



Bluetooth[®] Vanguard[™]

Advanced Wireless Protocol Analysis System

Innovative • Cutting-Edge • Integrated

Sales Contact:



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www.ellisys.com/bv1

and Audio I2S



Powerful Ellisys Features

- generic I2C, UART, SWD, and SPI, Audio I2S, and WCI-2
- insights they need
- discovery/connection traffic and complex topologies
- capture accelerated by Ellisys hardware protocol engine for best-in-class performance
- unmatched coexistence analysis capability
- Connection / Power Flexibility: Connect, control, and power the system locally or remotely Deliverv)
- Emerging Features Support: Benefit from early implementation of pre-specification feature additions
- Mesh Support: Includes full support for Bluetooth Mesh network topologies
- Reprogrammable Bluetooth Digital Radio: Support for new specifications without hardware changes
- Multi-Piconet Support: Visualize all topologies, including multiple piconets and scatternets
- All Protocols and Profiles: Best-of-breed protocol decoding
- I2S, within the software, in sync with all other traffic
- issues
- Free Maintenance: Free lifetime updates as well as free fully-featured viewer software with unlocked hardware that can be used on any computer

Innovative Tool for Demanding Users

Wideband BR/EDR and Low Energy sniffer, with concurrent capture of Wi-Fi, WPAN IEEE

802.15.4, spectrum, HCI (USB, UART, SPI), Generic UART, SPI, SWD, I2C, WCI-2, logic signals,

The most advanced, most comprehensive Bluetooth protocol analyzer ever made. Building on a legacy of innovation, the Bluetooth Vanguard All-In-One Wireless Protocol Analysis System delivers new advances designed to ease the increasingly complex tasks of Bluetooth developers.

With its revolutionary wideband Digital Radio and integrated All-in-One hardware approach, Ellisys has changed the way Bluetooth protocol capture and analysis is done, by radically overcoming the drawbacks of legacy approaches. The Ellisys whole-band capture approach robustly records any packet, at any time, from any neighboring piconet, with zero-configuration and without being intrusive.

Reconfigurable Bluetooth Digital Radio

The reconfigurable radio concept for Bluetooth analyzers is another innovation from Ellisys engineering. With the Bluetooth Vanguard, this cost-saving feature remains a core user benefit. Reconfigurability means that the analyzer can be updated by software to support new features, without any change to the hardware. For instance, this flexibility allowed for the addition of Bluetooth features such as enhanced AES Security, Connectionless Broadcast, and more recent features, like Coded PHY and the 2Mbps BLE speed enhancement many months before these features were released in an updated specification.

Additionally, Ellisys analyzers come with free lifetime software updates and no restrictions on sharing the application software with co-workers, so our customers can benefit from these great additions hassle-free.



Industry's First Bluetooth Wideband Capture

Bluetooth wireless technology was originally designed to be robustly impervious to interference on the much-used 2.4 GHz ISM band. It was also designed to be difficult to sniff, for security reasons. To meet these criteria, a Bluetooth radio uses from 40 to 79 channels pseudo-randomly according to a hopping sequence defined at the piconet's connection time.

A hopping sniffer tries to actively synchronize on a specific hopping sequence, and captures the packets only after a successful synchronization. This kind of sniffer has several inherent limitations, making it more difficult to use, less reliable, and usable only in a limited set of scenarios.

Ellisys created the industry's first wideband sniffer in 2010, which overcame these drawbacks, adding revolutionary features which opened new horizons for Bluetooth debugging and interoperability testing. The wideband capture approach is as simple as it is powerful; instead of listening to just a few channels, the sniffer captures all channels concurrently. The sniffer thus does not need to synchronize to a piconet; it will listen passively to all nearby Bluetooth piconets, scatternets, and other topologies without any required configuration.

The All-in-One Sniffer Concept — **Another Ellisys Innovation**

Capturing wireless traffic is a very important aspect of Bluetooth debugging, but other information is equally important for understanding the big picture. This is another aspect where Ellisys sniffers excel.

The Bluetooth Vanguard supports one-click concurrent and tightly synchronized capture of:

Wireless Capture

- Bluetooth Low Energy
- Bluetooth Classic (BR/EDR)
- Wi-Fi IEEE 802.11a/b/g/n/ac (3x3) [ENT]
- WPAN IEEE 802.15.4 [ENT]
- 2.4 GHz Raw Spectrum Energy [PRO]

Wired Capture

- Bluetooth HCI (UART x2, USB x1, SPI x2) [PRO]
- General Purpose Logic Signals [PRO]
- Audio I2S [PRO]
- Wireless Coexistence Interface 2 [PRO]
- Generic Communications –UART, SPI, I2C, SWD [PRO]



• All-in-One: Fully hardware-integrated, time-synchronized, and truly one-click concurrent capture of BR/EDR, Bluetooth Low Energy, Wi-Fi, WPAN (IEEE 802.15.4), raw RF spectrum, HCI, logic/GPIO,

 Widely Acclaimed Software: The Ellisys software application provides intuitive understandings of complex protocol and RF behaviors, and flexible configuration and control to give engineers the

Bluetooth Wideband Capture: Easy and rock-solid capture of any traffic on all channels, including

• Wi-Fi 802.11 a/b/g/n/ac (3x3) Capture: Extremely accurate and perfectly synchronized Wi-Fi

• WPAN 802.15.4 Wideband Capture: Concurrent capture of all 16 WPAN 2.4 GHz channels for an

via networkable GbE (with Power-over-Ethernet/PoE) or USB 3.1 over Type-C[™] (with USB Power

Integrated Audio Analysis: Listen to captured over-the-air audio, including audio over HCI and

• Raw RF Spectrum Display: Characterize the raw wireless environment and visualize coexistence



Ellisys Bluetooth[®] Vanguard[™] Advanced Wireless Protocol Analysis System

All-Channels 802.15.4 WPAN

IEEE 802.15.4 is a technical standard that provides lower-layer support for higher-layer network specifications like Thread and Zigbee. Increasingly, this Low-Rate Wireless Personal Area Network (LR-WPAN) technology is being used on devices, modules, and SoC's that also employ Bluetooth and/or Wi-Fi communications, and in environments like Smart Home, smart cities, and industrial applications where Bluetooth and Wi-Fi are also present.

These circumstances present coexistence challenges. **Bluetooth Vanguard uses an innovative wideband approach to capture all 16 WPAN channels** that are used in the 2.4GHz band, including associated RF characteristics, in precise synchronization with all other traffic streams captured by the analyzer.



Automated Error Detections

The analyzer software alerts the user to a variety of errors detected for both wired and wireless captures. Physical, protocol, and profile layer errors, including packet and transactional errors, are **automatically highlighted without any need to search through the capture.**

Errors are highlighted on a color-coded system to indicate the relative severity of the errors, summarized in a dedicated status column in each protocol overview, and described in the Details view or with pop-up messages on fly-over in the Overviews. Incomplete payloads, missing or incorrect field values, center frequency violations, timing violations, missing responses, and CRC errors are among the errors indicated.

Visualizing Coexistence Issues

In addition to Bluetooth Classic and Bluetooth Low Energy, Vanguard supports capture of Wi-Fi 802.11a/b/g/n/AC 3x3, WPAN 802.15.4, and raw RF spectrum - **in precise synchronization with each other and all supported wired transmissions.** These technologies are frequently sources of interference and contention with Bluetooth communications, as they share the 2.4 GHz ISM spectrum used by Bluetooth. Increasingly, these technologies are co-resident on the same SoC.

To fully characterize coexistence issues, Vanguard delivers a variety of features that make this task easier. The user is provided a precise understanding of RF signatures, sources, and power, various timings, device performance indications, and other related metrics.



Wi-Fi Capture - Accelerated

With Vanguard, **Wi-Fi traffic is captured using an innovative, Ellisys-designed hardware-accelerated protocol engine.** With lower-performance Wi-Fi capture tools that use a software-based capture approach, the capture process is done with a processor involved. This approach can limit the speed and timing accuracy of the capture – packets can be missed when the processor is outmatched by the incoming streams.

With Vanguard's specially designed protocol engine, the Wi-Fi capture is driven directly and without processor dependence to guarantee throughput and minimize latency. Importantly, the Wi-Fi traffic is captured concurrently and in precise synchronization with all other supported wired and wireless capture streams.

Bluetooth Mesh Networking

The Bluetooth Mesh Networking specifications define a broad spectrum of device and system requirements for a large-scale many-to-many network using Bluetooth Low Energy wireless technology. Bluetooth mesh networks can greatly increase the range of Bluetooth communications by using a message relay approach and are inherently uncomplicated and inexpensive to deploy, as there are no requirements for a central router or computer.

Bluetooth Vanguard provides **comprehensive support for capture of mesh network protocol,** related packet and transactional decodes, encryption and key management features, and error detections. Mesh traffic is captured concurrently and in precise synchronization with all other supported traffic streams.



Instant Timing

Timing is everything as they say, and with Bluetooth, it's always an important focus. Multitudes of timing parameters defined by the Bluetooth specification are system-critical. It is understandably important to characterize these timings efficiently and accurately. Hardware and software timing issues are often the source of interoperability and performance issues that can challenge Bluetooth engineers.

The Instant Timing view displays various information along a common timestamp, including visualized Bluetooth, Wi-Fi, and WPAN packets, HCI traffic (UART, SPI, and USB), generic communications (SWD, I2C, UART, and SPI), and logic signals. Data throughput and packet transmission statistics are included to complete the approach.



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Nominal Connection Interval	37.500 ms
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Ellisys Bluetooth[®] Vanguard[™]

Advanced Wireless Protocol Analysis System

One-Click Record Capture starts instantly without any configu-

ration. Devices under test are automatically detected.

Protocol Overview

Low-level and stack protocol elements are hierarchically displayed in easily configurable views.

Instant Spectrum

Visualize hopping sequences, AFH dynamics, statistical per-channel error characteristics, timings, and RF characteristics.

In-Depth Data Mining

Detailed meta-data and protocol fields are clearly displayed and linked to the selected item in the overview.

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629 872 500	🚓 🔎 SDP Service Search Attribute Transaction (Hands-Free Audio Gateway)	Master: "iPhone" 2C:33:61:DE:8C:3E <-> Sla	2453 - 51 - 24 - 79 2456 - 54 - 25 - 75	
567 372 500	🗉 😓 L2CAP SDU (Basic, Dst=Fixed 0x0030)	Master: "iPhone" 2C:33:61:DE:8C:3E <-> Sla		
669 872 625	■ 🔎 SDP Service Search Attribute Transaction (Audio Source: L2CAP AVDTP V1.3)	Master: "iPhone" 2C:33:61:DE:8C:3E <-> Sla	2462 - 60 - 28 11 -	
707 372 625	🖶 🚇 SDP Service Search Attribute Transfer (A/V Remote Control Target)	Master: "iPhone" 2C:33:61:DE:8C:3E <-> Sla		←2.998375 ms
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912 372 625		Master: "iPhone" 2C:33:61:DE:8C:3E <-> Sla	2477 - 75 - 75 - 35	
915 496 750		Master: "iPhone" 2C:33:61:DE:8C:3E <-> Sla	🛶 L2CAP SDU (Basic, Dst=Fixed 0	
916 746 750	G	Master: "iPhone" 2C:33:61:DE:8C:3E <-> Sla	→ POLL packet (ACL)	
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Protocol & Profiles Analysis

Bluetooth protocols and profiles are displayed in an easy-to-un-

derstand, high-level procedures-oriented chronological

format in the Overview windows and fully detailed to the low-

est bit/byte level in the linked Details view. All supported traffic

streams are displayed in designated Overviews real-time, as the

The user is provided various controls to easily customize any

Overview, including powerful filtering and coloring capabilities

designed to quickly isolate specific protocols, profiles, or commu-

nications of interest. Traffic can be presented at the highest level

of abstraction and the user can drill down to show all intermedi-

ate levels, down to the most basic elements, such as packet-only



Ellisys Bluetooth[®] Vanguard[™] Advanced Wireless Protocol Analysis System

Topology Analysis

Bluetooth technology has become very popular among consumers and continues to evolve into new applications and markets, leading to more complex use cases. The only way to support these new use cases is to create more complex topologies, for example, Mesh Networking.

Debugging complex topologies has always been a difficult task, but Bluetooth Vanguard is up to the task with its **powerful wideband radio capable of capturing any traffic from any device,** including the most complex topologies. The Instant Piconet view helps developers visualize their topologies live while capturing, and also provides a play-back feature showing step-by-step evolution of topology changes.

Logic Analysis

The logic analysis feature allows for synchronous capture of external logic signals. Any digital signal is supported, including general-purpose inputs/outputs (GPIOs) or dedicated pins such as TX/RX Active, CTS, RTS, etc. A convenient color-coded probe is supplied.

These signals are visualized with 5-nanosecond precision

and displayed in the Instant Timing view with all over-the-air and wired traffic streams. Signals can be assigned custom names and colors for easy identification. Custom signal groups can be created and displayed as buses, in addition to the display of discrete signals. Users can create simple external comparators and observe thresholds being crossed for various metrics, such a power consumption.

Integrated Audio Analysis

The Ellisys analysis software includes integrated Audio analysis. **Any captured audio stream can be quickly and easily played back, even live, during capture.** Finding the packet carrying a specific audio portion or seeing event and topology changes at specific audio positions becomes child's play.

Audio captured over HCI or from an Audio I2S input [PRO] can be played back as well. This enables characterization of the complete audio chain, from the uncompressed audio provided to the source radio chip, to the audio transmitted wirelessly, and the decoded audio received by the receiver radio chip. The various audio streams are exportable to WAV format.

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HCI Analysis

Wireless traffic is the primary element of debug information for Bluetooth engineers, but Host Controller Interface (HCI) traffic can be an equally important complement of information for getting a clear and complete picture of a given situation. Bluetooth Vanguard supports capture of HCI transports over USB, UART, and SPI.

HCI traffic is captured concurrently with the wireless traffic and other wired streams using the same precision clock for perfect synchronization and timing analysis and is decoded and displayed in various formats. Conveniently, the Ellisys software **automatically extracts any Link Key exchanged over HCI** and uses it to decrypt the wireless traffic, all without any user interaction.



Spectrum Analysis

capture progresses.

views.

The Instant Spectrum feature displays packets by channel, over time and can also synchronously display raw RF spectrum information in the busy and unlicensed 2.4GHz ISM band in which Bluetooth operates. Other users of this band include Wi-Fi, LTE, ZigBee, ANT, microwave ovens, and other products and technologies. These users can and do interfere with each other, and it is often necessary to gain a precise understanding of the wireless environment.

The signal strength of all emitters (RSSI) is displayed. Adaptive Frequency Hopping (AFH) behaviors are overlaid, enabling a keen understanding of the complexities of the dynamic RF challenges encountered by any given Bluetooth link.

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37.863 186 375	🛞 🍫 L2CAP Configure (Dist=0x0045 + Sirc=0x00446)	OK .	Master: Laptop <-> Sk	37.574 170 41	0 8 📢	L2CAP Configure (Dst=0x0041, HTU=1017 + Src=0x0042, HTU=672)	LICAP	OK	20 by
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38.010 686 625	AUDTP Get Capabilities (ACP+1) + Media Transport Audio SEC: 4804z	OK	Master: Laptop <> Si	37.500 690 73	0 84	L2CAP Connection (Src=0x0042, PSH=HED Interrupt + Dst=0x0043)	LICAP	OK	25 b-
38.040 687 250	🛞 🦓 AVOTP Set Configuration (VCP - 1, INF - 52, Media Transport Audio SBC: Joint	OK .	Master: Laptop <> 5k	37.590 143 25	5 8+	HCI Link Supervision Timeout Changed (Connection-Ex0049, Timeout-2 s)	HCL	OK	6 by
38.070 688 000	AVDTP Open (ACP - 1) + Accept	OK .	Master: Laptop <-> Sk	37.990 530 93	0	LICAP Configure (Dst-0x0042, HTU+1017, OsS-Best Effort + Src-0x0043, I	LICAP	OK .	44.5
38.100 687 750		OK	Master: Laptop <-> Si	37.596 266 38	5 84	L3CAP Configure (Dist=0x0043, MTU=672 + Src=0x0042, MTU=672)	LICAP	OK	20 b
38.130 065 000	R 🛖 L2CAP Configure (Dst=0x0045, HTU=1000 + Src=0x0046)	OK .	Master: Laptop <-> Sk	37.599 302 58	5 8.4	HCI Sniff Hode (Connection=Ox0049, Max=7.5ms, Min=5ms, Attempt=3.75	. HCI	OK .	13 b
38.131 938 250	R 🕎 L2CAP Configure (Dist-Dx0046 + Sirc=0x0045)	OK.	Haster: Laptop <-> Sk	37.601 055 58	0 8/	HCI Read Scan Enable + Both	HCI	OK	36
38.517 567 750	# PE UNP Preferred Rate (PEC, IR -No preference, EDR -Use 3 Mbps packets, Pref-N		Master: Laptop <>> Sk	37,602 468 63		HCI Write Scan Enable (Insbin -Page)	HCL	OK .	45
40.003 197 625	(# @ Inquiry (no responders, 20 s)	ox	Master: Inquirer <>> 5	37.604 066 83	5 8.4	HCI Read Class of Device > Headoet	HCI	OK .	301
40.099 446 250	(# 92 UNP Preferred Rate (DR - No preference, CDR - Use 3 Mbos packets, Pref - Use 5		Mester: Laptop <-> Sk	37,605 496 90	0 8.4	HCI Write Class of Device (Headset)	HCI	OK .	6.01
+1.201 464 000	@ HE UMP Name Transaction ("Novx Gamepad Controller 281878FA51D9")	ox	Masteri Laptio <-> Si	37,606 204 90	0.85	HID Set Ide (tate-Infinite)	HID	ox	20 8
55,142 012 625	# 12CAP Signaling Reserved (0x00) (15 bytes (EC 86 F0 D8 24/E3 40 SE 0F 22 98 D	Warning	Master: Lapton <-> Sk	37,784 949 30	0	L2CAP Disconnection (Sec -0x0040, Dat-0x0041)	LOCAP	OK .	35 5
56.521 296 000	# 92 UMP Preferred Rate (III -No preference, EDR -Use 2 Mbos packets, Prof -No pre		Master: Laptop <> Sk	37,829 949 21	0	L3CAP Connection Err - 0x0043, PSH - AV07P + Dit - 0x00440	LICAP	OK	26.8
60.003 294 125	(# 00) Inquiry (2 responders, 20 s)	OK .	Master: Inquirer <-> 5	37,832 338 21		L2CAP Configure (Dist-Ox0043, HTU-1017 + Sec-Ox0044)	LOCAP	OK .	20 5
64,531 432 875	# 98 UMP Preferred Rate (PEC, IR -No preference, IER -Use 3 Mbps packate, Pref -N		Mester: Laptop <-> Si	37,041 211 92		L2CAP Configure (Dist=0x0044 + Sirc=0x0043)	LICAP	OK .	25 5
28,296 146 125	Parine Dation BD ACCR > couFE CB/CE, no resource, 20.6 s)	ox	Masteri Uningen FD (37,852 490 13		L2CAP Connection (Frr - 0x0044, PTP - AVCTP + Drt - 0x0045)	LICAP	OK .	26 b
80 001 171 175	(# 0) Insuity (2 responders, 19,1 a)	OK.	Master Inning Co.S.	12 854 682 56	5	1 2042 Conferent Electropidate attitue (0.12 a Deceber045)	127.42	l or	20.5
55.477 449 500	R Parine (Unineue R) 4008 a revEE CB-CE, no reserves. 3.44 s)	ox	Master: Linkneyn FD 2	37.863 712 83	1.0.4	12CaP Conferent Entrado 0045 a Secular00440	13548	OK .	16 h
105 819 499 00	A AUTO Grant (1/2 - 1) - Arrent	CV.	Master: Lantas c. 2 St	17 991 630.00		AUTOR Decrear Command a Lincol-No. 3/12-1	4.7/	CV.	12.0
105 847 241 50	A AUTOR Media Chevan (Contra SPC) Sent Steven, 44 Sette Loudness, 8 Schlands, 5	or	Master: Lanton cub Sk	36.011 130.01		AUTTE Get Carolylites (ACE +1) + Media Transport Auto SEC: #Bitte	4/1	OK .	11.5
100 810 494 51	A AVAID Made Chases Conferr 601 biot Chases 44 title Loudsers 8 Subbands 1	~	Master Laster co. 9	19 041 114 7		AUTOR Set Conferences (1/1/2 1 1/1/57) Made Transport Aude SPC 16	8.01	~	22.0
107 717 247 62	S CA AUTO Mada Chaam (Color (SC) bird Garan 44 little Loudness & Gibbards 5	OK.	Master: Lanton cub St	38.071 140 50		AUTTE Onen (I/Card) a Arrent	4/1	OK.	11.5
158 110 340 10	A AUTOR Made Deser Contra - Dirition de Lines de Lines a de lines	~	Master Laster C. B.	28 101 108 00		1 SCAR Connection (Inc. AvAnte 1014 - 60278 - DutAvAnte)	12048	~	16.0
100 200 253 15	A SUNTE Made Charas Contra CO's bort Garas de Side Loudeaux & Gabasets	CV.	Master: Lastro c.o. St	10 102 061 0		12/32 Conferra Europeanas, 1011-2000 - Scondardada	13742	CV.	20.5
110,218,508,00	A AUTOR Media Chevan (Contra SPC) bird Oleven, dd. 1811 Lawdress, 8 Schlands, 5	or	Master: Lantas c.) St	38,112,441,00		1 2042 Conferre (Data Dx0046 a Security 0045)	13742	OK .	16.5
111 228 514 53	A SUTTE Made Charge ("inter-SB") best Daries, 44 Size Loudeaux, 8 Subbands 1	CY.	Master Laster Co. B.	10 162 100 00		With solver Of Considered Backets (Consistence Backats, Decision, 1)	Her.	~	78.0
112 243 519 37	S CA AUTTE Made Charam (Conter SDC) bind Garan, 44 little Loudness, 8 Gibbards S	or .	Master: Lanton (-> Si	53 163 397 51		11827 Gean Merrane	liet	OK.	
113 368 531 13	1. C. A. MUTTH Made Disease ("relative SN"), bird Disease At 1985 Londonse, 8 Subbands 1	~	Master Lantas confi	105 818 080	1	11887 Webs of Marcala	linet	~	
114 392 226 12	S (2 A SUTTE Marks Charam Contra SDC) bind Charam Ad Shirt Loudness & Gabbands C	a.	Master Lanton con St	105 010 360	1	11827 Walks in Manage	Unit	N.	
118 040 780 18	A STATE Made Places (" PR", Serie Places of Tate I andress & Fullwords I	~	Master I aske dia fit	104 810 560	1	11877 Bishan Message	line	~	
<			>	<					

ellisys

Ellisys Bluetooth® Vanguard[™] **Advanced Wireless Protocol Analysis System**

Configurations and Purchase Information

Radio Configuration	EDR	LE	DUAL
BR/EDR Capture	x		x
Low Energy Capture		x	x
Editions	Standard	Pro	Enterprise
Wideband Bluetooth Capture	x	x	x
HCI Capture		x	x
Logic Capture		x	x
I2C, UART, SPI, SWD Capture		x	x
Spectrum Capture		x	x
Audio I2S Capture		x	x
WCI-2 Capture		x	x
Wi-Fi 802.11 a/b/g/n/ac Capture			x
WPAN 15.4 Capture			x
Warranty	2 years	2 years	3 years

Description

Ellisys Bluetooth Vanguard Standard BR/EDR Ellisys Bluetooth Vanguard Standard Low Energy Ellisys Bluetooth Vanguard Standard Dual Mode Ellisys Bluetooth Vanguard Pro BR/EDR Ellisys Bluetooth Vanguard Pro Low Energy Ellisys Bluetooth Vanguard Pro Dual Mode Ellisys Bluetooth Vanguard Enterprise BR/EDR Ellisys Bluetooth Vanguard Enterprise Low Energy Ellisys Bluetooth Vanguard Enterprise Dual Mode Ellisys Bluetooth Vanguard Pro Upgrade Ellisys Bluetooth Vanguard Enterprise Upgrade Ellisys Bluetooth Vanguard Dual Mode Upgrade

Instant Channels

The Instant Channels feature provides easy-to-understand visual and statistical analyses on various per-channel transmission characteristics, including packet retransmissions, header errors, and payload errors. This information can be useful in understanding where in the Bluetooth spectrum all devices, or specific devices, are communicating and the spectral areas (channels) they are avoiding, generally due to external interferences.

Visual cues are provided to give the user an understanding of the propensity of a given device, or aggregate devices, to avoid particular channels. This information is provided for the duration of an entire capture and can be configured to characterize all devices in the vicinity or specific devices.



💽 😋 🔍 🔳 🚡 - I origin: 0.00 s

Total 1.55 MB Marc 15.4 MB DCRT6 S01A45/4800 Phone 80-C555M2279 Total 3.96 MB Marc 15.4 From DCRT6 Total 1.36 MB Marc 1

Test 205 8 Mer L 09 Mile CELMOIDER 42:04/06/ 00/24/2C/A1F7/50 00/2

- sparc 272.24 s

Funort Solt ET / Wi

Instant Throughput

Understanding device data throughout performance is a common task for wireless engineers. These metrics are the domain of the Instant Throughput view, which provides throughput by device and by L2CAP or SCO/eSCO channel and Wi-Fi communications. A convenient statistical overlay provides information on how various transmission inefficiencies may be affecting throughput, such as packet retransmissions.

Each device and channel is color-coded and can be shown or not shown as the user may prefer. A navigation bar is provided to allow the user to select a time range to pan through the entire capture to see trends, as well as high and low peaks on data throughput.

Emerging Features Support

All Ellisys Bluetooth analyzer systems are reconfigurable with software updates – another Ellisys innovation. Ellisys maintains close relationships with radio developers worldwide and with various technical groups involved in outlining new Bluetooth specifications.

This approach allows new features to be added even in the conceptual stages, long before they become standardized in a public release of the Bluetooth specification. This is a huge advantage to Bluetooth radio developers, and to the Bluetooth developer ecosystem in general, as radio developers can test new features well before they are committed to silicon, greatly reducing chances of re-spins or discoveries of issues in the marketplace, post-spin.





Code
BV1-STD-EDR
BV1-STD-LE
BV1-STD-DUAL
BV1-PRO-EDR
BV1-PRO-LE
BV1-PRO-DUAL
BV1-ENT-EDR
BV1-ENT-LE
BV1-ENT-DUAL
BV1-PRO/UPG
BV1-ENT/UPG
BV1-DUAL/UPG

Ellisys Bluetooth[®] Vanguard[™]

Advanced Wireless Protocol Analysis System

ellisys Better Anglysis

Technical Specifications

Bluetooth Capture Characteristics

- Ellisys Rainbow[™]: Industry's first wideband concurrent capture of all Bluetooth channels. Introduced in 2010.
- Frequency band: 2.402-2.480 GHz
- Sensitivity range: From -90 to +15 dBm
- Gain: Programmable from -30 to +30 dB
- Modulations: All BR/EDR/LE modulations (GFSK 1/2Mbps, p/4-DQPSK, 8-DPSK)
- Baseband: Support of Bluetooth 5, upgradeable by software. Preliminary support of non-released specifications available.

Wi-Fi Capture Characteristics

- IEEE 802.11 a/b/g/n/ac (3 streams)
- Channel width 2.4GHz: 20MHz, 40MHz
- Channel width 5GHz: 20MHz, 40MHz, 80MHz
- 11n MCS: 0 to 23 (up to 3 streams)
- 11ac MCS: 0 to 9 (up to 3 streams)
- Guard Interval: 800ns (long) and 400ns (short) GI
- Frame encoding: BCC, LDPC, STBC, Greenfield
- Max AMPDU size: 65,535 bytes
- Timing accuracy: 125 ns

WPAN Capture Characteristics

- IEEE 802.15.4-2011
- Channels: All 16 2.4 GHz channels (11 to 26)
- Data rate: 250 kbps
- Modulation: O-QPSK
- Timing accuracy: 125 ns

Logic Capture Characteristics

- Maximum bandwidth: 20 MHz
- Sampling precision: 5 ns
- Supported input voltage: 1.8 to 3.3V

HCI Capture Characteristics

- USB transport: Low, Full, and High Speed, with automatic detection
- UART transport: Up to 8 Mbit/s, automatic detection of all parameters
- SPI transport: Up to 8 Mbit/s, automatic detection of all parameters

Embedded Memory

- 512 MB of FIFO memory
- Data is stored in highly optimized format
- Analyzed data is uploaded in real time

Low-speed Serial Capture Characteristics

- UART: Up to 8 Mbit/s automatic detection of all parameters
- SPI: Up to 8 Mbit/s, automatic detection of all parameters
- I2C: Up to 1 Mb/s
- SWD: Up to 8 Mb/s

Timing

- Clock: ±10ppm frequency accuracy over -10 to +60 degrees Celsius range
- BR/EDR/LE timestamp accuracy: ±125ns
- Wi-Fi timestamp accuracy: ±125ns
- WPAN timestamp accuracy: ±125ns
- USB HCI timestamp accuracy: ±16.7ns
- Logic timestamp accuracy: ±5ns

Power Adapter

- Input: 100-240 VAC
- Output: 24 VDC
- Power: 40 W
- Plug: 5.5 x 2.1 x 12 mm barrel straight
- Safety: CB, TUV, UL, CCC, PSE
- EMI: CE, FCC, VCCI, RCM

Front-Panel Indicators

- Power: unit powered on
- Operating: unit performing requested task
- Activity: blinks when wireless or wired activity detected

Front-Panel Connectors

- RF (x3): Shared between Bluetooth, Wi-Fi and WPAN
- USB HCI: USB 2.0 Standard-A and Standard-B
- Logic: supports UART/SPI HCI, WCI-2, generic I2C/UART/SPI/SWD and logic analysis
- SDIO: Optional, for external trace storage and unit recovery



Rear-Panel Connectors

- Computer: USB 3.1 Gen 1 Type-C
- Ethernet: 1GbE, PoE+
- Power: 12-24 VDC, max 36W
- Trigger: SMA in and out, 50 $\Omega,$ 3.3VDC
- Clock IN: SMA, 50 Ω, 3.3VDC, 10MHz
- Clock OUT: SMA, 50 Ω, 3.3VDC, 10MHz
- Earth: Optional, to ground the unit



Power Inputs

- DC input (12-24 V)
- USB Type-C Power Delivery
- Power-over-Ethernet (PoE+)
- Backup Battery (22 Wh)

Enclosure

- 180 x 170 x 58 mm (7.1 x 6.7 x 2.3")
- 1.5 kg (3.3 lbs)

Hardware Upgrade

 The Ellisys Rainbow[™] engine is automatically updated with each software release (no user intervention required)

Maintenance and Licensing

- Free lifetime software updates no maintenance fees
- Free full-featured viewer software easily share annotated traces between computers and colleagues and replay captured traffic
- Use Ellisys hardware on any computer no additional licenses needed

Warranty

- Two-year limited warranty [STD and PRO]
- Three-year limited warranty [ENT]

Minimum Requirements

- Intel Core, 2 GHz or compatible processor
- 4 GBytes of RAM
 1280 x 1024 display resolution with at
- least 65,536 colorsUSB 2.0 EHCI host controller

DS4004-BV1-A

Windows® 7 or higher

More information at: www.ellisys.com/bv1

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