼 🧼 Movable	No		
\cdots 🥥 Signaling Slot	No		
Security Mode	1		
🚊 🔩 Beacon Period Occupancy IE			
🧼 🤣 BP Length	6		
😑 🔩 Beacon Slot Info Bitmap	000000		~



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.

Ellisys WiMedia Explorer 300 Analyzer

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.

🕀 🔧 MAC header

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

The expanded fields details are displayed:

Details	ą	L X
V DEC HEX BIN OFS LEN 📑		÷
Name	Value	^
₩ WiMedia Frame Information		
🖃 🕪 WiMedia Frame		
🏝 🕂 🏘 PHY header		
😑 🔩 MAC header		
😑 🔩 Frame control		
🚽 🧼 Secure	No	
🗸 🧳 ACK Policy	No ACK	
🧼 🔷 Frame Type	Beacon	
🗝 🧼 DestAddr	0xFFFF (Broadcast)	
- 🧼 SrcAddr	0x0100 (Generated)	
🚍 🔩 Sequence control		
🗝 🧳 Fragment Number	0	
\cdots 🧼 Sequence Number	0	
🧼 🧼 More Fragments	No	
😑 🔩 Access Information		
🧼 🧼 Duration	0 us	
🧼 Payload	32 bytes	
🖉 🧳 FCS	Valid	~

To collapse fields in the Details pane:

```
A Minus = button appears beside an extended field.
```

🚊 🔧 MAC header

1. Click on **Minus** is 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.

Details		х
S DEC HEX BIN OFS LEN		Ŧ
Name	Value	^
🗈 🐘 WiMedia Frame Information		
🖃 🕪 WiMedia Frame		
🖮 🔩 PHY header		
🖃 🔩 MAC header		
😑 🔧 Frame control		
🧼 Protocol Version	1.0	
🧼 🧼 Secure	No	
- 🧼 ACK Policy	No ACK	
🧼 🧼 Frame Type	Beacon	
- 🧳 Frame Subtype / Delivery ID	Reserved (0)	
🧼 Retry	Reserved (0)	
🧼 Reserved	0	
🧼 🧼 DestAddr	0xFFFF (Broadcast)	
- 🧼 SrcAddr	0x0100 (Generated)	
😑 🔧 Sequence control		
🗝 🧼 Fragment Number	0	
🗁 🧼 Sequence Number	0	
🧼 More Fragments	No	v

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
- 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:



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 違 .

or

3. Right click. A menu appears:



4. Click Export.

A Save As screen appears:

Save As						? 🔀
Savejn:	😂 Exported files		~	G 🦻 I	• 📰 🁏	
My Recent Documents						
Desktop						
Documents						
Computer						
My Network Places	File <u>n</u> ame: Save as <u>t</u> ype:	Details.txt Text file (*.txt)				<u>S</u> ave Cancel

- 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
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 \ldots ml 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" />
  </Ttem>
 <Item name="Pavload" value="32 bytes" offset="120" length="256" />
 <Item name="FCS" value="Valid" offset="376" length="32" hex="0x2A25ED33" />
 </Ttem>
</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.

User Guide

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.

Raw data											д	х
Data type:	Ra	w dat	а					-				Ŧ
	0	1	2	3	4	5	6	7	0123	4567		
0x0000:	20	20	80	FO	00	00	00	FF				
0x0008:	FF	00	01	00	00	00	00	F F		<mark>.</mark>		
0x0010:	FF	FF	FF	FF	FF	02	40	01		0.		
0x0018:	03	06	00	00	09	08	OB	06				
0x0020:	FΕ	00	FΕ	FF	00	FO	0C	02				
0x0028:	00	00	OD	03	FF	02	FF	33		 3		
0x0030:	ED	25	2 A						.**			

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:

Addresses	►]
Width	►	🗸 Auto
Group by Left area Right area	* * *	4 bytes 8 bytes 10 bytes
Edit	×	16 bytes
		32 bytes

- 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:

Addresses Width Group by Left area Right area	* * * * *		
Edit	۲	Copy as Data	Ctrl+C
		Copy as Text	Ctrl+Shift+C

- 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.

error 🗸 🗸

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

The search results are highlighted.

<u> ()</u>	WiMedia Overview							4	1 ⊳
Filters	: d Beacon frames 17'127	frames displayed				error		-	
Enter t	ext here	🏾 🕶 En 🖓 🔹	En 🍸 🕶	Enter 🍸 🗸	Enter text here	Enter text here	▼ • Ent	Υ.	·
Item		SrcAddr	DestAddr	Status	Payload	Time	Fram	e#	^
dl	Data frame	0082	0083	OK	4'095 bytes (AA 00 00 00	4.012 761 184	2'692		
d II	Data frame	0082	0083	OK	4'095 bytes (AA 00 00 00	4.012 875 561	2'693		-
d	Data frame	0082	0083	OK	4'095 bytes (AA 00 00 00	4.012 989 938	2'694		
d D	Data frame	0082	0083	OK	4'095 bytes (AA 00 00 00	4.013 104 315	2'695		
gII	Aggregated Data frame	0000	8200	ERROR	3'087 bytes (00 00 00 00	4.013 218 692	2'696		
all a	Data frame	0082	0083	OK	4'095 bytes (AA 00 00 00	4.013 422 847	2'697		
d I	Data frame	0082	0083	OK	4'095 bytes (AA 00 00 00	4.013 540 959	2'698		
d	Data frame	0082	0083	OK	4'095 bytes (AA 00 00 00	4.013 655 336	2'699		
d D	Data frame	0082	0083	OK	4'095 bytes (AA 00 00 00	4.013 769 713	2'700		
d	Data frame	0082	0083	OK	4'095 bytes (AA 00 00 00	4.013 884 090	2'701		~

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:

 $0\,{\tt ?FE}$ will match all addresses that start with 0 and end with FE ${\tt *data}$ 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:

Go to WiMedia frame	X
Reference	
 Closest frame number 	500 👻
Closest frame time	· · · · · · · · · · · · · · · · · · ·
Closest superframe number	· · · · · · · · · · · · · · · · · · ·
 Highlighted frame 	
	<u> </u>

or

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

Go to WiMedia frame	
Reference	
 Closest frame number 	✓
 Closest frame time 	34.721
Closest superframe number	▼
 Highlighted frame 	
	<u> </u>

or

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

Go to WiMedia frame		
Reference		
Closest frame number		¥
 Closest frame time 		×
 Closest superframe number 	641	~
 Highlighted frame 		
		<u>D</u> K <u>C</u> ancel

or

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

Go to WiMedia frame	
Reference	
 Closest frame number 	
Closest frame time	
 Closest superframe number 	▼
 Highlighted frame 	
	<u> </u>

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:

Sea	rch					
	≦earch	Ctrl+F				
	Search in	•				
孡	Instant search	Ctrl+I				
	Go <u>t</u> o	Ctrl+G	1			
	Go to next	•		PHY Header: Data Rate	•	53.3 (62 items)
	Find next	F3		PHY Header: Frame Length	۲	320 (17333 items)
				PHY Header: Burst Mode	•	
				PHY Header: Preamble Type	۲	
				PHY Header: TF Code	۲	
				PHY Header: Band Group	۲	
				MAC Header: Source Address	•	
				MAC Header: Destination Address	۲	
				MAC Header: Communication	•	
				MAC Header: Frame Type	•	
				MAC Header: Retry	۲	
				MAC Header: Secure	۲	
				MAC Header: ACK Policy	۲	
				Error	•	
				Packet: Endpoint	۲	
				Packet: Identifier	۲	
				Packet: Handshake	•	
				Packet: Notification	۲	
				MMC: Information Element	٠	
				MMC: Channel Time Allocation	٠	

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:

Show in Instant Timing view	
Search	
Find next	Similar frame
Coloring •	Item: Beacon (Slot 2 Drp MacCap PhyCap)
Set time reference	SrcAddr: 4687
Reset time reference	DestAddr: FFFF
Neset time for or or or or or	PHY Rate: 53.3
	Payload Length: 33 bytes

- 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:

Show in Instant Timing view	1	
Search		
Find next	•	
Coloring	•	Add color
Set time reference		
Reset time reference		

- 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.

- Click the tabs to access the different search criteria options and complete the required options.
- Click on Colorize 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:

Show in Instant Timing view	Show in Instant Timing view				
Search					
Find next	•				
Coloring	•	Add color			
Set time reference		Remove all colors			
Reset time reference		Remove color 1			

- 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:

Show in Instant Timing view	
Search	
Find next •	
Coloring •	Add color
Set time reference	Remove all colors
Reset time reference	Remove color 1

- 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.
- Click on A or Press CTRL+F.

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

The Search WiMedia Frames window appears:

earch WiMedia Frames 🛛 🛛 🔀							
1011 Payload Payload							
Source address (e.g: 0001, 00FF)							
Destination address (e.g: !00020007)							
Frame type (e.g: Data, Control)							
Control frame subtype (e.g: RTS, 0x0F)							
Command frame subtype (e.g: !Probe, GTK)							
Data rate (e.g: 53.3, 200)							
Find items that 🛞 Match All 💌 🏥 Find Next 🔹							

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.

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.
- O Match Any Finds items that matches any of the selected search criteria.
- On't Match All Finds items that do not match all of the selected search criteria (opposite of Match All).
- On't Match Any Finds items that do not match any of the selected search criteria (opposite of Match Any).
- 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 <u>count</u> 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.
- Click on A or Press CTRL+F.

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

The Search Wireless USB window appears:

Search Wireless USB	
Din Payload Text Rield	
Data to search for	
Data type Search for all data types	~
Interpreted bytes Hex bytes: <none> ASCII text: <none> Unicode text: <none></none></none></none>	<
Length From to bytes	
Search in 💿 All items 🔿 Packets 🔿 Transactions	Transfers
Find items that 🛞 Match All	Find Next

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.

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.
- S Match Any Finds items that matches any of the selected search criteria.
- On't Match All Finds items that do not match all of the selected search criteria (opposite of Match All).
- On't Match Any Finds items that do not match any of the selected search criteria (opposite of Match Any).
- 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 ${\bf Find}~{\bf Next}$ button and select ${\bf Count}$

<u>Σ</u> <u>Count</u> 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:

Summary		φ x
Find next Item	1	Tota
icom		1000
🖃 👀 WiMedia Frames	Frames	Bytes
(+) Total	6257	2.68 ME
🗉 🧼 By Device		
🗄 🔿 By Communication		
🖃 🔹 🖻 🖃 🖃 🖃 🖃		
• 53.3	5449	153 ki
• 80		
106.7		
 160 		
• 200	808	2.53 M
• 320		0 byte
400		
480		
主 👀 By Type		
🗉 🙀 By Length		
🗉 🚱 WiMedia Beacons	Beacons	Byte
🗉 🥪 WUSB MMCs	MMCs	Byte
🗉 💜 WUSB Packets	Packets	Byte
🗉 🛞 WiMedia Low-level Errors	Errors	Byte
🗉 💮 WiMedia FCS Errors	Errors	Byte

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 $\ensuremath{\textit{Summary}}$ 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** \blacksquare 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:

Summary		4 >
Item		Tota
🗉 👀 WiMedia Frames	Frames	Bytes
(*) Total	6257	2.68 M
🗉 🧼 By Device		
🗉 🖨 By Communication		
🖃 🔹 By Data Rate		
• 53.3	5449	153 ki
80		0 byte
106.7		
• 160		
200	808	2.53 M
• 320	0	0 byte
400		
480		
표 🕪 By Type		
🗉 🤢 By Length		
🗉 💮 WiMedia Beacons	Beacons	Byte
🗉 🤫 WUSB MMCs	MMEs	Byte
🗉 💜 WUSB Packets	Packets	Byte
🗉 🛞 WiMedia Low-level Errors	Errors	Byte
🗉 💮 WiMedia FCS Errors	Errors	Byte

2. Click on Find Next 🚱 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:

BPST

• a BPST indicator:





Ellisys WiMedia Explorer 300 Analyzer

• several Beacon frames with the speed indicator:



• two time markers:



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

		V	V	V	V	V	V	V	
	\checkmark		V	V	V	V	V	V	
	\checkmark	V		V		V	V		
	- V				V				
1					-				
	V	- V	V	- V	V		V	- V	
	\sim				V			V	
	X			- V					

• a tooltip with contextual information:

Beacon (Slot 5 MacCap PhyCap) [Frame end] From: 00-14-A5-36-99-CD / 0x71AE
Frame #: 2966
Frame time: 186.591 049 304 s
Frame end time: 186.591 069 929 s

• a Beacon frame summary:

🚽 Beacon (Slot 5 MacCap PhyCap)

• the time indicator:

186'591.070 ms

• **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:

90.70 90.80 90.90 91.10 91.20 91.30 **186 591.00 ms**

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

Zoom bar

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:

Instant Timing			₽ X
💽 🖑 🔍 💵 🚡 - 🔛 🕪	origin: 7.88 s	▼ span: 0.31 s	🝷 👫 🦊 🛤 🛛 🖬
BPST	BPST	BPST	
			an litera and litera
7.90 7.92 7.94 7.96 ;	7.98 8.02 8.04 8.00 s	8.06 8.08 8.10 8	.12 8.14 8.16 8.18
Zoom bar	0.00 3		

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:

Instant Timing 💽 🖑 🔍 🂵 🚡	🛨 🔲 🕪 🗸 or	gin: 131'061.	98 ms	span: 2.03	ms	▼ ∰	BPST M	د ب 11
I.	I MMC	1	I.	I	I.		1	
	6	14— zu 04	252 us 🛶	348 us				
	-	d d	d d	- A	4			
T T								
429.00	10 us							
- 129.00	10 US -							
62.20	62.40 62.60	62,80	63.00	63.20	63,40	63.60	63,80	
62.00 ms	02,40 02,00	62,60	65,00	65.20	65,40	00,00	00,00	131

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:

nstant Timing 💽 🖑 🔍 🏭 🚡 - 🚧 🕪 -	origin: 20'415.92 ms	✓ span: 0.48 ms	▼ BPST BP	д > ммс 📑
			, , , , ,	
181 us 🛶		297 us 🛶		
		+_ I		
		- Ind	-	
		0.015 us		
4	- 247.015 us			
💤 DN_EPRdy			_	
		20'416.241		
15.95 20'416.00 ms 16.05	16.10 16.15	16.20 16.25	16.30 16.3	35 16

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:

Instant Timing		4 ×
📘 🖑 🔍 🚛 🚡 - 🔛 🕪 🕸 - origin: 188'569'416.92 us	 span: 20.12 us 	🔹 🚑 📮 🔜
	4 3.1	20 us
9.375 us 16.875 us	2	3.750 us
	Data frame [PHY header] From: 00-14-A5-36-9A-50 / 0x	C166
	Frame #: 6656	
	Frame time: 188.569 418 149 :	5
Data frame		
	188'569'427.83 us	
18.00 22.00 24.00 26.00	28.00 30.00 32.00	34.00 36.00
Zoom bar		

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
Ы	Wireless USB Notification Packet
┛	Wireless USB Data Out Packet
	Wireless USB Data In Packet

Wireless USB Nak Packet

10.2 Instant Timing Toolbar

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



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.

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:

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

Click on **Zoom Q**.

The cursor changes to a spyglass \mathfrak{Q} symbol.

 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 zoomout 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 T** • . 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.
- 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:

_

 Click on Timing error verifications (☆ ▼. The Timing verification menu appears:

(r) -	
~	Check All Wireless USB Timings
~	Check MMC WUSB Channel Time Stamp
~	Check MMC scheduling accuracy
~	Check CTA timing
~	Check DNTS timing
~	Check Packet timing

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 \mathbb{Q} 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:

*	Freeze
i≱∥	Duplicate
×	Remove
BPST	Scroll one superframe backward Alt+Left
BPST	Scroll to current superframe start
BPST	Scroll to current superframe end
BPST	Scroll one superframe forward Alt+Right
ммс •••	Place MMC cursor here
ĥ 4	Place cursor A here
¥.	Place cursor B here
⇒	Go to Mmc cursor
⇒Î	Go to cursor A
⇒	Go to cursor B

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:

*	Freeze	
₩	Duplicate	
×	Remove	
BPST	Scroll one superframe backward Alt+Left	
BPST	Scroll to current superframe start	
BPST ↓⇒	Scroll to current superframe end	
BPST	Scroll one superframe forward Alt+Right	
ммс •••	Place MMC cursor here	
Ŵ	Place cursor A here	
Å	Place cursor B here	
ымс	Go to Mmc cursor	
⇒Î	Go to cursor A	
⇒	Go to cursor B	

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:

*	Freeze	
₩	Duplicate	
×	Remove	
BPST	Scroll one superframe backward	Alt+Left
BPST	Scroll to current superframe start	
BPST ↓⇒	Scroll to current superframe end	
BPST	Scroll one superframe forward	Alt+Right
ммс 14	Place MMC cursor here	
ŵ	Place cursor A here	
*	Place cursor B here	
ымс	Go to Mmc cursor	
⇒Î	Go to cursor A	
⇒	Go to cursor B	

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:

Save						? 🔀
Save in:	🔁 Exported files		~	3 🕫	ب 🔝 👏	
My Recent Documents						
Desktop						
Documents						
Computer						
My Network Places	File name: Save as type:	Sample (origin 188'C GIF Image (*.gif))30.57 ms, span	5.22 ms).gi		Save Cancel

- 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:

	Slot	Device	Addr	BPST Delta	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
3 B0-B0-B0-B0-B0 34EA 1.449 us Image: Constraint of the state of the s		Prior Beacon Period					d	đ	d	đ	d	d	d	d									
4 C0-C0-C0-C0-C0 C166 1.769 us 5 D0-D0-D0-D0-D0 71AE 2.180 us 6* E0-E0-E0-E0-E0 7882 0.000 us 7 10-10-10-10-10 00FF 0.623 us 8 30-30-30-30-300 ED05 0.443 us	2	A0-A0-A0-A0-A0-A0	2C2B	1.811 us			d	<	✓	✓	<	1	✓	<									
5 D0-D0-D0-D0-71AE 2.180 us 6* E0-E0-E0-E0-E0-70 7882 0.000 us 7 10-10-10-10-10 00FF 8 30-30-30-30-300 ED05 0.413 us V V	3	B0-B0-B0-B0-B0-B0	34EA	1.449 us			\checkmark	đ	\checkmark	✓	1	1	\checkmark	√									
6* E0-E0-E0-E0-E0 7882 0.000 us √ √ √ dl √ √ √ √ √ √ √ √ √ ∞ </td <td>4</td> <td>C0-C0-C0-C0-C0-C0</td> <td>C166</td> <td>1.769 us</td> <td></td> <td></td> <td>\checkmark</td> <td><</td> <td>d</td> <td>✓</td> <td>1</td> <td>1</td> <td>\checkmark</td> <td><</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	4	C0-C0-C0-C0-C0-C0	C166	1.769 us			\checkmark	<	d	✓	1	1	\checkmark	<									
7 10-10-10-10-10 00FF 0.623 us 8 30-30-30-30-30 ED05 0.413 us √ √ √ √ √ dl √ √ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	5	D0-D0-D0-D0-D0-D0	71AE	2.180 us			\checkmark	<	\checkmark	d	<	1	\checkmark	√									
8 30-30-30-30-30 ED05 0.443 us	6*	E0-E0-E0-E0-E0	7B82	0.000 us			\checkmark	\checkmark	\checkmark	✓	đ	\checkmark	\checkmark	\checkmark									
	7	10-10-10-10-10-10	00FF	0.623 us			\checkmark	<	<	√	1	d	✓	√									
9 20-20-20-20-20 9F7C 1.293 us 📔 🗙 🗸 🗸 🗸 🗸 🗸 d 💥 💥 💥	8	30-30-30-30-30-30	ED05	0.443 us			\checkmark	\checkmark	\checkmark	✓	~	1	d	\checkmark									
	9	20-20-20-20-20-20	9F7C	1.293 us			×	~	~	~	~	~	~	đ									

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:

d	Valid frame received
×	Frame received with HCS/FCS error
4	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:

5lot	Device	Addr	BPST Delta	0 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	7
	Prior Beacon Period				d	đ	đ	đ	đ	đ	đ	d									
2	A0-A0-A0-A0-A0-A0	2C2B	1.796 us		d	\checkmark	\checkmark	✓	\checkmark	√	\checkmark	\checkmark									
3	B0-B0-B0-B0-B0-B0	34EA	1.449 us		-	d	✓	✓	<	✓	<	√									
4	C0-C0-C0-C0-C0-C0	C166	1.769 us		-	\checkmark	d	✓	<	✓	<	<									
5	D0-D0-D0-D0-D0-D0	71AE	2.165 us		-	\checkmark	\checkmark	d	✓	✓	✓	\checkmark									
6*	E0-E0-E0-E0-E0	7B82	0.000 us		-	\checkmark	✓	✓	d	✓	<	<									
7	10-10-10-10-10-10	00FF	0.790 us	L	-	\checkmark	\checkmark	\checkmark	\checkmark	d	✓	\checkmark									
в	30-30-30-30-30-30	ED05	1.306 us	1	×	\checkmark	\checkmark	\checkmark	✓	✓	d	\checkmark									
9	20-20-20-20-20-20	9F7C	1.687 us		×	~	~	~	~	~	~	d									



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



Click on **Zoom-In** (4) and **Zoom-Out** (2) 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 II** to pause the playback.
 - Click on **Stop** to stop the playback and reset to the beginning of the file.
 - Click on Previous Beacon Period *d* 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 違 .
- A Save As window appears:

Save						? 🗙
Savejn:	🗀 Exported files		~	3 🦻	• 📰 🥙	
My Recent Documents						
Desktop						
Documents						
Computer						
My Network Places	File <u>n</u> ame: Save as <u>t</u> ype:	Sample (bpst 7.777 GIF Image (*.gif)	7 777 777).gif		✓✓	<u>S</u> ave Cancel

- 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.

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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** l and **Zoom-Out** l 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 b** to play back the traffic. Superframes contents are shown one superframe after another.
 - Click on **Pause II** 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 It 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.
- 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:

Save					? 🗙
Savejn:	🚞 Exported files			🏂 📂 🛄-	
My Recent Documents					
Desktop					
Documents					
Computer					
My Network Places	File <u>n</u> ame: Save as <u>t</u> ype:	Sample (bpst 7.777 777 7 GIF Image (*.gif)	77).gif	✓✓	<u>S</u> ave Cancel

- 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.

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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.

cording Act	ivity							
Analyzer								
Status:	Recordir	1g						
FIFO level:	0 bytes		Valid frames:	57'705				
Time:	0:10		Error frames:	0				
Detected de	vices: 3		Total recorded: 2.98 !					
Detected de	ACC3. 3		rocarrecoraea	2.50110				
Devices Th	roughput RX Qua	ality						
				Deel				
Device	Throughput	Error rate	LQI	RSSI				
CB78	308 kB/s	0%	31 dBm 29 dBm	25 dBm 16 dBm				
1EBF 0005	930 bytes/s 128 kB/s	0% 0%	29 dBm 29 dBm	15 dBm				
- Total								
Throughp	ut: 437 kB/s	Error	rrate: 0%					
				Stop recording				
			L	Stop recording				

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:

Recording Activ	vity			X
Analyzer				
Status:	Recordin	ig		
FIFO level:	0 bytes		Valid frames:	1'736
Time:	0:43		Error frames:	3 (0.17%)
Detected devi	ces: 1		Total recorded	242 kB
Devices Thro	ughput RX Qua	lity		
Device	Throughput	Error rate	LQI	RSSI
CE05	141 kB/s	0%	29 dBm	37 dBm
1580	30 bytes/s	0%	29 dBm	16 dBm
Total	:: 141 kB/s	Error	rate: 0%	
			C	Stop recording

i

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:

Recording Activity			X			
Analyzer						
Status:	Recording					
FIFO level:	0 bytes	Valid frames:	2'111'203			
Time:	4:29	Error frames:	12			
Detected devices:	3	Total recorded:	146 MB			
Devices Throughp	ut RX Quality					
Error rate						
CB78 💌	1EBF 💌	0005 🖌				
		St	op recording			

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:

Recording Activity			X
Analyzer			
Status:	Recording		
FIFO level:	0 bytes	Valid frames:	399'963
Time:	0:52	Error frames:	29
Detected devices:	3	Total recorded:	20.7 MB
Devices Throughp	ut RX Quality		
	where the provide the		
RSSI			
CB78 💌	1EBF 🕑 000	05 🔽	
		Sto	op recording

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 postprocessing. Go to the *Details* pane and review *RX Quality* under the section *WiMedia Frame Information*.

User Guide

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.
- 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 te:	xt here 🌱	Ent 🍸	Ente 🍸	Enter text here 🏾 🌱	Enter text 🍸
🛨 🔯 G	ietDescriptor (Device)	0 (2)	0	18 bytes (12 01 00 02 E	6.748 463 783
🕀 📴 S	etAddress (2)	0 (2)	0	No data	6.935 963 550
🕀 🔯 G	ietDescriptor (Device)	2	0	18 bytes (12 01 00 02 E	6.998 461 283
+ 🔣 G	ietDescriptor (Configuration)	2	0	9 bytes (09 02 12 00 01	37.199 328 067
🕀 🙀 G	etDescriptor (Configuration)	2	0	18 bytes (09 02 12 00 0	37.199 631 617
🕀 📴 S	etConfiguration (1)	2	0	No data	37.199 879 550
🛨 🙀 G	ietAssociationInformation	2	0	25 bytes (19 00 02 00 0	37.345 176 300
🕀 📴 S	etAssociationResponse	2	0	84 bytes (00 00 02 00 0	37.503 616 533
🛨 🙀 G	ietAssociationRequest	2	0	44 bytes (02 00 04 00 6	37.524 701 167
🕀 🔯 G	ietAssociationRequest	2	0	108 bytes (02 00 04 00	37.525 328 133
🛨 📴 S	etAssociationResponse	2	0	78 bytes (00 00 02 00 0	61.311 526 950
🛨 📴 S	etAssociationResponse	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:

tails	P
SetAssociationRespo	nse
0 Response data	*
AssociationTypeId	Certified Wireless USB
AssociationSubTypeId	0×0001
🌵 Length	78 bytes
🔱 СНІД	13 C7 4D 41 52 49 4F 30 30 30 30 30 4F D6 9B 4A
V CDID	D8 5C F0 DF B1 35 85 82 09 59 58 C8 BD 22 DC 24
Connection Key	64 FB 9F BB C1 92 62 9E 41 90 8C 7A 77 9F 9F E6
🗼 BandGroups	0000000 0000001

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
🕀 <table-cell-rows> IN transaction</table-cell-rows>	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:

Security			₽	×
🔍 Set key 🤏 Clear key				Ŧ
Туре	Key ID	Кеу		
Master key (PMK) Pair-wise temporal key (PTK) Pair-wise temporal key (PTK)	D8 5C F0 DF B1 0x00020200 0x00030303	Unknown Not available Not available		

3. Click on Set Key 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*.

Security			д	×
🕓 Set key 🤹Clear key				Ŧ
Туре	Key ID	Кеу		
Master key (PMK) Pair-wise temporal key (PTK)	D8 5C F0 DF B1 0x00020200	64 FB 9F BB C1 92 62 9E 41 90 8C 7A 77 9F Not available	9F	E6
Pair-wise temporal key (PTK)	0×00030303	1F 66 C6 2A 9C EB 33 97 86 F6 94 E6 D5 62	ЗВ	AD

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
🗉 <table-cell-rows> IN transaction</table-cell-rows>	1	1 IN	NAK	No data	30.555 525 542
🕀 🏓 OUT transaction	1	2 OUT	ОК	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:

Security		р ж
🔍 Set key 👒 Clear key		
Туре	Key ID	Кеу
Master key (PMK) Pair-wise temporal key (PTK) Pair-wise temporal key (PTK)	D8 5C F0 DF B1 0x00020200 0x00030303	64 FB 9F BB C1 92 62 9E 41 90 8C 7A 77 9F 9F E6 Not available 1F 66 C6 2A 9C EB 33 97 86 F6 94 E6 D5 62 3B AC

3. Click on Clear Key 🤹 Clear key .

The selected security key is cleared:

Security		1	,)
🔍 Set key 🤏 Clear key			
Туре	Key ID	Кеу	
Master key (PMK) Pair-wise temporal key (PTK) Pair-wise temporal key (PTK)	D8 5C F0 DF 81 0x00020200 0x00030303	Unknown Not available 1F 66 C6 2A 9C EB 33 97 86 F6 94 E6 D5 62 3	38 AC

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
🕀 <table-cell-rows> IN transaction</table-cell-rows>	1	1 IN	NAK	No data	30.555 525 542
🕀 🌧 OUT transaction	1	2 OUT	ОК	16 bytes (Encrypted)	30.556 407 527

User Guide

15 WiMedia Traces Merger Utility

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

ata captured by ar				
Reference frame #	7681	\$		
Second file				
Data captured by ar	halyzer Blefo			
Reference frame #	8347	~		
Output file				
Results.efo				
Results.eto The first file will be merged with the second file starting at the reference frames. The reference frame numbers must point to frames with identical raw data.				

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:

WiMedia Traces Merg	jer 🦷	×			
First file		-			
Reference frame #		<u>.</u>			
Second file		_			
Reference frame #					
Output file		_			
The first file will be merged with the second file starting at the reference frames. The reference frame numbers must point to frames with identical raw data.					
	<u>R</u> un <u>C</u> lose				

- 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.

User Guide

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:

WiMedia Protocol Examiner
Verifications Settings Results
Description
🖃 🔩 WiMedia Platform Test
 G TD.7.4 Data and Control Frames Background Test CCD-03 For frames with the access method set to one an Data frame #289 from 60D3 Data frame #330 from 60D3 Data frame #334 from 60D3
Details
Status Failed
Name: CCD-03 For frames with the access method set to one and more frames set to zero, the device must not transmit another frame to the same recipient in the current reservation block.
Save report
Run tests Frames verified: 527 Failures: 3 Close

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.

To select the verification settings:

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

The WiMedia Protocol Examiner window appears:

WiMedia Protocol Examiner				
Verifications Settings Results				
🖃 🔳 WiMedia Platform Test				
 TD.7.1.1 Beacon Format Background Test TD.7.4 Data and Control Frames Background Test TD.8.2.1 Beacon Protocol Observation Background Test 				
 TD.8.5.1.1 Clock Accuracy Test DUT beacon period interval must be between 65536-1.4 to DUT beacon period interval must be between 65536-1.4 to Average DUT beacon period interval must be between 65536-1.4 to DUT beacon period interval must be between 65536-1.4 to DUT beacon period interval must be between 65536-1.4 to DUT beacon period interval must be between 65536-1.4 to Check frames detected ✓ Ellisys Additional Background Test 				
Details				
Status None				
Runs: 0 Failures: 0				
Name:				
Run tests Close				

- 2. Click on **Plus** $\textcircled{\bullet}$ 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:

w	iMedia Protocol Examiner		X
	Verifications Settings Results		
	- Devices Identifiers (EUI-48)		
		00-00-00-12-34-56	
	Device Under Test (DUT)		
	Interop Device (INTD)	00-00-00-AB-CD-EF	
	Test System	F0-F0-F0-F0-*	
	✓Verification options		
	Verify DUT frames	Verify unidentified frames	
	Verify INTD frames	Verify Test System frames	
	Veni y INTO trailles	Veniry resc system frames	
	Run tests	Close	ר
			_

- **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** | Run tests

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:

WiMedia Protocol Examiner
Verifications Settings Results
Selected tests completed successfully
Description
Details
Status None
Name:
× .
Save report
Run tests Frames verified: 527 Failures: 0 Close

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

WiMedia Protocol Examiner 🛛 🛛 🔀				
Verifications Settings Results X 3 frames failed				
Description				
🖃 🔩 WiMedia Platform Test				
TD.7.4 Data and Control Frames Background Test CCD-03 For frames with the access method set to one an Data frame #289 from 60D3 Data frame #330 from 60D3 Data frame #334 from 60D3				
Details				
Status Failed				
Name: CCD-03 For frames with the access method set to one and more frames set to zero, the device must not transmit another frame to the same recipient in the current reservation block.				
Save report				
Run tests Frames verified: 527 Failures: 3 Close				

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.

User Guide

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:

Wi	Media	Channels Scanner	X
ſ	Channe	Options	_
	Select	t a channel in the list below to start recording.	
	(+)	Band Group 1, TFC 1 (0x09) No activity detected	
	(*)	Band Group 1, TFC 2 (0x0A) No activity detected	
	(*)	Band Group 1, TFC 3 (0x0B) Scanning No activity detected	
	(*)	Band Group 1, TFC 4 (0x0C) No activity detected	
	((<u>•)</u>)	Band Group 1, TFC 5 (0x0D) 1'174 frames detected, 43'855 KBytes/s	
	(*)	Band Group 1, TFC 6 (OxOE) No activity detected	
	(*)	Band Group 1, TFC 7 (0x0F) No activity detected	
		Record channel Close	

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:

WiMedia Channels Scanner 🛛 🛛 🛛 🛛
Channels Options
Scan channels using: Ellisys WiMedia Explorer 300 (WEX300-24500) V Start
Scan channels:
✓ Band Group 1, TFC 1 (0×09) ✓ Band Group 1, TFC 2 (0×0A) ✓ Band Group 1, TFC 3 (0×0B)
Image: Stand Group 1, TFC 4 (0x0C) Image: Band Group 1, TFC 5 (0x0D)
 ✓ Band Group 1, TFC 6 (0×0E) ✓ Band Group 1, TFC 7 (0×0F)
Scan time per channel (ms): 100
Close

- 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** Ito scan the channels with the selected options.

User Guide

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:

Export
Export Export Please select the type of data to export in the list below.
What would you like to export? WiMedia overview WiMedia frames and data Wireless USB overview Elikys WiMedia Generator Script Elikys Trace File
Description Export data as displayed in the WiMedia overview columns (Item, SrcAddr, DestAddr, etc.)
< Back Next > Cancel

2. Select WiMedia overview in the list.

The Export Options window appears:

Export	×
Export Please select the WiMedia overview columns to export in the list	: below.
Columns to export	
 ✓ Item ✓ SrcAddr ✓ DestAddr ✓ Prame type ✓ Status ✓ Protocol ✓ PHY Rate ✓ Payload ✓ Time ✓ Frame interval ✓ Frame # 	Set as default Set as displayed
Options • Export displayed items Export all items	
< Back Nex	xt > Cancel

- 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.

The *Export Format* window appears:

Export	×
Export Please choose the output file and format.	Con the second
Export format: CSV (Comma Separated Values)	Preview
XML (Extensible Markup Language)	
Save exported file as:	
C:\Exported files\Sample.csv	Browse
< Back Finish	Cancel

- 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:

Export	X
Export Please select the type of data to export in the list below.	
What would you like to export?	
WiMedia overview WiMedia Frames and data Wirreless USB overview Ellisys WiMedia Generator Script Ellisys Trace File	
Description Export WiMedia frames and data to text, XML or binary format file.	
< <u>Back</u> <u>Next</u> > Cancel)

2. Select WiMedia frames and data in the list.

The Export Options window appears:

Export	×
Export Please select the data to export in the list below.	E C
 Data to export ✓ Time ✓ Length ✓ Data ④ Frame raw data ④ Frame payload Options Options ④ Export displayed items ⑥ Export all items 	
<pre></pre>	ncel

- In the Data to export list select one or all of the following check boxes:
 - Time
 - Length
 - Data
- 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.

The *Export Format* window appears:

Export	×
Export Please choose the output file and format.	Con and a second
Export format:	
CSV (Comma Separated Values) Text file XML (Extensible Markup Language) Binary data file	Preview
Save exported file as:	
C:\Exported files\Sample.csv	Browse
< Back Finish	Cancel

- 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:

Export	×
Export Please select the type of data to export in the list below.	
What would you like to export? WiMedia overview WiMedia Frames and data Wireless USB overview Ellisys WiMedia Generator Script Ellisys Trace File	
Description Export data as displayed in the Wireless USB overview columns (Item, Device,	
Endpoint, etc.) Sector Sec)

2. Select Wireless USB overview in the list.

The Export Options window appears:

Export	×
Export Please select the Wireless USB overview columns to export in th	e list below.
Columns to export	
V Device V Endpoint Status V Payload V Time	Set as default
Options • Export displayed items • Export all items	
< Back	kt > Cancel

- 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.

The *Export Format* window appears:

Export	×
Export Please choose the output file and format.	Surger State
Export format:	
CSV (Comma Separated Values) XML (Extensible Markup Language)	Preview
Save exported file as:	
C:\Exported files\Sample.csv	Browse
< <u>B</u> ack Fi <u>n</u> ish	Cancel

- 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:

Export	×
Export Please select the type of data to export in the list below.	
What would you like to export?	
WiMedia overview WiMedia frames and data Wireless USB overview Ellisys WiMedia Generator Script	
Ellisys Trace File	
Description	
Export data as an Ellisys WiMedia Generator Script file (*.esf).	
< Back Mext > Cancel)

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

The Export Options window appears:

Export	×
Export Please select the exporting options below.	total a
Traffic to export	
 Export Wireless USB host frames 	
Host address	
Export Wireless USB devices frames Device address	
Options	
< Back Next > Ca	ncel

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.

The *Export Format* appears:

Export	×
Export Please choose the output file and format.	E Cores
Export format: Ellisys script file	Preview
Save exported file as:	
C:\Exported files\Sample.esf	Browse
< <u>B</u> ack Fi <u>n</u> ish	Cancel

- 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:

Export	X
Export Please select the type of data to export in	the list below.
What would you like to export?	
WiMedia overview WiMedia frames and data Wireless USB overview Ellisys WiMedia Generator Script	
Ellisys Trace File	
Description Export WiMedia frames to an Ellisys tra	re file (efo)
Expert winded in times to an Elisys are	
	< Back Next > Cancel

2. Select Ellisys Trace File in the list.

The Export Options window appears:

Export	×
Export Please select the data to export in the list below.	E.
Frames to export Export frames displayed in the WiMedia overview Export all frames Options Limit Data frames payload to B to bytes	
<back next=""> C</back>	ancel

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.

The Export Format window appears:

Export	×
Export Please choose the output file and format.	Cores and
Export format:	
Elliys Trace File	Preview
Save exported file as:	
C:\Exported files\Sample.efo	Browse
< <u>B</u> ack Fi <u>n</u> ish	Cancel

- 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.

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.

• 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.

User Guide
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.
ΑΡΙ	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.
СТА	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
 A type of electric connector usually attached to a flat ribbon connector

 connector
 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 A number that identify the recipient of a packet of information. address 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

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. тχ A communication abbreviation for transmit Ultra A technology for transmitting information spread over a large wideband 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.

In wireless communications, the PHY enables the actual

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 highspeed 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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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