YORKIE-PRO

User manual version 2.4

Table of Contents

Yorkie-Pro ships inside its own rugged Pelican carrying case along with all accessories to get you going right away.

Included in box:
Pelican hard carrying/shipping case with space for accessories
Yorkie-Pro unit
charging base
AC power adapter with 110V AC power cable
USB-A to USB Mini 6' cable
2.4 / 5.8 GHz Wi-Fi/BT/BLE SMA omni-directional antenna
650-3000 MHz CW SMA omni-directional antenna
4.9-5.9 GHz CW SMA omni-directional antenna
2.4 / 5.8 GHz Wi-Fi/BT/BLE SMA directional patch antenna with 18" cable
650-3000 MHz CW SMA directional antenna including 18" cable

Before you start, completely charge up your Yorkie-Pro using the supplied AC/DC transformer and charging base. Note that the mini-USB port is for BVS factory use unless specified by your authorized BVS sales engineer or reseller.

Power up your Yorkie-Pro using the white, round button on the front of the unit just below the screen. The unit will immediately begin scanning but allow at least one minute after all antennae are attached for complete measurements of all nearby wireless energy.

You may power down Yorkie-Pro at any time by simply holding in the same round, white button for a few seconds and you see the screen power back down.

CHARGING YORKIE-PRO

The primary method for charging the Yorkie-Pro wireless intrusion detector is by using the supplied charging cradle.

TO CHARGE:

Insert the Yorkie-Pro into the charging cradle.
Ensure the external transformer is plugged into an AC power outlet.
The GREEN light on the charging cradle will illuminate while the unit is charging.
Error Indicator:

If the RED light illuminates at any point while the Yorkie-Pro is in the charging cradle, this indicates an error. In this case, remove the Yorkie-Pro, unplug the charger base, and contact BVS for technical support.

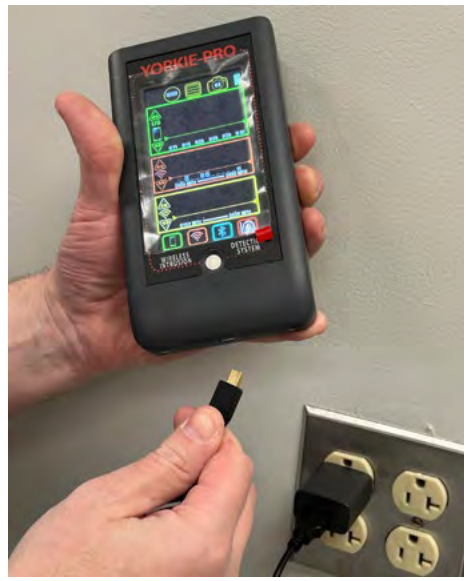
SECONDARY CHARGING METHOD

If you lose, misplace, or forget the charging cradle and/or external transformer, you can charge the Yorkie-Pro using a micro USB cable. This method provides a trickle charge, allowing the unit to operate and maintain battery life until it can be properly recharged in the charging cradle.

BATTERY & CHARGING SPECIFICATIONS

Charging Time: Approximately 5 hours for a full charge using the supplied charging cradle.
Runtime: Approximately 4 hours on a full charge/discharge cycle.
Battery: The Yorkie-Pro is powered by a high-capacity 5500mAh lithium battery.

BACKUP (TRICKLE) CHARGING PROCEDURE



If you lose or forget the Yorkie-Pro charger base or external charge transformer, follow these steps to charge the device using a standard micro-USB cable:

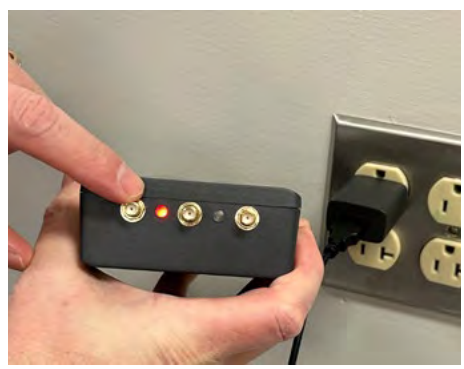
OBTAIN COMPATIBLE POWER ADAPTER

Use a wall adapter (USB power supply) with the following specifications:
Output Voltage: 5V DC
Output Current: 1.0 Amp (1000mA)
Ensure the adapter is certified for safe operation (UL, CE, or equivalent).
Use a Standard Micro-USB Cable

Connect a high-quality micro-USB cable to the USB charging port on the Yorkie-Pro.
Avoid using low-quality or damaged cables, as they may affect charging efficiency.
Plug Into a Reliable Power Source

Insert the USB adapter into a standard AC wall outlet.
Alternatively, a USB power bank with a 5V/1A output can be used for emergency charging.
Charging Time Considerations

This trickle charge method will charge the Yorkie-Pro at a slower rate than the standard charging base. (Up to 24 hours)
Expect a longer charging duration to reach full capacity (charging time may vary depending on battery level).



CHARGING INDICATOR & BATTERY STATUS

The battery LED indicator on the Yorkie-Pro will illuminate to show charging status.
Allow the device to charge fully before use to ensure optimal performance.
Important Notes:

DO NOT use fast chargers (higher than 5V/1A) as they may damage the internal battery.
This trickle charge method is for temporary use only and is not a replacement for the original charging base. For any further questions or technical support

BATTERY REPLACEMENT & MAINTENANCE

The internal rechargeable battery should only be replaced or upgraded by a factory-authorized technician. During battery replacement, the technician will:
Conduct a full battery test
Perform battery calibration to optimize performance.
For any charging issues or battery service, contact BVS technical support.

MAIN MEASUREMENT

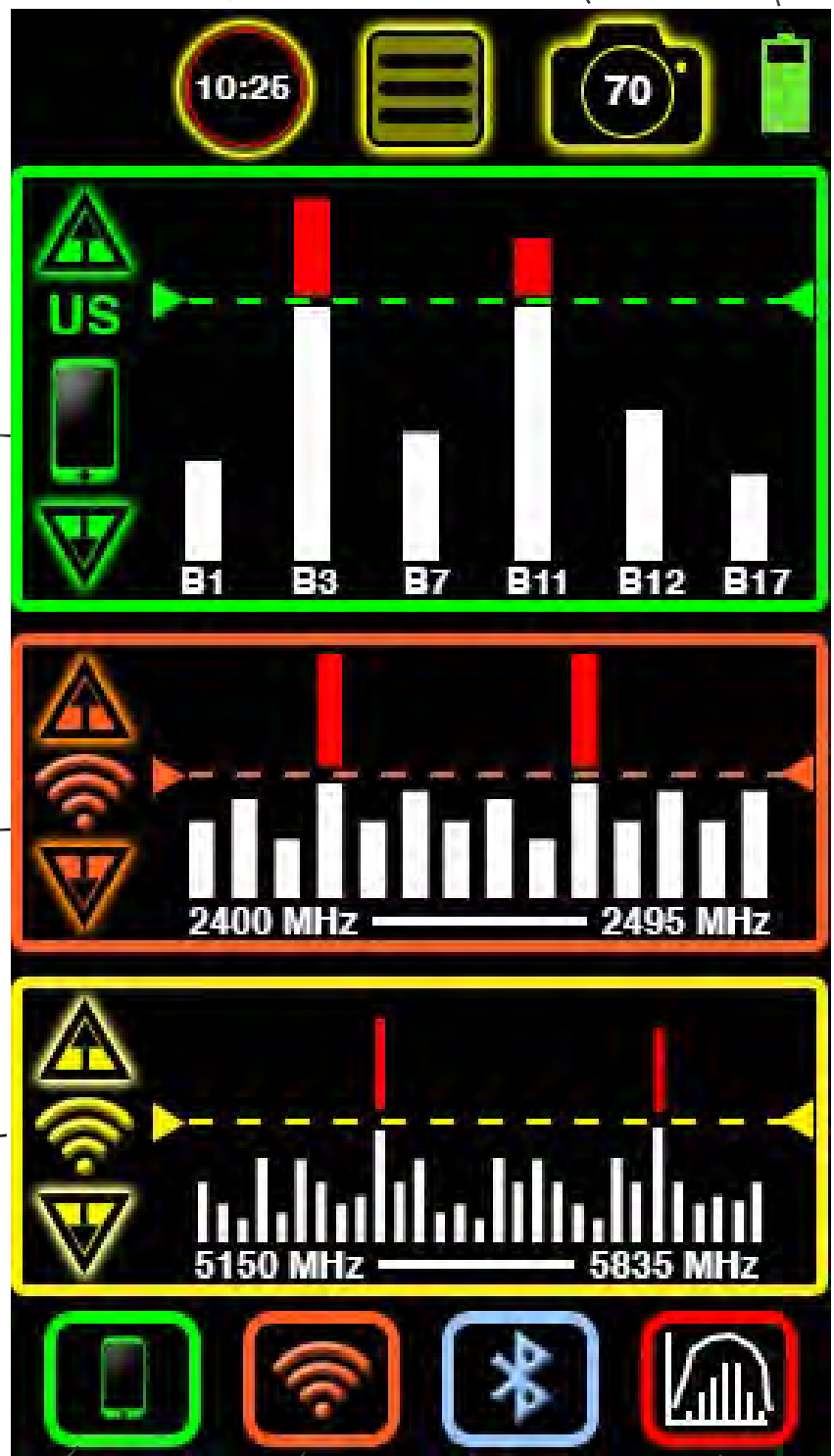
This is the first and main Yorkie-Pro measurement screen users will see allowing a quick glance of all wireless activity. In this screen, independent thresholds can be set for cellular and Wi-Fi bands. Users can also drill down to one or all lists of all detected devices. Logging data, data snapshots and main menus can all be accessed from here too. A frequency and time domain analysis screen can only be accessed from here.

Records all data shown on screen for export and review onto PC

Navigates to Main Menu for all settings.

Saves a single data snapshot and time-stamps for export and review onto PC.

Battery level indicator. Navigate to battery settings in main menu for more info.



Top 6 strongest cellular frequencies are listed by channel number. Use UP/DOWN arrows to adjust threshold. Red signal strength bars indicate level above threshold and will trigger vibrating alerts depending upon alert settings. 'US' indicates United States cellular bands will only be detected. Yorkie-Pro ships from the factory with country's RF bands as indicated by the customer but you can change to your country of choice in the Main Menu settings. Please consult with BVS sales or support staff to verify that your unit can support your country before purchasing and also before you attempt to change the country in the MAIN MENU.

Displays entire 2.4 GHz Wi-Fi 14 channel band. Use UP/DOWN arrows to adjust threshold. Red signal strength bars indicate level above threshold and will trigger vibrating alerts depending upon alert settings.

Displays entire 5 GHz Wi-Fi band. Use UP/DOWN arrows to adjust threshold. Red signal strength bars indicate level above threshold and will trigger vibrating alerts depending upon alert settings.

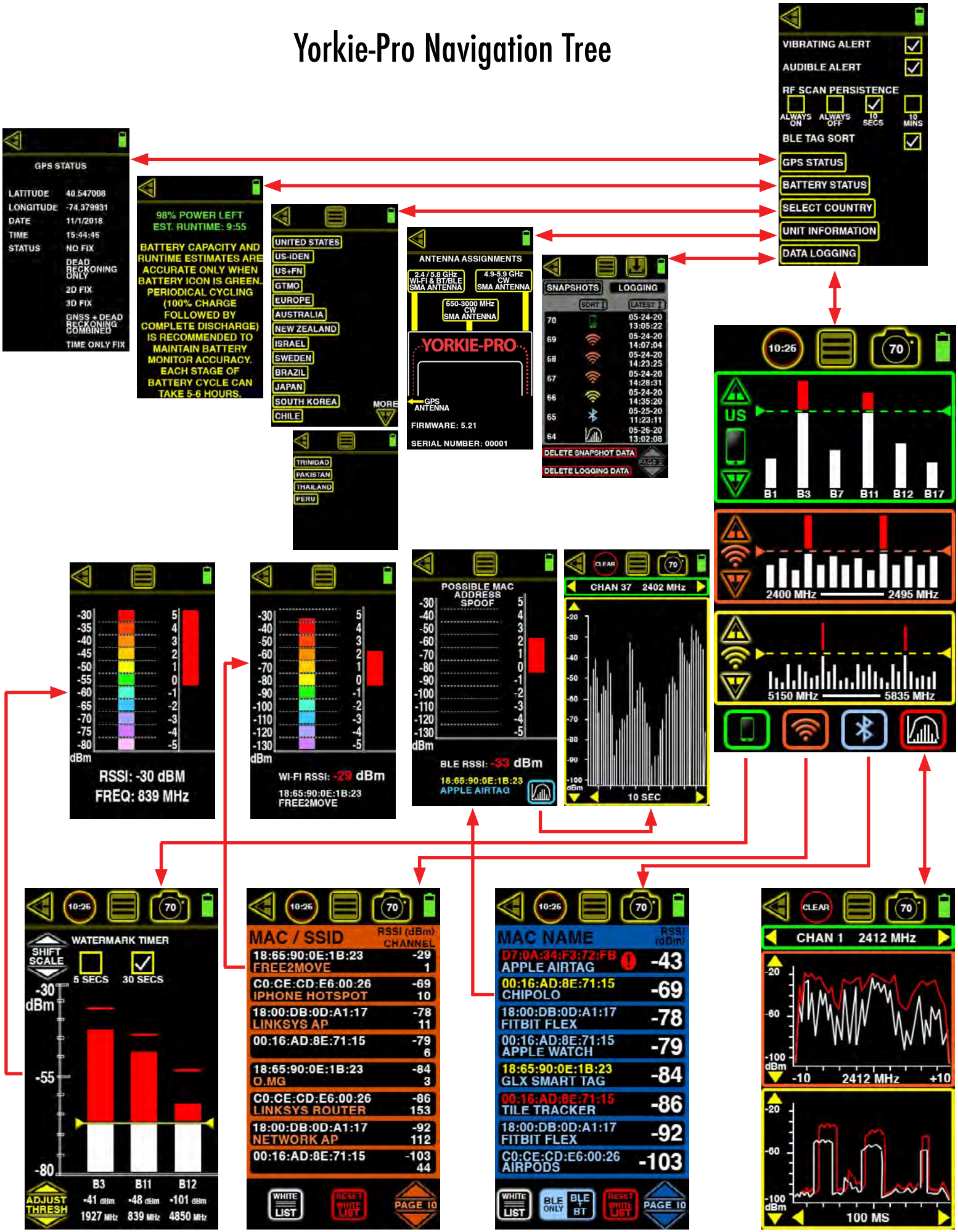
Push this button to access cellular band and compare top 3 strongest signals received.

Push this button to access a list of all Wi-Fi access points by signal strength and more information.

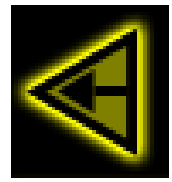
Push this button to access a list of all Bluetooth and BLE (Bluetooth Low Energy) devices by signal strength and more information.

Push this button to access the frequency analyzer screen which displays frequency and time domain graphs in 2.4 GHz band only.

Yorkie-Pro Navigation Tree



FEATURES & NAVIGATION



BACK ARROW

Use this arrow usually located on the upper left of the screen to navigate back to the previous screen. If it does not appear, then there is no previous screen.

DATA LOGGING

Touch this icon to begin logging data. The icon flashes to indicate measurements currently being seen on screen are also being recorded to the unit's internal flash storage. All data logs are time stamped using the Yorkie-Pro's internal GPS for precise time and positioning. Simply touch the icon again to stop data logging.

Internal storage allows for 5 unique data logging sessions at approximately 13MB per log file. Depending upon the screen being logged, the resulting data can be logged for a range of time. Use the countdown timer as an estimate for your security surveys. This data can then be downloaded from Yorkie-Pro to a PC for further analysis in any standard spreadsheet application. Check with your BVS sales or support representative for more information.

MAIN MENU

Touch this menu icon to enter the MAIN MENU settings from any screen. If you do not see this icon at the top of the screen, you are already in the MAIN MENU. Continue further into this user manual for a detailed breakdown of all settings.

DATA SNAPSHOT

Touch this camera icon to take a quick data snapshot of the on-screen data at anytime. Note: this does not take a screen image but rather it captures all visible measurements into a data snapshot. Yorkie-Pro can store up to 70 data snapshots internally.

This allows for convenient data points that can easily be integrated into a spreadsheet or report. All snapshots are time stamped using the Yorkie-Pro's internal GPS for precise time and positioning. These snapshots can then be downloaded from Yorkie-Pro to a PC for further analysis in any standard spreadsheet application.

BATTERY STATUS

This battery icon indicates the unit's remaining power at a glance. For estimated runtime and battery details, choose BATTERY STATUS in the MAIN MENU.

CELLULAR MEASUREMENTS

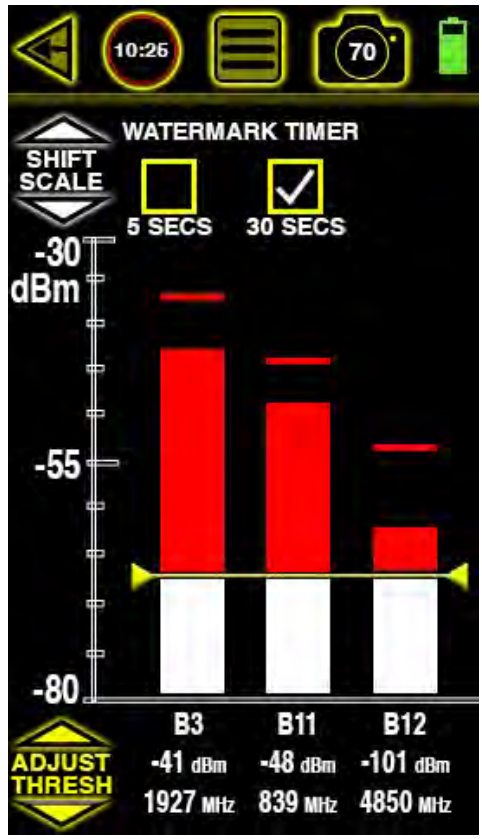
This screen displays the 3 highest cellular signal strength measurements in dBm, frequency and cellular channel allocation from moment to moment. This means that the top 3 strongest signals displayed can quickly change if any newer, stronger cellular signals are then detected. This allows users to dynamically sweep the area for the strongest (usually the closest too) signals in real time.

Choose SHIFT SCALE to dynamically shift the dBm measurement scale between 0 dBm to -50 dBm and -40 dBm to -90 dBm. SCALE SHIFT allows users to effectively "zoom in" or "zoom out" on signals that are too visibly low or too high respectively.

The threshold is also adjustable allowing for vibrating alerts when any one or all of the signals break that threshold. When a vertical signal strength measurement bar is greater than the threshold setting, the area above the threshold turns red. Touch the up or down ADJUST THRESH arrows to adjust the threshold. Lowering the threshold (touching down arrow) is useful for detecting and alerting users to lower strength measurements. Raising the threshold (touching up arrow) is useful for detecting and alerting users to higher strength measurements.

Each vertical signal strength bar displays a high watermark indicating the maximum signal strength detected. This peak signal strength can indicate a great change in signal strength over time that cannot be seen by simply looking at this screen momentarily. The watermark timer is settings are located at the top of the screen and can reset the watermark every 5 or 30 seconds automatically.

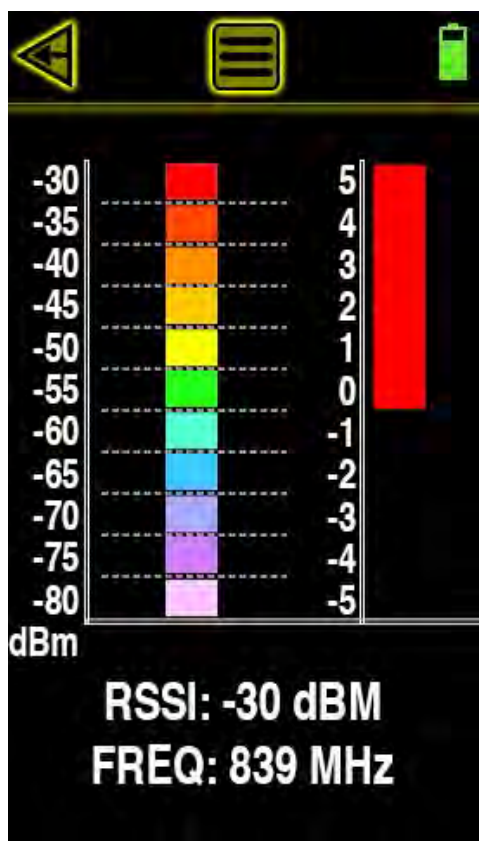
Users who wish to pick a single measurement for further surveying and direction finding can simply touch the one of interest to enter the CELLULAR DIRECTION FINDING screen.



CELLULAR DIRECTION FINDING

This screen allows users to locate a cellular device being measured by replacing the standard omni-directional antenna with the optional direction finding antenna and using the real time signal strength scales. The color-coded scale on the left is measured in a range from -30 dBm to -80 dBm. Each colored bar represent 5 dBm. The stronger the signal, the greater the number of bars that are shown. Before you begin direction finding, replace the small omni-directional antenna with the larger directional at the middle SMA antenna connection (650 MHz - 3000 MHz) on top of the Yorkie-Pro unit.

As you sweep, the colored bar will guide you in the direction of the cellular signal source by lowering and raising accordingly. When the colored bars are at their maximum height, you can utilize the scale to the right to view further signal strength details in dBm. The top half of this scale (starting at 0 and ending in 5) corresponds to 5 dBm which is also the size of a single colored block on the left so the scale on the right effectively magnifies the top portion of the scale on the left.



Once the direction finding antenna is pointing in the direction of the highest signal strength, you can begin to locate the phone being detected by slowly walking in that direction. If you see the signal strength drop, simply stop moving and rotate in place just as you did before until the strongest signal strength is again displayed. Continue moving in the direction that the directional antenna is now pointing and repeat these steps until you reach the source.

You can return to the previous screen at any time by touching the back arrow on the upper left side of the screen. From there you can try to locate the same cellular source again or choose a different one. Just remember to replace the direction finding antenna with the omni-directional antenna when you are not in the direction finding screen or your RF surveys will not be accurate.

WI-FI MEASUREMENTS

Starting from the MAIN MEASUREMENT screen, touch the Wi-Fi icon located on the bottom to scan all nearby Wi-Fi access points. This screen indicates MAC address, RSSI signal strength in dBm, 802.11 channel number and SSID of every 2.4 GHz and 5 GHz access point detected. Orange colored SSIDs indicate 2.4 Ghz and yellow SSIDs indicate 5 GHz. Yorkie-Pro will not detect any client Wi-Fi devices.

Depending upon the number of access points and their activity, you might see the list updating very frequently or not frequently at all. The strongest Wi-Fi access point will move to the top of the list followed by the next strongest one and so on, but if you find the list too long or changing too frequently you can adjust the RF SCAN PERSISTENCE in the MAIN MENU settings. RF SCAN PERSISTENCE does not affect measurements, it only affects how long measurements remain on the screen after a signal is lost. The choices include ALWAYS ON, ALWAYS OFF, 10 SECS and 10 MINS. You might need to experiment with these settings depending upon your environment but BVS recommends 10 SECS for most busy RF environments and 10 MINS for less busy RF environments.

WI-FI MEASUREMENT screen includes sorting and navigation buttons on the bottom. Touch the up or down PAGE arrows in the lower right of the screen to navigate through the pages of APs and their respective measurements

The WHITE LIST button allows users to remove known access points from the list. This feature allows users to spend more time identifying unknown and possibly dangerous rogue APs instead of continually sorting through access points that have already been scanned and accounted for. Simply touch this button to activate this feature (the button will invert to indicate activation). Next, touch each listed Wi-Fi device that you wish to white list. Every AP you choose will disappear from the list and not return until the unit power is reset or until you choose to reset your white list. Touch the WHITE LIST button again when you are finished white listing access points.

RESET WHITE LIST button simply resets the white list of removed access points. Touch this button to reset the list.

WI-FI ROGUE AP DETECTION

A Rogue Access Point (AP) is any wireless access point that exists on a network without the authorization of the network administrator. These rogue APs pose significant risks to a company's cybersecurity posture:

Data Interception (Man-in-the-Middle Attacks): Rogue APs can intercept sensitive company data, including login credentials, confidential files, and communication. Cybercriminals can set up malicious APs designed to mimic legitimate company networks, tricking employees into connecting to them.

Network Breach and Malware Deployment: Attackers can use rogue APs to bypass corporate firewalls and security controls, gaining unauthorized access to the internal network. Once inside, they can deploy malware, ransomware, or spyware.

Credential Theft and Phishing: Employees connecting to rogue APs may unknowingly enter their login credentials, which can then be harvested by attackers. Rogue APs can also serve phishing websites or inject malicious code into legitimate sites.

Compliance Violations: Unauthorized APs may compromise data protection regulations, such as GDPR, HIPAA, or PCI DSS, leading to legal consequences, fines, and reputational damage.

Denial of Service (DoS) Risks: Rogue APs can degrade legitimate network performance or launch denial-of-service attacks, disrupting operations.

WHY YORKIE-PRO IS ESSENTIAL FOR DETECTING ROGUE APs?

The Yorkie Pro wireless intrusion detector is a critical tool for security audits and sweeps because of its ability to:

Accurate Rogue AP Detection: Yorkie-Pro can detect and locate unauthorized access points by identifying suspicious wireless signals and comparing them against known authorized devices.

Real-Time Threat Identification: Its real-time scanning capabilities ensure that rogue APs are identified as soon as they appear on the network, minimizing the time attackers have to exploit vulnerabilities.

Wide Spectrum Coverage: Yorkie-Pro can scan multiple wireless frequencies (Wi-Fi, Bluetooth, BLE) and pinpoint threats from a wide range of rogue devices.

Portable and User-Friendly Design: Its compact, portable design allows security teams to conduct regular on-site sweeps easily, covering even large facilities.

Proactive Security Posture: Routine audits using the Yorkie-Pro help organizations maintain a proactive security posture, identifying vulnerabilities before attackers can exploit them.

Potential Threats to a Company's Cybersecurity Posture

Failing to address rogue APs can lead to:

- Loss of Intellectual Property: Sensitive data can be exfiltrated through unsecured rogue APs.
- Reputational Damage: A data breach linked to a rogue AP can erode trust among clients and stakeholders.
- Financial Impact: Costs related to legal actions, fines, incident response, and downtime can be significant.
- Reduced Employee Productivity: Network instability caused by rogue AP interference can disrupt business operations.

By integrating tools like the Yorkie-Pro into regular security routines, companies can bolster their defenses, prevent unauthorized access, and safeguard their networks against rogue AP threats. If you are looking to specifically hunt down Wi-Fi clients/STA's then consider the companion offering; the Yellowjacket-Pro WiFi security tool.

The Yorkie-Pro wireless intrusion detector is highly effective in detecting and locating O.MG bad cables that have integrated Wi-Fi capabilities and function as covert hotspots for deploying malicious payloads. These malicious cables appear as standard USB or Lightning cables but house embedded chips that create rogue Wi-Fi access points, allowing attackers to wirelessly execute payloads, steal data, or maintain persistent access to compromised systems.

How Yorkie-Pro Detects O.MG Cables:
1. RF Signal Detection – The Yorkie-Pro continuously scans for unauthorized or suspicious Wi-Fi signals (2.4 GHz, 5 GHz), identifying rogue access points created by compromised cables. The O.MG bad cable acts as a WiFi AP Hot Spot.

2. SSID and MAC Address Analysis – The device can recognize anomalous SSID broadcasts or unauthorized MAC addresses, which often appear with randomization tactics that differ from facility-approved networks.

3. Signal Strength Direction Finding – Once an unauthorized signal is detected, Yorkie-Pro enables direction-finding mode to pinpoint the exact location of the O.MG cable by following its RF emissions.

4. Automated Alerts & Logging – Yorkie-Pro can integrate with security monitoring systems to alert personnel in real-time and provide detailed logs of the detected threat.

Why This Threat is Critical for US DoD & Other Secure Facilities
• Covert Exfiltration – An attacker with brief physical access can replace legitimate cables with O.MG cables, which then serve as remote access backdoors, potentially leaking sensitive data from classified systems.

• Bypasses Traditional Security – These malicious cables operate outside of traditional network defenses since they establish their own Wi-Fi hotspots, making them difficult to detect without RF surveillance.

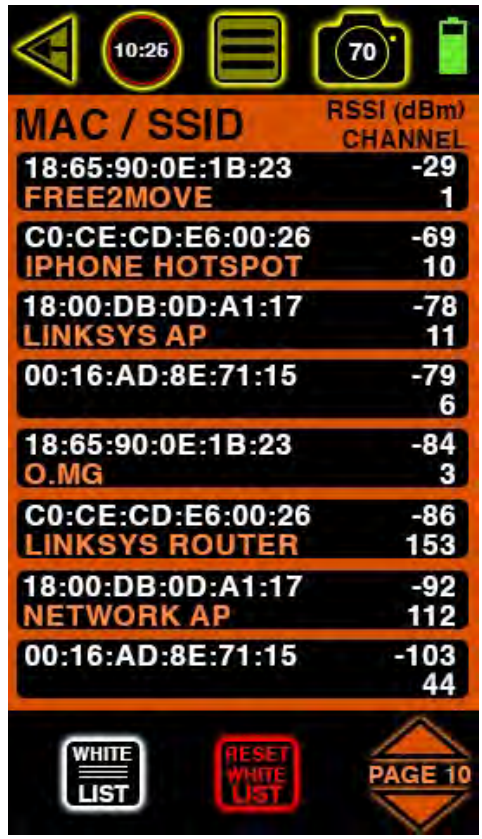
• Air-Gapped Facility Risk – Even secure air-gapped environments are vulnerable if a compromised cable is introduced internally, bridging the gap between isolated systems and external attackers.

• Insider Threat & Supply Chain Attacks – The introduction of these devices can be intentional (insider threat) or unintentional (compromised supply chain), making regular RF sweeps essential to counter emerging threats.

The Need for Routine Yorkie-Pro Scanning
Given the rapid evolution of wireless attack vectors, DoD and other high-security facilities must implement frequent RF sweeps with the Yorkie-Pro to detect:

• Emerging Wi-Fi-based threats, including unauthorized IoT devices and bad cables.
• New rogue signals in secure areas that should not have any wireless activity.
• Hidden access points that evade conventional Wi-Fi security tools.

By integrating Yorkie-Pro into daily or weekly security sweeps, facilities can proactively identify and mitigate wireless threats like O.MG cables before they lead to catastrophic security breaches.



This O.MG cable contains a Wi-Fi chip capable of delivering malware directly to any device it is plugged into. It is visibly indistinguishable from any regular USB-C cable but Yorkie-Pro can detect it.

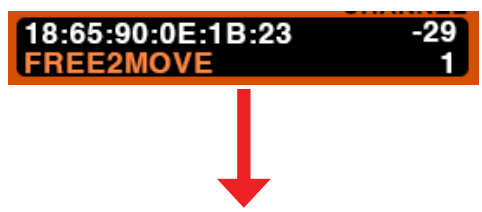
WI-FI DIRECTION FINDING

Once you have identified a Wi-Fi access point of interest, you can begin to locate it by choosing it from the Wi-Fi MEASUREMENT list screen. That takes you to the WI-FI DIRECTION FINDING screen seen here. This screen scans only the AP selected from the previous screen. If you require a full Wi-Fi scan of all channels or Wi-Fi RF energy profile, use the BACK ARROW to return to the MAIN MEASUREMENT screen.

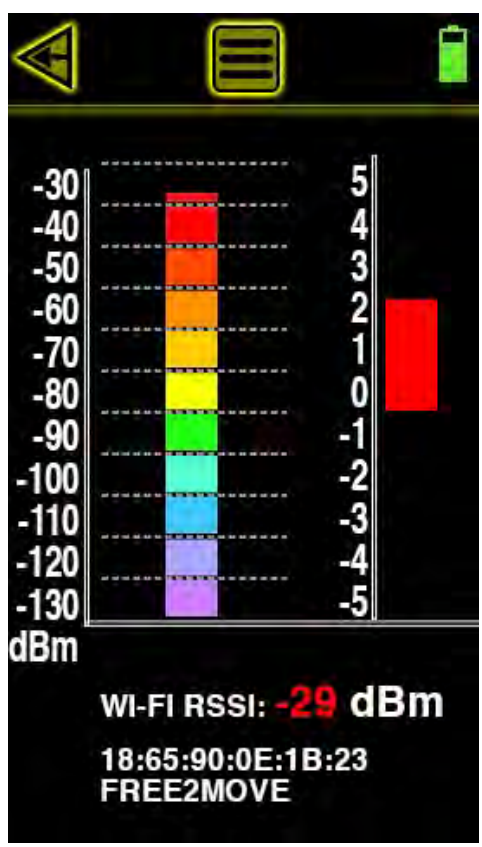
In addition to Wi-Fi RSSI measurements in dBm, the WI-FI DIRECTION FINDING screen also displays the MAC address, and SSID of the access point.

Replace the omni-directional antenna with the large, 2.4/5.8 GHz DF antenna by connecting to the SMA connector on the left side atop the Yorkie-Pro unit.

From the Wi-Fi MEASUREMENT list screen, touch the device you wish to locate. This will take you to the Wi-Fi Direction Finding screen. This screen displays the device's signal strength in dBm in both numerical and graphical form. The scale on the left goes from -30 dBm to -130 dBm. The lower the number, the higher the signal strength. Graphically, the higher the signal strength detected, the higher the color-coded blocks will appear. Red to orange blocks are high signal strength, yellow to green are medium signal strength and blue to purple are low signal strengths. A high signal strength generally indicates that the device being scanned is nearby and in the same direction that the direction finding patch antenna is pointing at that moment. If the signal strength is stronger than -30, it will appear as red and blinking at the bottom.



The scale on the right is a more granular scale for dBm within each color-coded block. The signal strength bar to the right should always match the color of the color-coded block being displayed on the left. The RSSI number at the bottom (in dBm) should also correlate to the signal strength currently being show. Due to some factors such as interference and movement during direction finding performed by the user, these numbers and color-coded blocks can shift abruptly.

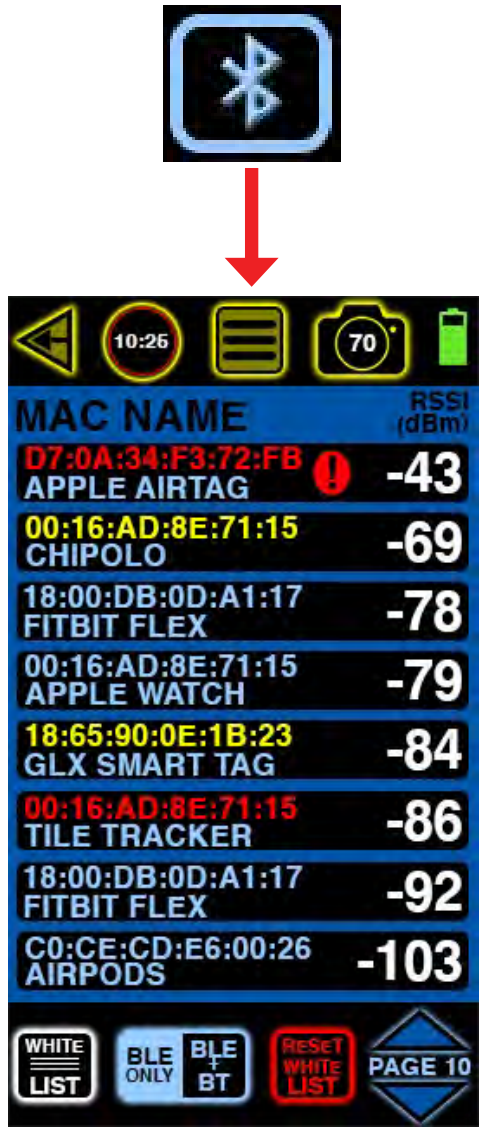


Users trying to locate any device while direction finding need to move slowly and methodically always keeping the position and direction of the handheld antenna in mind. Once the direction finding antenna is attached to the Yorkie-Pro the position or direction of the unit itself has no bearing on the measurements being taken. Once the omni-directional antenna is connected back to the Yorkie-Pro receiver, the position and direction of the unit itself will have some bearing on the measurements taken again.

Begin direction finding by slowly sweeping the area in a full 360 degrees. Note the direction you are facing when you see the strongest signals. Next, you can break the 360 degree sweep into halves or quarters and concentrate the next sweep on just the half or quarter(s) that showed the strongest signals. Move into the direction of the strongest signals and continue sweeping slowly until you reach the highest signal strength. If the DF antenna is held too closely to the measured device, it can overload the receiver and display a measurement of -120 dBm in white at the bottom of the screen.

BLUETOOTH MEASUREMENTS

Starting from the MAIN MEASUREMENT screen, touch the Wi-Fi icon located on the bottom to scan all nearby Bluetooth and BLE (Bluetooth Low Energy) devices. This screen indicates MAC address, Device ID and RSSI signal strength in dBm of every BT and BLE device detected. White colored MAC and device IDs (friendly names) indicate BT but light blue colored MAC and device IDs (friendly names) indicate BLE devices.



Depending upon the number of devices and their activity, you might see the list updating very frequently or not frequently at all. The strongest BT or BLE device will move to the top of the list followed by the next strongest one and so on, but if you find the list too long or changing too frequently you can adjust the RF SCAN PERSISTENCE in the MAIN MENU settings. RF SCAN PERSISTENCE does not affect measurements, it only affects how long measurements remain on the screen after a signal is lost. The choices include ALWAYS ON, ALWAYS OFF, 10 SECS and 10 MINS. You might need to experiment with these settings depending upon your environment but BVS recommends 10 SECS for most busy RF environments and 10 MINS for less busy RF environments.

BLUETOOTH MEASUREMENTS screen includes sorting and navigation buttons on the bottom. Touch the up or down PAGE arrows in the lower right of the screen to navigate through the pages of devices and their respective measurements.

BLE ONLY/BLE+BT TOGGLE is a two-way button that either displays only nearby BLE devices detected or all nearby BLE and BT devices detected. Since there are so many BT and BLE devices already in use, some users need to view only BLE devices, specifically hidden personal trackers. This toggle disappears when the BLE TAG SORT is checked on in the MAIN MENU screen.

PERSONAL TRACKERS are among the cheapest and most ubiquitous devices around. They are also elusive to most BLE receivers. Yorkie-Pro utilizes a special algorithm to detect hidden BLE trackers (including Apple AirTag®, Samsung Galaxy SmartTag®, Tile Tracker®, etc.) immediately without the need to wait for warning notifications from your phone that you are in the vicinity of an unknown tracker. BLE MAC addresses shown in YELLOW have been identified as possible BLE trackers. BLE MAC addresses in RED have a much higher confidence identification of unknown personal trackers.

The WHITE LIST button allows users to remove known devices from the list. This feature allows users to spend more time identifying unknown and possibly dangerous rogue BT or BLE devices instead of continually sorting through devices that have already been scanned and accounted for. Simply touch this button to activate this feature (the button will invert to indicate activation). Next, touch each listed Wi-Fi device that you wish to white list. Every AP you choose will disappear from the list and not return until the unit power is reset or until you choose to reset your white list. Touch the WHITE LIST button again when you are finished whitelisting devices.

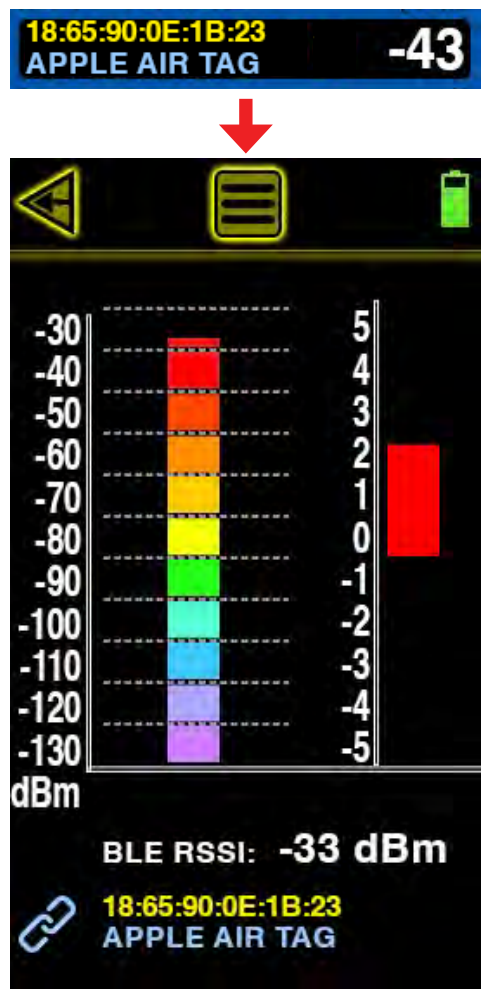
RESET WHITE LIST button simply resets the white list of removed BT and BLE devices. Touch this

button to reset the list.

About Bluetooth and BLE

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the 2.4 GHz ISM band) from fixed and mobile devices, and building personal area networks (PANs). The Bluetooth protocol is active in over tens of billions of devices worldwide. Bluetooth technology, combined with a lower cost of entry, has enabled business cases for applications that were previously unthinkable.

BLE devices follow the Bluetooth standard. They manage their power by automatically powering up and down while remaining connected to the reader infrastructure (smart connectivity). Compared to previous versions, BLE enables 250% faster and more reliable over-the-air data transmission and 10x more packet capacity. The job of BLE is to drive the 'Internet of Things' (IoT), namely the thousands of smart, web connected devices – from fridges to toothbrushes – that are expected to enter our lives over the next decade.



BLUETOOTH/BLE DIRECTION FINDING

Once you have identified a Bluetooth or Bluetooth Low Energy device of interest, you can begin to locate it by choosing it from the BT/BLE MEASUREMENT list screen. That takes you to the BT/BLE DIRECTION FINDING screen seen here. This screen scans only the device selected from the previous screen. If you require a full BT/BLE scan of all nearby devices, use the BACK ARROW to return to the MAIN MEASUREMENT screen. In addition to BT/BLE RSSI measurements in dBm, the BT/BLE DIRECTION FINDING screen also displays the MAC address, and device ID of the device.

Replace the omni-directional antenna with the large, 2.4/5.8 GHz DF antenna by connecting to the SMA connector on the left side atop the Yorkie-Pro unit.

BLUETOOTH/BLUETOOTH PAIRING

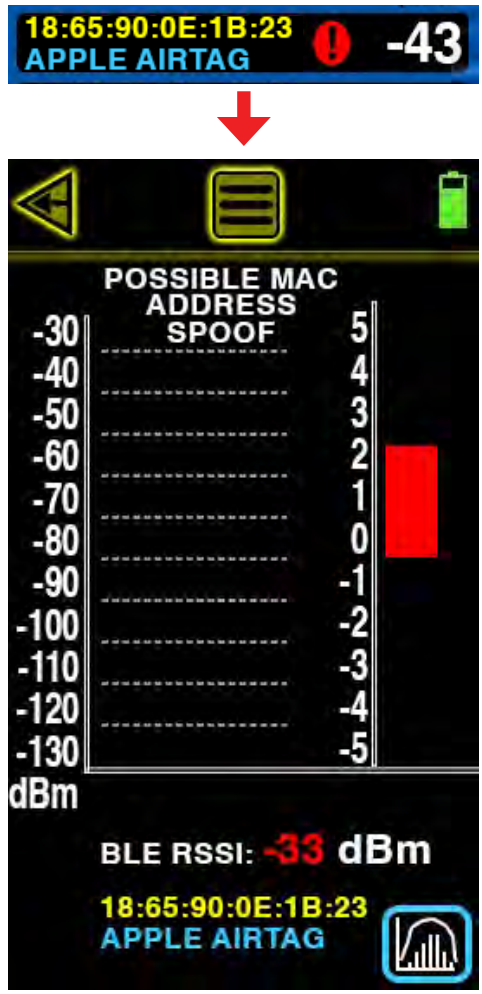
Some BT/BLE devices allow pairing with Yorkie-Pro's internal BT/BLE module. This pairing is dependent upon the BT/BLE device settings and cannot be controlled or guaranteed by Yorkie-Pro. When this happens, a blue chain icon will appear in the lower left corner of the direction finding screen. You may notice a speed increase in the direction finding screen's update rate during this time due to the nature of BT/BLE pairing.

From the BT/BLE MEASUREMENT list screen, touch the device you wish to locate. This will take you to the BT/BLE Direction Finding screen. This screen displays the device's signal strength in dBm in both numerical and graphical form. The scale on the left goes from -30 dBm to -130 dBm. The lower the number, the higher the signal strength. Graphically, the higher the signal strength detected, the higher the color-coded blocks will appear. Red to orange blocks are high signal strength, yellow to green are medium signal strength and blue to purple are low signal strengths. A high signal strength generally indicates that the device being scanned is nearby and in the same direction that the direction finding patch antenna is pointing to at that moment. If the signal strength is stronger than -30, it will appear as red and blinking at the bottom.

The scale on the right is a more granular scale for dBm within each color-coded block. The signal strength bar to the right should always match the color of the color-coded block being displayed on the left. The RSSI number at the bottom (in dBm) should also correlate to the signal strength currently being show. Due to some factors such as interference and movement during direction finding performed by the user, these numbers and color-coded blocks can shift abruptly.

Users trying to locate any device while direction finding need to move slowly and methodically always keeping the position and direction of the handheld antenna in mind. Once the direction finding antenna is attached to the Yorkie-Pro the position or direction of the unit itself has no bearing on the measurements being taken. Once the omni-directional antenna is connected back to the Yorkie-Pro receiver, the position and direction of the unit itself will have some bearing on the measurements taken again.

Begin direction finding by slowly sweeping the area in a full 360 degrees. Note the direction you are facing when you see the strongest signals. Next, you can break the 360 degree sweep into halves or quarters and concentrate the next sweep on just the half or quarter(s) that showed the strongest signals. Move into the direction of the strongest signals and continue sweeping slowly until you reach the highest signal strength. If the DF antenna is held too closely to the measured device, it can overload the receiver and display a measurement of -120 dBm in white at the bottom of the screen.



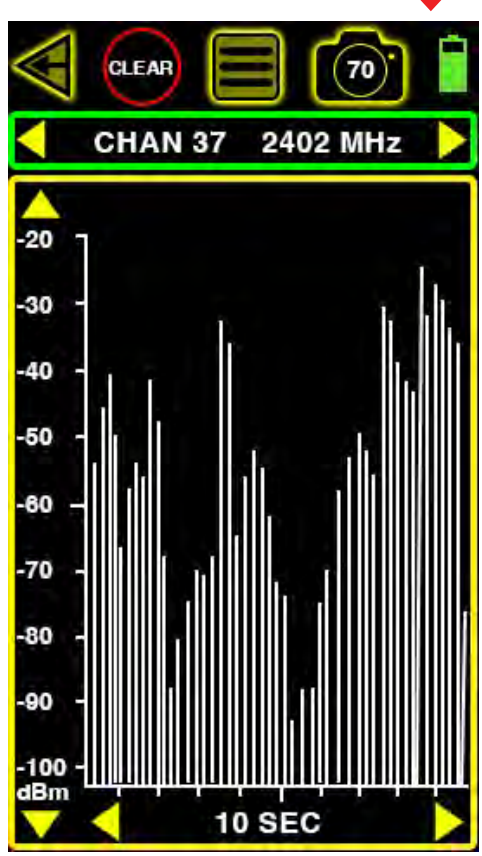
BLUETOOTH/BLE DEVICE SPOOFING

MAC address randomization is a process of generating MAC addresses that cannot be traced back to a specific device. MAC addresses are randomly generated and changed periodically, making it difficult for someone to track down a specific device. Many smartphones, Wi-Fi and BLE devices utilize MAC and Device ID spoofing to maintain user privacy. These spoofing randomizations usually occur about every 15 minutes (varies by manufacturer) but Yorkie-Pro can detect these changes and alert users to them.

The red and black "!" next to any device ID indicates a possible MAC spoof. If you choose one of these devices from the list, the direction finding screen will also display "POSSIBLE MAC ADDRESS SPOOF" at the top as well. Learn more about spoofing in the steps for Locating BLE Personal Trackers that follows this page.

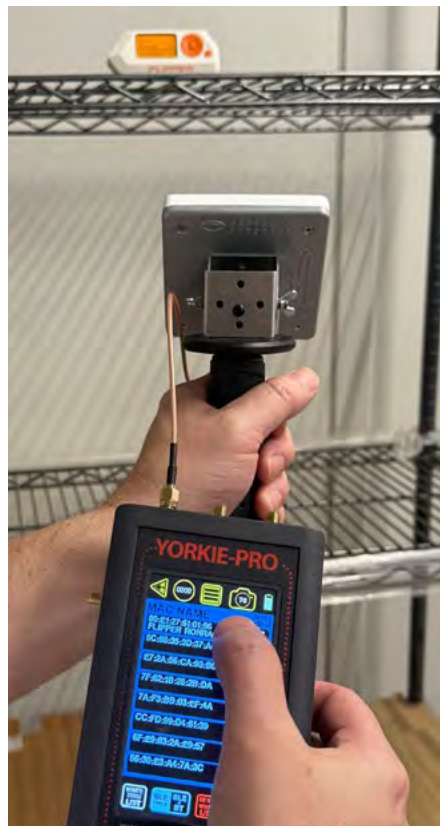
BT/BLE FREQUENCY ANALYZER

This frequency analyzer (button with blue outline) measures the 3 advertising channels (37, 38 and 39) in the BT and BLE spectrum. Users can adjust the time domain at the bottom between 1, 4 and 10 seconds for each scan. This frequency analyzer mode differs slightly from the regular frequency analyzer mode (button with red outline) used in the MAIN MEASURMENT screen.



DETECTING FLIPPER ZERO

Why the Flipper Zero is a Threat? The Flipper Zero is a powerful multi-tool for hackers, pentesters, and tech enthusiasts, but it also poses a serious security threat due to its ability to interact with various wireless protocols. It can be used for legitimate testing purposes, but in the wrong hands, enables unauthorized access and potential exploitation of RFID systems, NFC devices, infrared, sub-GHz radio signals, BLE devices.



RFID and NFC Cloning

- Can read, store, and emulate RFID/NFC badges and access cards.
- Poses a risk for unauthorized entry into secure areas using cloned credentials.

Sub-GHz Frequency Attacks

- Can intercept and replay signals from key fobs, garage doors, and other remote-controlled systems.
- Potential for unauthorized access to vehicles, buildings, and secured gates.

Bluetooth Low Energy (BLE) Exploits

- Can scan and interact with BLE devices, exposing vulnerabilities in wireless security.
- Could be used to hijack or disrupt IoT devices, smart locks, and medical equipment.

Infrared Control

- Can mimic remote controls for TVs, air conditioners, and other IR-based systems.
- Possible manipulation of security cameras and smart home systems.

BadUSB Attacks

- Can act as a rogue USB device to execute malicious scripts when plugged into a computer.
- Enables unauthorized data extraction, malware installation, or system compromise.

Why Use the Yorkie-Pro to Detect and Locate a Flipper Zero? Yorkie-Pro is an advanced RF scanner capable of identifying and tracking suspicious wireless activity, including threats from a Flipper Zero.

Bluetooth Low Energy (BLE) Scanning:
The Yorkie-Pro can scan and list active BLE devices, including the Flipper Zero.
Once detected, the Flipper Zero appears in the main list screen for further analysis.

Direction-Finding Mode:
Once the Flipper Zero is identified, Yorkie-Pro enables users to locate its precise location.
By moving toward the signal source, security teams can pinpoint and neutralize the threat.

Continuous RF Monitoring:
Yorkie-Pro provides real-time detection of unauthorized wireless activity and ideal for corporate security, government facilities, and law enforcement agencies monitoring for rogue devices.

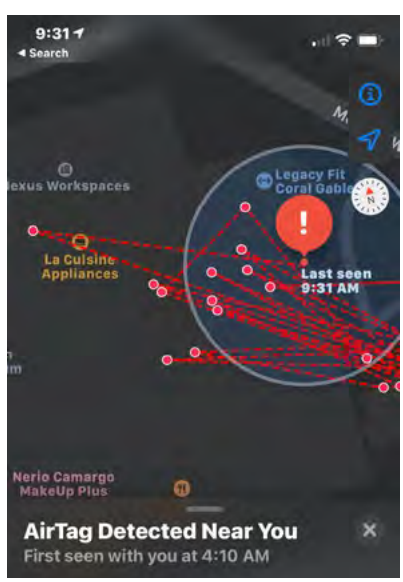
About BLE Personal Trackers

Yorkie-Pro detects frequencies used by both cellular GPS trackers and BLE (Bluetooth Low Energy) personal trackers such as AirTags, Galaxy Smart Tags, Tile Trackers, Chipolo, PebbleBee and others. For precise cellular GPS tracker detection and location features, ask your BVS sales engineer about Wolfhound-Pro. For detection of BLE personal trackers, Yorkie-Pro contains special features described in the following text, but first a brief background on BLE personal trackers.

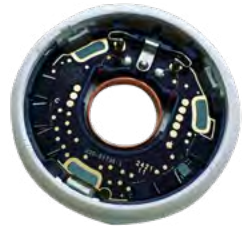
Back in 2013, Tile launched their first BT (Bluetooth) based keyfinders. Over the years, they've improved the product line and added a Tile Network that leverages the GPS in every smartphone to help users locate a variety of lost items. These trackers (including all modern personal trackers) are relatively small, inexpensive and have a long battery life lasting around a year. All of these products required users to install an app on their Android or iOS devices so marketshare was limited but that all changed once Apple introduced their AirTag back in 2021. Since Apple has shipped well over 1.5 billion iOS devices that include their 'Find My' app pre-installed and integrated into their iOS, AirTags gain an immediate advantage over all personal trackers because every iOS user in the world automatically participates in finding lost items using AirTags. Other popular BLE trackers are on the market including Samung Galaxy Smart Tags and Tile Trackers but they are all similar so for this discussion, we will only be dealing with AirTags since they are the most popular for both good and not-so-good reasons that we will discuss shortly.

Since iOS devices are popular around the world, Apple's Find My network is able to identify AirTags around the globe. The primary limitation for AirTag discovery is the range of the BLE radio beacon in every AirTag. Since BLE is limited to about 100 meters, if there is no iOS device in that range, the AirTag will not be seen on the Find My network until an iOS device is nearby. In order to save battery life, AirTags do not continuously emit a BLE beacon so if an iOS device leaves the AirTag's range too soon after arriving, it will not be discovered on the Find My network either. Nevertheless, AirTags can usually be located by their users reliably and quickly from the other side of the world. AirTags also utilize an UWB (Ultra WideBand) chip that works in the 6.5-8 GHz range for short range direction finding (typically 15 feet or less) and an NFC (Near Field Communications) chip that works at 13.56 MHz for initial AirTag setup out of the box, but without a 2.4 GHz BLE connection to a nearby iOS device, an AirTag will not be discoverable on the Find My network.

Soon after AirTags arrived on the scene, problems were being reported by users involving illegal stalking and tracking of people and items without their knowledge. Apple foresaw some of these problems before they released AirTags by including "unwanted tracking" technology warnings for users. If an unknown AirTag has been hidden inside a vehicle or in someone's bag, the AirTag will eventually emit an audible chime and also send a notification to the user's iOS device that they are being tracked by a nearby, unknown AirTag. However, some users reported to only receive unwanted tracking warnings days after the tracking began and others complained that the alert chime was too faint to hear in most scenarios. In 2022, Apple updated all AirTags to include a more audibly discernible chime but the amount of time from the beginning of unwanted tracking to the moment of notification is a much more complex issue. Tech enthusiasts have added



to the mix by modifying and selling “silent’ AirTags on Etsy and Ebay. These are simply AirTags that have been modified so that no audible tone can be heard. This makes detection of hidden AirTags even more difficult for the average consumer and since they are being sold as a remedy to thieves who can easily hear and remove hidden AirTags on items they just stole, ‘silent’ AirTags are not being labelled as illegal so they continue to be sold.



Since many users hide AirTags inside valuable items to track them, the faster the Find My network alerts users to the possibility of unwanted tracking, the more likely thieves who’ve stolen trackable items will be informed that they contain an AirTag. From there, thieves can simply locate and remove the AirTag frustrating honest users. If unwanted tracking notifications takes too long to warn users, it might be too late for victims of stalking or theft. Couple this balancing act with the fact that Apple has implemented specific algorithms that respond to AirTag movement, proximity to owners and other iOS devices and you end up with an unpredictable notification system at best and a dangerous and illegal stalking or tracking tool at worst.

Law enforcement agents have already responded to thousands of reports of unwanted tracking but that is only because users have already been notified of an unknown, nearby AirTag. AirTags continue to be used to track police vehicles, track packages of illegal substances and the whereabouts of high profile individuals and their families. Law enforcement agents have managed to successfully detect hidden cellular GPS trackers since they transmit at regular intervals when in motion but personal BLE trackers are more complex to identify and locate. Since AirTags do not immediately alert users to nearby unwanted tracking, there is no fast and easy way for anyone to detect a hidden AirTag without waiting hours or possibly days until they receive a warning notification. This is not acceptable to any law enforcement agent that requires immediate actionable intelligence. Yorkie-Pro solves this problem. Use the following steps on the next page to practice detecting the tracker included with your unit.

Locating BLE Personal Trackers

In order to help users better understand how to locate personal trackers, we have included an Apple AirTag to get you started. Be sure to follow all of the respective manufacturers' setup steps unless instructed otherwise by these following steps.

1. Unpack and register your included tracker by activating it and following the instructions included from the manufactruer of the respective tracker.

2. After you have initialized your tracker and are ready to practice detecting it using Yorkie-Pro, be sure to turn OFF your phone or put it into airplane mode making sure the BT radio is off as well (some phones do not include BT in airplane mode). Otherwise, that tag cannot be detected.

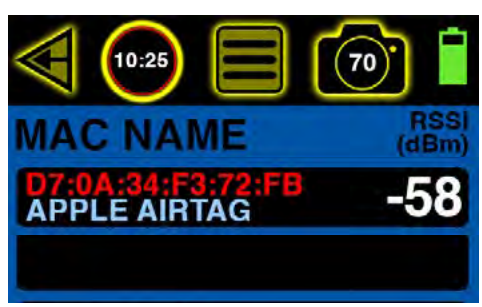
3. Be sure that all included omni-directional antennas are connected to the Yorkie-Pro.

4. Enter the Main Menu Settings and make sure that the 'BLE Tag Sort' box is checked.

5. While in the Main Menu Settings, set RF Scan Persistence to 'Always Off'. This will ensure that all trackers present will be seen as they appear and that trackers no longer active or in range will not appear. Since you are only testing your tracker detection feature at this stage, you will be keeping a close watch on a single tracker so 'Always Off' is a useful setting.

When you begin to operate Yorkie-Pro in unknown environments with varying degrees of BT and BLE activity, you will need to experiment with different RF Scan Persistence settings to minimize your time spent surveying. For instance, if you leave RF Scan Persistence 'Always On' in a busy environment, the list of devices will grow quickly and you will eventually see the spoof icon (exclamation point surrounded by red) for some devices indicating that those MAC addresses are being spoofed and no longer being used by those devices. Navigate back to the Main Measurement Screen and enter the Bluetooth Measurement screen.

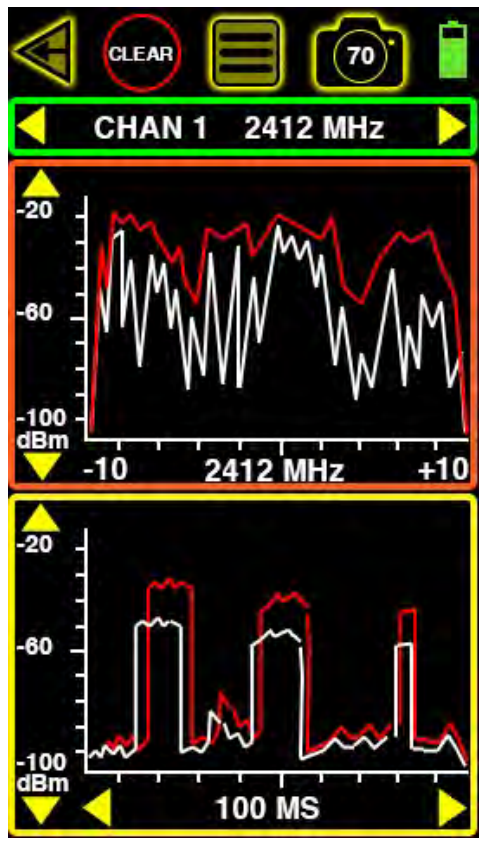
6. In Bluetooth Measurement screen, the tracker should appear within a minute or so and the RSSI value should remain relatively stable unless the distance from Yorkie-Pro to the tracker changes. The MAC address will initially appear in yellow to indicate that a tracker has likely been detected. Once Yorkie-Pro fully verifies tracker detection, the MAC address will turn red.



Each tracker manufacturer has their own timing assigned to this advertising beacon. For example, Apple AirTags can take up to 20 minutes for the MAC address to turn from yellow (lower confidence) to red (high confidence) to indicate tracker identification certainty while Samsung's Galaxy Smart Tags are immediately identified as such (MAC address is red) as soon as they are detected. It can be helpful to note these time variations with each new manufacturer and their respective tracker models that you detect using Yorkie-Pro as it will help anticipate survey times for future surveys.

FREQUENCY ANALYSIS

The FREQUENCY ANALYSIS screen can only be accessed from the MAIN MEASUREMENT screen. It consists of 2 different panels that both scan the 2.4 GHz spectrum but do not display live data simultaneously. The orange panel on top is a frequency domain that scans 20 MHz chunks starting at the center of each of the (14) 802.11b/g channels. The yellow panel on the bottom is a time domain that samples a single frequency (same as center frequency in the top panel) over a selectable time interval.



Touch the top panel to begin scanning by frequency. If the time domain panel below was active, it will freeze during the frequency domain scan. Move along the spectrum in 20 MHz chunks by touching the left or right yellow arrows on the green top panel. Adjust the dBm scale by touching the up and down yellow arrows on the left side of the orange top panel just below.

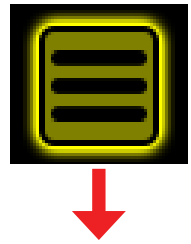
Touch the bottom yellow panel to activate the time domain scan. If the frequency domain panel above was active, it will freeze during the time domain scan. Move along the spectrum in 20 MHz chunks by touching the left or right yellow arrows on the green top panel. Adjust the dBm scale by touching the up and down yellow arrows on the left side of the yellow bottom panel. Choose between 100 ms, 1 sec and 10 sec using the yellow left and right arrows at the bottom of this yellow panel.

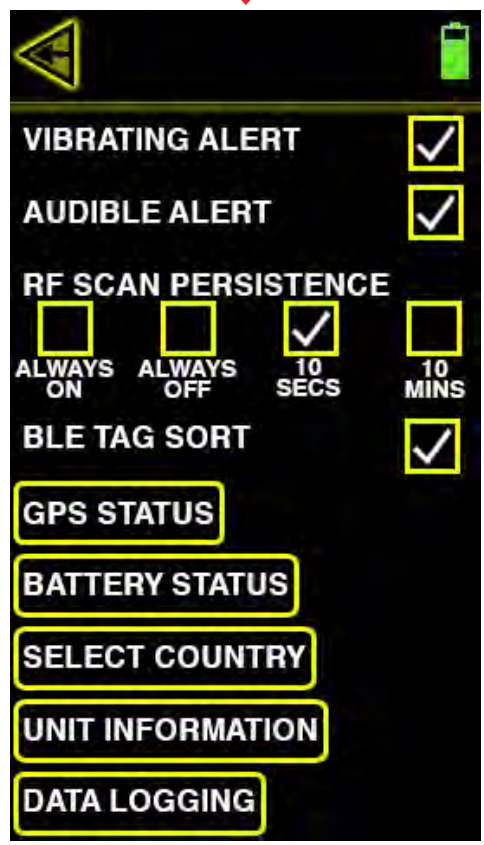
The white lines indicate real time activity in each panel and the red lines indicate peak activity in each panel. Touch the CLEAR button at any time on the top to reset the red peak activity lines.

Each graph has its merits but the biggest value to most users is in capturing both domains' signals and analyzing them together in order to recognize the combined pattern belonging to a specific signal source.

MAIN MENU

The MAIN MENU allows access to more of the Yorkie-Pro's settings and information. These include alerts, RF scan persistence, GPS, battery status, country selection and unit information.





VIBRATING ALERT

Touch the VIBRATING ALERT checkbox to toggle vibrating alerts on or off. When vibrating alerts are turned on, the unit will vibrate every time a set threshold is surpassed.

AUDIBLE ALERT

Touch the AUDIBLE ALERT checkbox to toggle audible alerts on or off. The unit will beep every time a threshold is surpassed or any button is touched.

RF SCAN PERSISTENCE

RF SCAN PERSISTENCE only affects the rate at which Wi-Fi, BT or BLE measurements are displayed. For instance, only the last scan result will be shown when it is set to ALWAYS OFF. The choices include ALWAYS ON, ALWAYS OFF, 10 SECS and 10 MINS. You might need to experiment with these settings depending upon your environment but BVS recommends 10 SECS for most busy RF environments and 10 MINS for less busy RF environments.

BLE TAG SORT

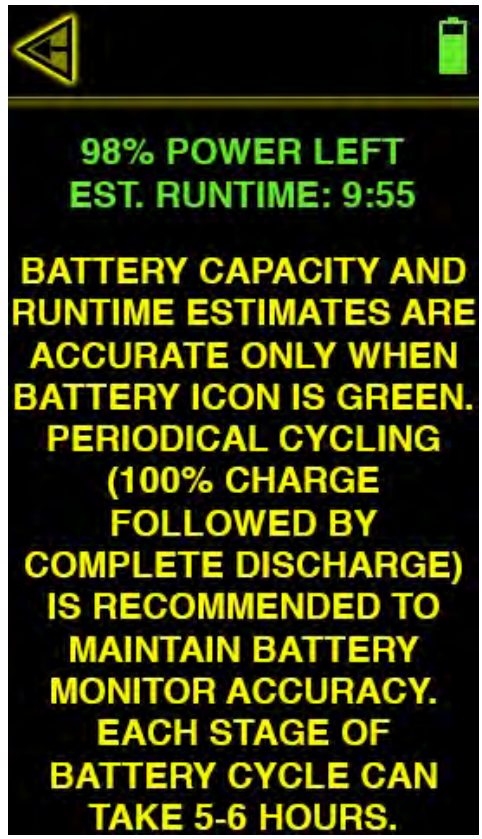
Touch the BLE Tag Sort checkbox to list only BLE personal trackers on the BLE Measurement Screen. This makes sorting and identification of such devices much easier. Note that when this box is checked on, the BT/BLE TOGGLE button will not appear.

GPS STATUS

Touch the GPS STATUS button to display the Yorkie-Pro's internal GPS receiver status including latitude, longitude, date, time, fix status, dead reckoning status, 2D fix status, 3D fix status, GNSS + dead reckoning status and time fix status. This information is useful primarily for users performing site security surveys requiring export for reports and later analysis.

BATTERY STATUS

Touch the BATTERY STATUS button to see estimated remaining runtime down to the minute and instructions for periodically cycling the battery to maintain superior battery life.

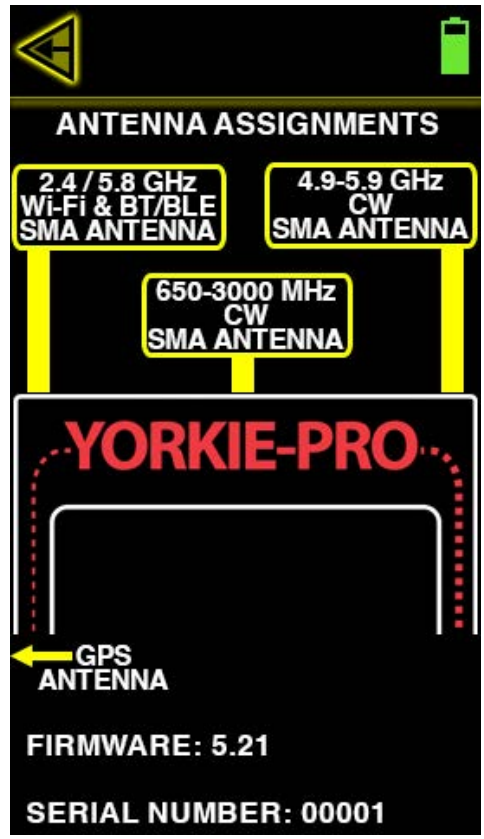


SELECT COUNTRY

Touch the SELECT COUNTRY button to match the country you are in when taking measurements there. These countries only apply to the cellular measurements. The current selected country is indicated by its two letter abbreviation near the top left of the MAIN MEASUREMENT screen. Supported countries or territories include: Unites States (US), Canada (CA), Europe (EU), Australia (AU), New Zealand (NZ), Israel (IL), Sweden (SW), Brazil (BR), Japan (JP), South Korea (KR), Chile (CL), India (IN) and Philippines (PH). Yorkie-Pro ships direct from the factory with support for the country designated by the customer. Check with your BVS sales or support contact for more details about support in your country.

UNIT INFORMATION

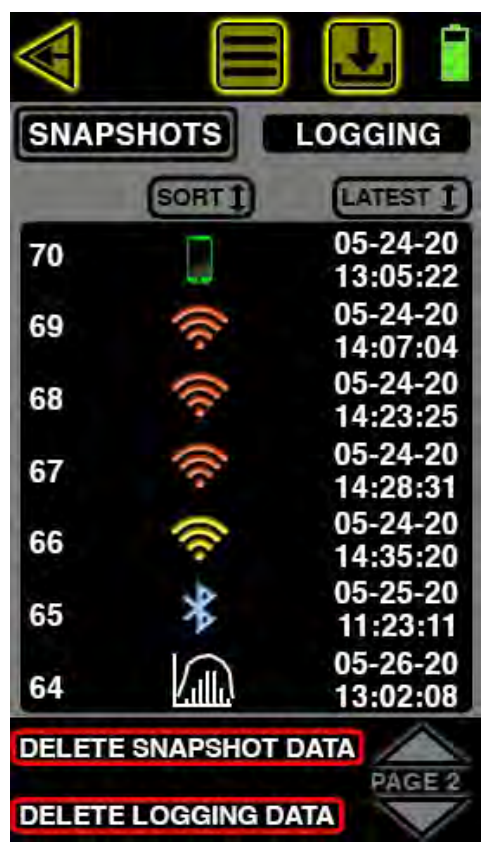
Touch the UNIT INFORMATION button to access this screen for antenna assignments, firmware and your unit's serial number. Be sure to reference these SMA connection assignments when attaching any antennas to your unit. Also be sure to reference this screen for the firmware and serial number for any sales or support related issues. Do not update your unit's firmware until you can confirm it is compatible with the correct hardware. Contact BVS support at support@bvsystems.com or call 732-548-3737 with your unit serial number for confirmation to proceed.



DATA LOGGING

Touch the DATA LOGGING button to access this screen. From here, users can sort and review all captured data snaphots or logged data. Begin by choosing between SNAPSHOTS and LOGGING buttons at the top. Data can be sorted by the measurement screen (cellular, BT, BLE, Wi-Fi 2.4 GHz, Wi-Fi 5 GHz and frequency analyzer) used and or by timestamp of measurement. If you have filled your Yorkie-Pro up with data and need more room to store more measurements, choose DELETE SNAPSHOT DATA or DELETE LOGGING DATA button to make more space for data. Be sure you have already connected Yorkie-Pro to a PC running the BVS logging software and have saved the data before you delete any data you might need.

Note: Not all screens support both data logging features. If you do not see the data snaphot (camera icon) or data logging (round record button icon) on top of the measurement screen, you cannot record data.



Approximate Time To Transfer Logged Measurements to PC:

1 Data Snapshot	< 100 mSec per snapshot
10 minute Mainscreen Log File	23 seconds
60 minute Mainscreen Log File	2.5 minutes
10 minute WiFi Log File	3.5 seconds
60 minute WiFi Log File	22.4 seconds
10 minute Bluetooth or BLE Log File	3.2 seconds

Yorkie-Pro Product Safety Info

BVS WIDS (Wireless Intrusion Detection Systems) monitor for cellular, Wi-Fi and BT/BLE signals emitted by standard consumer electronic devices and therefore are rather passive Receivers of RF energy. Most of the time these receivers are passively listening for possible ambient signals of interest. Occasionally, BVS WIDS systems broadcast brief scanning requests. These requests are low energy standard signals just as signals emitted by personal consumer electronic devices, such as cell phones, etc.

Wi-Fi

Wi-Fi access points emit electromagnetic radiation in the form of radiofrequency (RF) signals to transmit data wirelessly. The RF signals used by Wi-Fi fall within the non-ionizing part of the electromagnetic spectrum, which means they do not have enough energy to ionize atoms or molecules and, therefore, are generally considered to be non-harmful at typical exposure levels.

The radiofrequency radiation emitted by Wi-Fi devices is classified as non-ionizing radiation, and it is generally considered safe for human exposure within established regulatory limits. Regulatory agencies, such as the Federal Communications Commission (FCC) in the United States, set limits on RF exposure to ensure that devices like Wi-Fi routers operate within safe levels.

Bluetooth & Bluetooth Low Energy

Similar to Wi-Fi, Bluetooth technology uses radiofrequency (RF) signals to transmit data wirelessly. Bluetooth operates in the same non-ionizing part of the electromagnetic spectrum as Wi-Fi, and the emitted radiation is generally considered to be safe at typical exposure levels.

Bluetooth devices, such as headphones, speakers, and other peripherals, emit low-power radiofrequency signals. The power levels used in Bluetooth communication are typically much lower than those associated with cell phones and other devices that use higher-powered RF signals.

As with any technology, it's important to follow established guidelines and regulations to ensure safe usage. Regulatory bodies, such as the Federal Communications Commission (FCC) in the United States, set limits on RF exposure to protect against potential health risks. The current scientific consensus is that the RF exposure from Bluetooth devices is not harmful at typical usage levels.

Cellphone

The radiofrequency (RF) signals emitted by cell phones are a form of non-ionizing electromagnetic radiation. The consensus among the scientific community, as reflected in the guidelines of various health organizations and regulatory agencies, is that the RF exposure from cell phones, when used within established safety limits, is not likely to cause harm to human health.

Regulatory bodies, such as the Federal Communications Commission (FCC) in the United States, set limits on the Specific Absorption Rate (SAR), which measures the rate at which the human body absorbs RF energy. Cell phones must comply with these SAR limits to ensure that the RF exposure is below levels considered safe.

W24-58-CP-9

M2M / WLAN

08/05/2015 v A

Dual Band Directional Patch Antenna

High gain directional antenna

Covers 2.4 & 5GHz for WIFI/WLAN

Ideal WIFI coverage extender for large rooms, car parks & warehouses

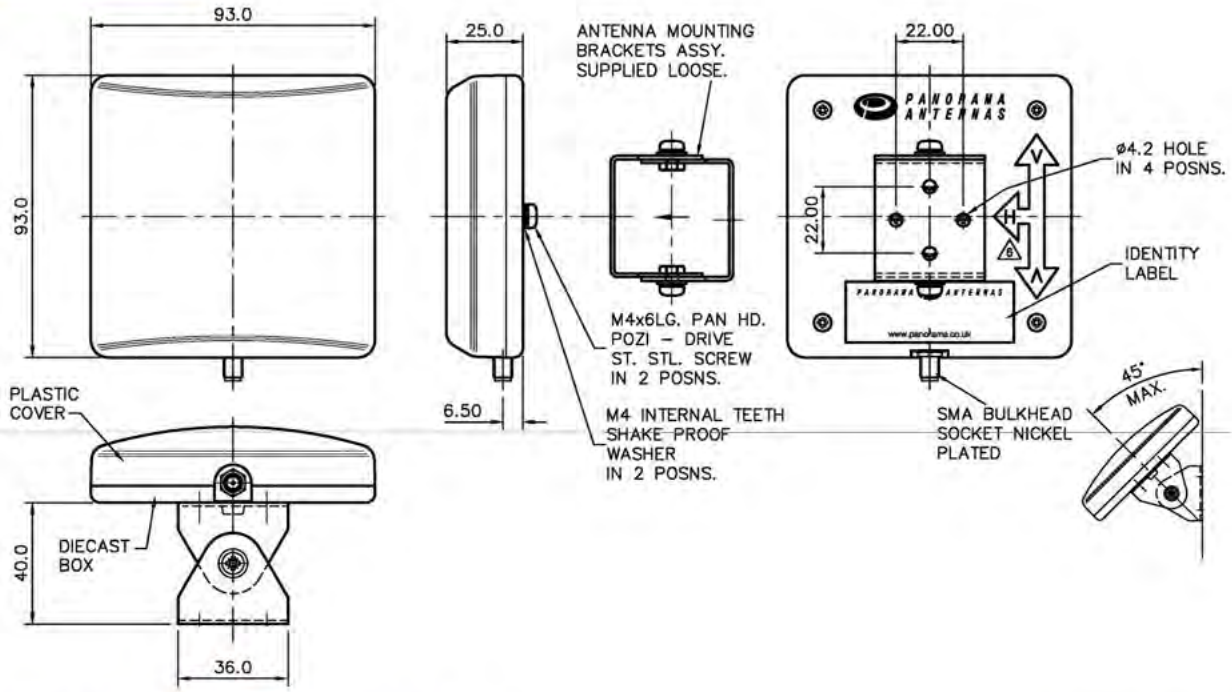
The Panorama client patch antenna is a directional wall or mast mounted antenna covering 2.4 & 5GHz for WIFI / WLAN applications.

This antenna is ideal for point to point communications or can be used to cover a wide area thanks to its relatively wide beamwidth in the horizontal and vertical planes. Several of these antennas can be used to provide cost effective sectored coverage.

The antenna is supplied with a 90 degree adjustable wall / mast mount angle bracket to give optimal mounting flexibility.

Ideal to infill network coverage black spots or to provide a consistent connection for subscriber terminals the W24-58-CP-9 is a cost effective solution to network coverage issues.

Technical Drawing



PANORAMA ANTENNAS

Panorama Antennas Ltd

Frogmore, London, SW18 1HF, United Kingdom

T: +44 (0)20 8877 4444

F: +44 (0)20 8877 4477

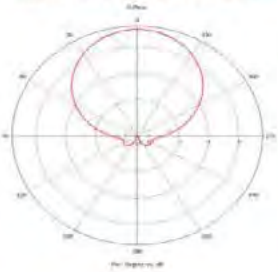
E: sales@panorama-antennas.com

www.panorama-antennas.com

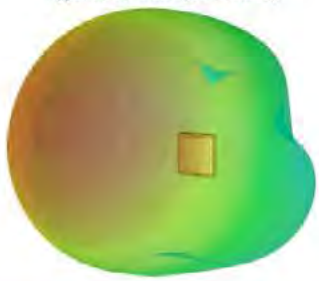
Typical VSWR

*VSWR measured in free space without additional cable

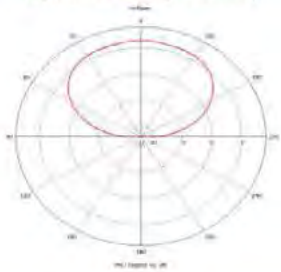
Typical H-Plane (2400MHz)



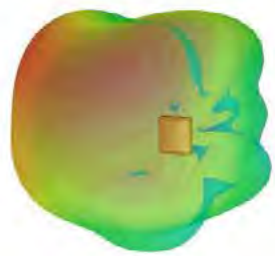
Typical 3D Plot (2400MHz)



Typical H-Plane (5400MHz)



Typical 3D Plot (5400MHz)



Part No.		
		W24-58-CP-9
Electrical Data		
Frequency Range (MHz)		2400-2485 /4900-6000
Operational Band		2.4GHz/5GHz WLAN
VSWR		≤ 2:1
Peak Gain: Isotropic		9dBi
Pattern		Directional
3dB Beamwidth	Azimuth 2.4GHz	60°
	Azimuth 5GHz	90°
Polarisation		Vertical
Impedance		50Ω
Max Input Power (W)		50
Mechanical Data		
Dimensions (mm)	Height	93 (3.66")
	Width	93 (3.66")
	Depth	25 (0.98")
Operating Temp (°C)		-30° / +70°C (-22° / +158°C)
Material		Geloy PC/ASA & die cast aluminium
Colour		Signal White
Mounting Data		
Fixing		Wall mount or Mast mount
Environmental Specification		
Wind Load / Resistance		11N at 150km/h
Radome Flammability		UL94 V0 - Halogen Free
Connector Data		
Termination		SMA socket

Inbuilding

Low PIM Directional Antenna

WM8-BADEP3G-26-NJ

24/03/2016 V4

CELLPOWER

WM8-BADEP3G-26-NJ

High gain

Mast mount or wall mount

Low PIM & SAR tested to EN50385:2002

Integrate wireless services into one antenna

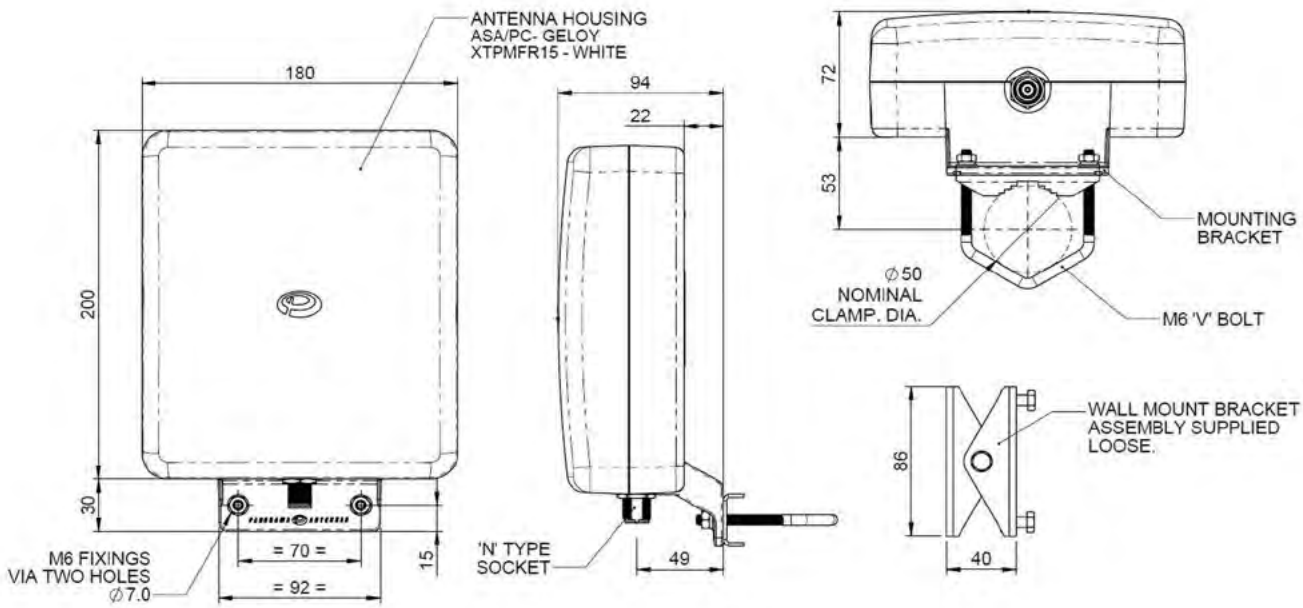
A versatile high gain directional antenna for in building applications, Panorama's WM8 range allows businesses and facilities to support multi-service/multi-operator wireless coverage. The WM8-BADEP3G-26-NJ supports 2G, 3G, 3G+ and 4G technologies including LTE, AMPS, PCS, GSM, UMTS & AWS with lower gain coverage of WIFI 2.4GHz and LTE 2.6GHz.

The WM8 range is housed in impact resistant, UV light stabilised plastic. The features a heavy duty N female connector making the product ideal for indoor and outdoor deployment, for inbuilding coverage or network infill applications.

PIMGuard Technology

This product features Panorama Antennas' PIM Guard Technology and will meet or exceed a third order intermodulation level of < -140dBc.

Technical Drawing

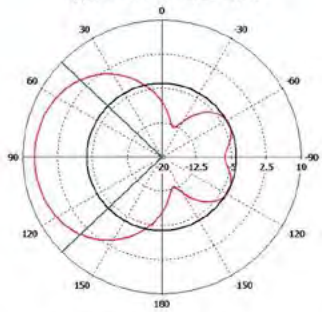


In Building Antennas

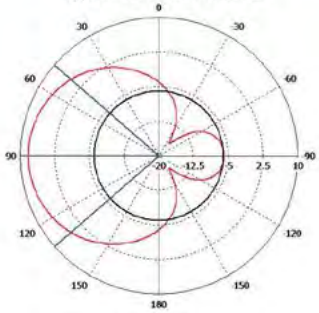
Low PIM Directional Antenna

Polar radiation plots

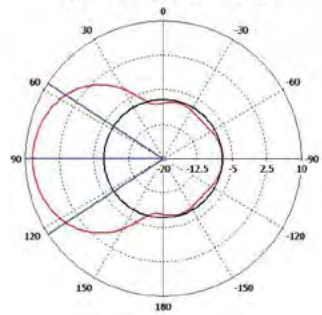
Typical H Plane 700MHz



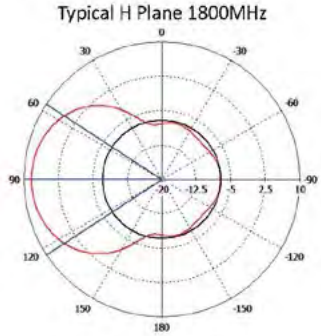
Typical H Plane 850MHz



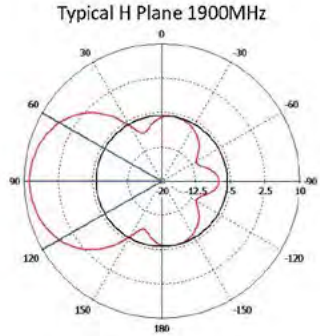
Typical H Plane 1700MHz



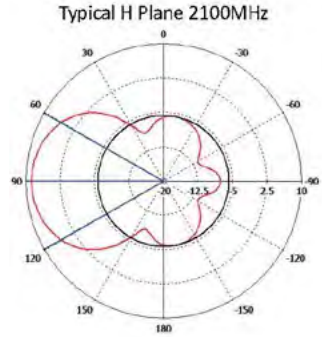
Typical H Plane 1800MHz



Typical H Plane 1900MHz

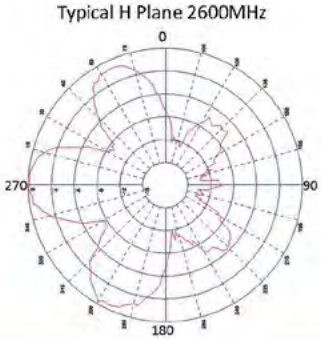


Typical H Plane 2100MHz

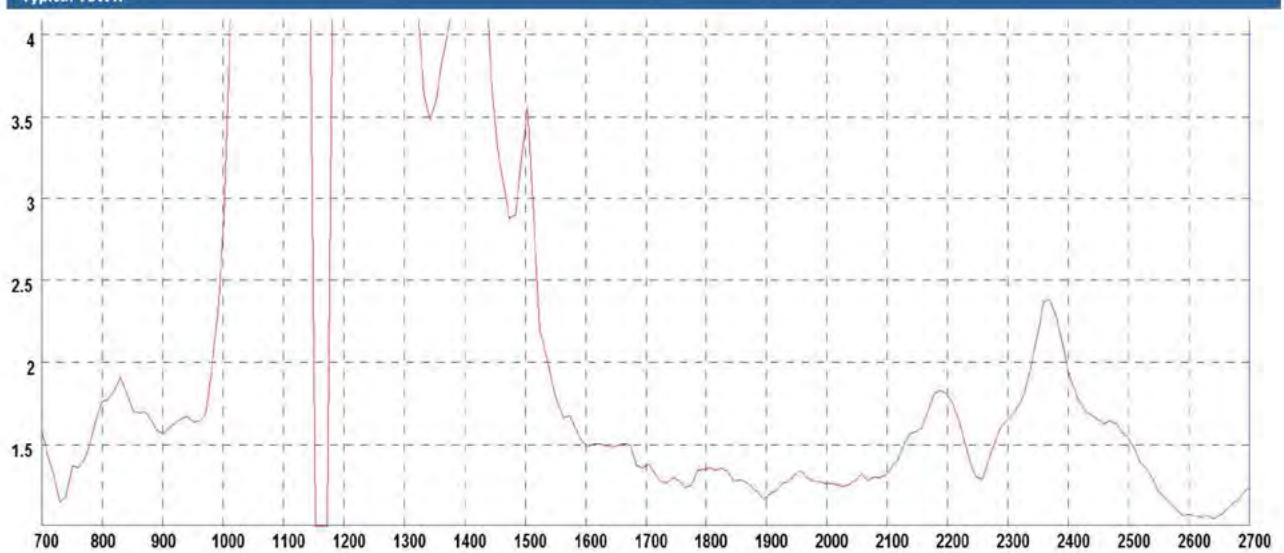


Typical H Plane 2400MHz

Typical H Plane 2600MHz



Typical VSWR



*Measurements taken looking directly into N connector on antenna housing.

In Building

Low PIM Directional Antenna

Part No.		
		WM6-BADEP3G-26-NJ
Electrical Data		
Frequency Range (MHz)		698-960, 1710-2700
Operational Band		LTE700, AMPS 850, CDMA 800, GSM1800, PCS1900, 3G UMTS, AWS, WIFI, LTE 2.6
Peak Gain: Isotropic	LTE 700MHz, AMPS800 & GSM900	6.5dBi
	GSM1800, PCS1900, 3G UMTS / AWS 2100	8dBi
	WIFI 2400, LTE 2600	6dBi
VSWR		<2.5:1
Polarisation		Vertical
Pattern		Directional
Typical Passive Intermod. (2x20W, 3rd ord.) dBc*		-140
SAR and 'Touch Safe' Test Data		According to 50385:2002 (Bands: 850, 900, 1800, 2100, 2600MHz)
Impedance		50Ω
Max Input Power (W)		50
Mechanical Data		
Dimensions (mm)	Height	230mm (9.05")
	Width	180mm (7.08")
	Length	94mm (3.7")
Operating Temp (°C)		-30° / +70°C (-22° /158°F)
Material		PC/ASA
Colour		White
Connector Data		
Type		N Socket
Mounting Data		
Fixing		Pole Mount / Wall Mount
Pole Diameter		20-50 mm (0.8 - 1.96")

*Range PIM performance verified under controlled conditions by Anritsu PIM Master test equipment.

Panorama Antennas Ltd
Frogmore, London, SW18 1HF, United Kingdom

T: +44 (0)20 8877 4444
F: +44 (0)20 8877 4477

E: sales@panorama-antennas.com
www.panorama-antennas.com

SPECIFICATION
PATENTED

Part No. : **TG.30.8113**

Product Name : **Apex Hinged TG.30**
Ultra-Wideband 4G LTE Antenna

Feature : LTE / GSM / CDMA /DCS /PCS / WCDMA / UMTS / HSDPA / GPRS / EDGE /GPS /Wi-Fi
698MHz to 960MHz, 1575.42MHz
1710MHz to 2700Mhz
Typical 70%+ Efficiency and 3dBi+ Peak Gain
Dipole Swivel Terminal Antenna
Hinged 90° termination with SMA(M) Connector
RoHS Compliant

2. Specification

ELECTRICAL							
Frequency (MHz)	700~800	824~960	1575.42	1710 ~ 1880	1850 ~ 1990	1710 ~ 2170	2400~2800
Peak Gain (dBi)							
Free Space Straight	1.1	0.3	1.1	1.9	2.7	2.6	2.7
Free Space Bent	2.6	1.5	2.9	2.7	3.1	3.1	2.0
30x30cm GP center Straight	2.1	0.7	2.9	1.5	1.9	2.0	2.9
30x30cm GP center Bent	3.5	1.7	5.2	5.9	6.7	6.4	4.9
30x30cm GP edge Straight	2.6	1.3	1.7	2.1	2.1	2.3	4.3
30x30cm GP edge Bent	2.6	1.8	3.1	2.1	3.0	2.8	5.1
PCB edge Straight	1.4	1.2	0.9	2.5	3.2	3.0	1.4
PCB edge Bent	2.1	0.1	2.1	2.4	3.6	3.4	3.0
Average Gain (dB)							
Free Space Straight	-1.1	-2.2	-2.0	-1.5	-1.2	-1.3	-3.5
Free Space Bent	-1.1	-2.3	-1.5	-1.5	-1.1	-1.2	-3.1
30x30cm GP center Straight	-0.6	-1.6	-2.0	-1.8	-1.7	-1.7	-3.8
30x30cm GP center Bent	-3.5	-4.9	-2.8	-2.4	-1.8	-2.0	-3.0
30x30cm GP edge Straight	-0.6	-1.5	-1.9	-1.6	-1.4	-1.4	-3.1
30x30cm GP edge Bent	-0.6	-1.7	-1.6	-1.5	-1.2	-1.3	-3.1
PCB edge Straight	-1.0	-2.0	-2.0	-1.6	-1.4	-1.4	-3.5
PCB edge Bent	-0.8	-2.5	-1.6	-1.5	-1.1	-1.3	-3.0

ELECTRICAL							
Frequency (MHz)	700~800	824~960	1575.42	1710 ~ 1880	1850 ~ 1990	1710 ~ 2170	2400~2800
Efficiency (%)							
Free Space Straight	79	61	63	71	76	75	45
Free Space Bent	78	60	70	72	78	75	49
30x30cm GP center Straight	86	69	62	66	67	68	42
30x30cm GP center Bent	47	32	51	58	66	64	51
30x30cm GP edge Straight	88	70	65	69	72	72	49
30x30cm GP edge Bent	88	67	69	70	76	74	49
PCB edge Straight	80	63	63	69	73	73	45
PCB edge Bent	83	57	70	71	77	75	50
Impedance	50Ω						
Polarization	Linear						
Radiation Pattern	Omni						
Input Power	10 W						

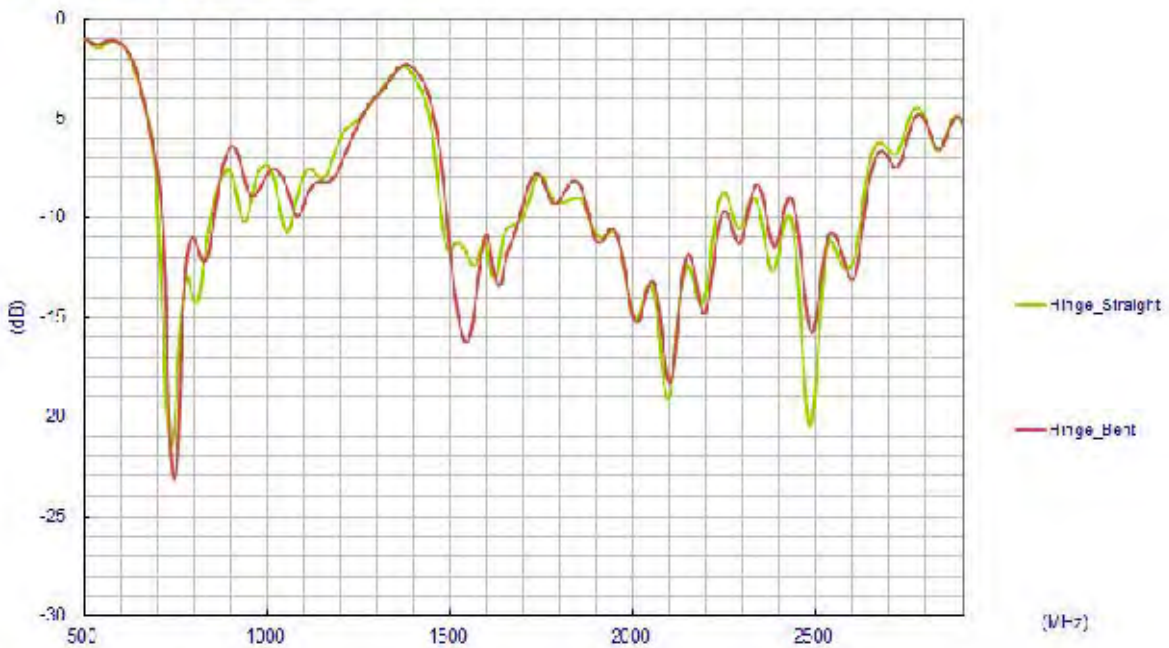
MECHANICAL	
Casing	UV Resistant PC/ABS
Connector	SMA Male Hinged 90°

ENVIRONMENTAL	
Temperature Range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

LTE BANDS			
Band Number	LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA		
	Uplink	Downlink	Covered
1	UL: 1920 to 1980	DL: 2110 to 2170	✔
2	UL: 1850 to 1910	DL: 1930 to 1990	✔
3	UL: 1710 to 1785	DL: 1805 to 1880	✔
4	UL: 1710 to 1755	DL: 2110 to 2155	✔
5	UL: 824 to 849	DL: 869 to 894	✔
7	UL: 2500 to 2570	DL:2620 to 2690	✔
8	UL: 880 to 915	DL: 925 to 960	✔
9	UL: 1749.9 to 1784.9	DL: 1844.9 to 1879.9	✔
11	UL: 1427.9 to 1447.9	DL: 1475.9 to 1495.9	✘
12	UL: 699 to 716	DL: 729 to 746	✔
13	UL: 777 to 787	DL: 746 to 756	✔
14	UL: 788 to 798	DL: 758 to 768	✔
17	UL: 704 to 716	DL: 734 to 746 (LTE only)	✔
18	UL: 815 to 830	DL: 860 to 875 (LET only)	✔
19	UL: 830 to 845	DL: 875 to 890	✔
20	UL: 832 to 862	DL: 791 to 821	✔
21	UL: 1447.9 to 1462.9	DL: 1495.9 to 1510.9	✘
22	UL: 3410 to 3490	DL: 3510 to 3590	✘
23	UL:2000 to 2020	DL: 2180 to 2200 (LTE only)	✔
24	UL:1625.5 to 1660.5	DL: 1525 to 1559 (LTE only)	✔
25	UL: 1850 to 1915	DL: 1930 to 1995	✔
26	UL: 814 to 849	DL: 859 to 894	✔
27	UL: 807 to 824	DL: 852 to 869 (LTE only)	✔
28	UL: 703 to 748	DL: 758 to 803 (LTE only)	✔
29	UL: -	DL: 717 to 728 (LTE only)	✔
30	UL: 2305 to 2315	DL: 2350 to 2360 (LTE only)	✔
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5 (LTE only)	✘
32	UL: -	DL: 1452 - 1496	✘
35	1850 to 1910		✔
38	2570 to 2620		✔
39	1880 to 1920		✔
40	2300 to 2400		✔
41	2496 to 2690		✔
42	3400 to 3600		✘
43	3600 to 3800		✘

3. Antenna Characteristics

3.1 Return Loss



3.2 Peak Gain

ANT-DB1-LCD-ccc

Data Sheet

Product Description

The Linx LCD Dipole Antenna is a superior solution for users searching for best-in-class performance for WLAN devices using Dual-Band WiFi (802.11ac, 802.11n, 802.11ax) or U-NII applications.

With a compact package and low price, the LCD's high peak gain and superior efficiency make it an excellent option for high volume, cost sensitive applications.

Dipole design means that no additional ground plane is required.

Features

- Excellent performance
- Dual-band
- Very low VSWR
- Omni-directional pattern
- Tilt and swivel base
- Standard SMA or Part 15 compliant RP-SMA connector

Ordering Information

ANT-DB1-LCD-RPS (with RP-SMA connector)
ANT-DB1-LCD-SMA (with SMA connector)

Electrical Specifications

Parameter			
Recommended Frequency Range	2.4GHz WiFi	U-NII	5.8GHz WiFi/ U-NII-3 Band
	2.4 – 2.5GHz	5.125 – 5.725GHz	5.725 – 5.875GHz
VSWR	<2:1	<2:1	<2:1
Peak Gain (max in the band)	2.8dBi	4.5dBi	2.92dBi
Average Gain (typical)	–0.6dBi	–1.5dBi	–2.2dBi
Efficiency (typical)	85%	70%	65%
Polarization	Linear		
Radiation	Omni-Directional		
Max Power	10W		
Wavelength	1/2-wave		
Impedance	50-ohms		
Connection	SMA Plug (Male) or RPS (Reverse Polarity Male)		
Weight	7.4g (0.26oz.)		
Operating Temperature Range	-40°C to +80°C		

Measurements taken on a 100 x 100mm ground plane, mounted on the edge, bent 90°.

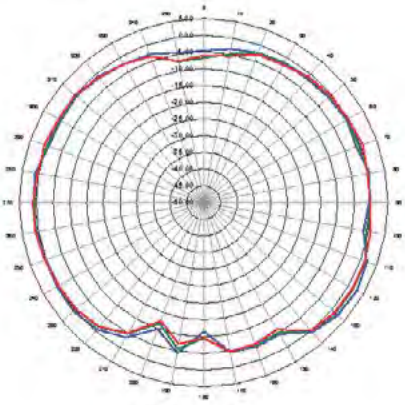
Gain Plots - Edge of Plane, Bent 90°

XZ-Plane Gain

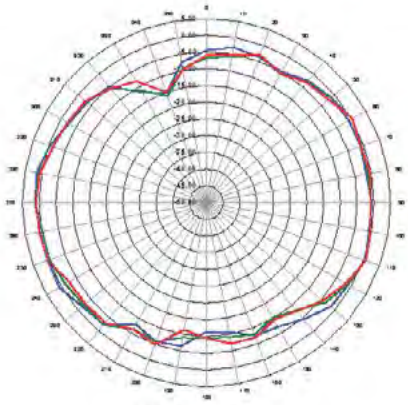
YZ-Plane Gain

XY-Plane Gain

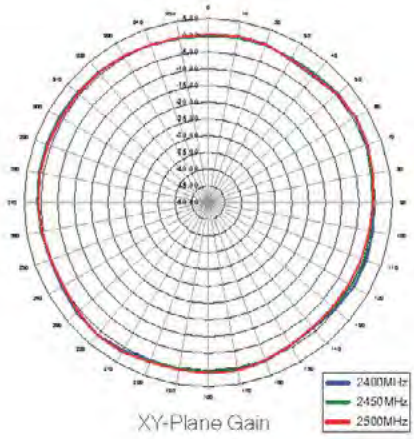
2400 - 2500MHz



XZ-Plane Gain

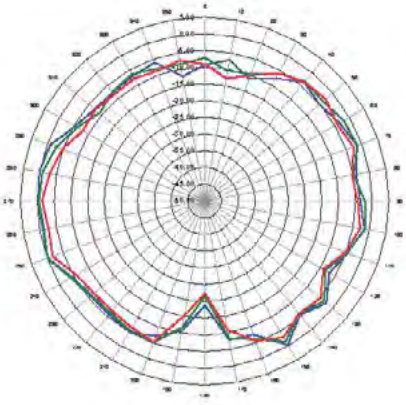


YZ-Plane Gain

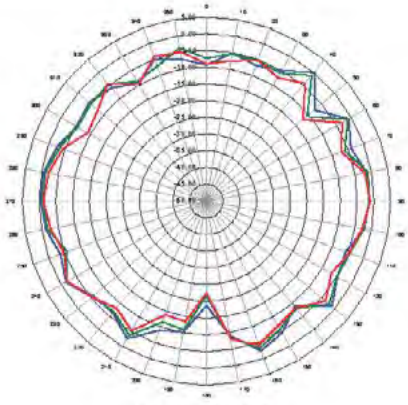


XY-Plane Gain

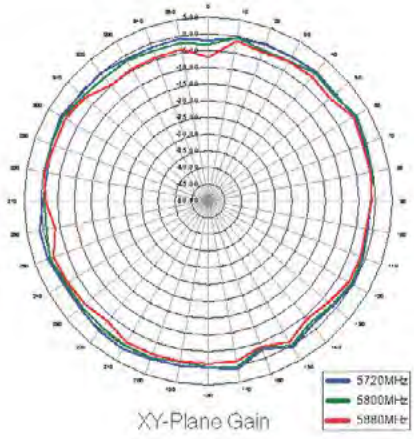
5720 - 5880MHz



XZ-Plane Gain



YZ-Plane Gain



XY-Plane Gain

Yorkie-Pro Product Safety Info

BVS WIDS (Wireless Intrusion Detection Systems) monitor for cellular, Wi-Fi and BT/BLE signals emitted by standard consumer electronic devices and therefore are rather passive Receivers of RF energy. Most of the time these receivers are passively listening for possible ambient signals of interest. Occasionally, BVS WIDS systems broadcast brief scanning requests. These requests are low energy standard signals just as signals emitted by personal consumer electronic devices, such as cell phones, etc.

Wi-Fi

Wi-Fi access points emit electromagnetic radiation in the form of radiofrequency (RF) signals to transmit data wirelessly. The RF signals used by Wi-Fi fall within the non-ionizing part of the electromagnetic spectrum, which means they do not have enough energy to ionize atoms or molecules and, therefore, are generally considered to be non-harmful at typical exposure levels.

The radiofrequency radiation emitted by Wi-Fi devices is classified as non-ionizing radiation, and it is generally considered safe for human exposure within established regulatory limits. Regulatory agencies, such as the Federal Communications Commission (FCC) in the United States, set limits on RF exposure to ensure that devices like Wi-Fi routers operate within safe levels.

Bluetooth & Bluetooth Low Energy

Similar to Wi-Fi, Bluetooth technology uses radiofrequency (RF) signals to transmit data wirelessly. Bluetooth operates in the same non-ionizing part of the electromagnetic spectrum as Wi-Fi, and the emitted radiation is generally considered to be safe at typical exposure levels.

Bluetooth devices, such as headphones, speakers, and other peripherals, emit low-power radiofrequency signals. The power levels used in Bluetooth communication are typically much lower than those associated with cell phones and other devices that use higher-powered RF signals.

As with any technology, it's important to follow established guidelines and regulations to ensure safe usage. Regulatory bodies, such as the Federal Communications Commission (FCC) in the United States, set limits on RF exposure to protect against potential health risks. The current scientific consensus is that the RF exposure from Bluetooth devices is not harmful at typical usage levels.

Cellphone

The radiofrequency (RF) signals emitted by cell phones are a form of non-ionizing electromagnetic radiation. The consensus among the scientific community, as reflected in the guidelines of various health organizations and regulatory agencies, is that the RF exposure from cell phones, when used within established safety limits, is not likely to cause harm to human health.

Regulatory bodies, such as the Federal Communications Commission (FCC) in the United States, set limits on the Specific Absorption Rate (SAR), which measures the rate at which the human body absorbs RF energy. Cell phones must comply with these SAR limits to ensure that the RF exposure is below levels considered safe.

Yorkie-Pro PC SOFTWARE

Introduction

Yorkie-Pro wireless intrusion detection system (WIDS) is a handheld receiver designed for wireless security audits of data-sensitive government, law enforcement, military and critical infrastructure facilities. Yorkie-Pro detects all nearby wireless PEDs (Personal Electronic Devices) including Cellular, Wi-Fi, Bluetooth and BLE (Bluetooth Low Energy) channels using a high-speed receiver engine in conjunction with a Wi-Fi/BT/BLE demodulator. Yorkie-Pro is also the only device on the market that detects and locates unknown Apple AirTag®, Samsung Galaxy SmartTag® and Tile® Tracker as well any active, hidden GPS trackers used for illegal stalking and tracking.

Yorkie-Pro is also capable of storing screen data such as Snapshot Data and Logged Screen Data.
Snapshot Data is an instance of the data and measurements taken from the current screen and stored in Yorkie-Pro. Yorkie-Pro can store up to 70 snapshots internally.

Logged Screen Data is a continuous collection overtime of current screen data and measurements that is stored onto Yorkie-Pro. Internal storage allows for 5 unique data logging sessions at approximately 13 MB per log file. Depending upon the screen being logged, the resulting data can be logged for a range of time.

Yorkie-Pro PC Software retrieves these types of data from Yorkie-Pro through Mini-USB connection to your Windows machine. Allows you to visualize the data on your PC and save the raw data to an Excel file.

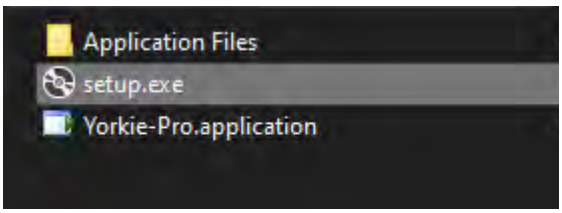
Minimum Software Requirements

Operating System:	Windows 8/10/11
RAM:	8 GB
Processor Speed:	2.30 GHz
Hard Drive Space:	5 MB for application installation
Monitor Resolution:	1680 x 1050 (recommended)
.Net Framework:	4.8
Yorkie-Pro Firmware:	2.13

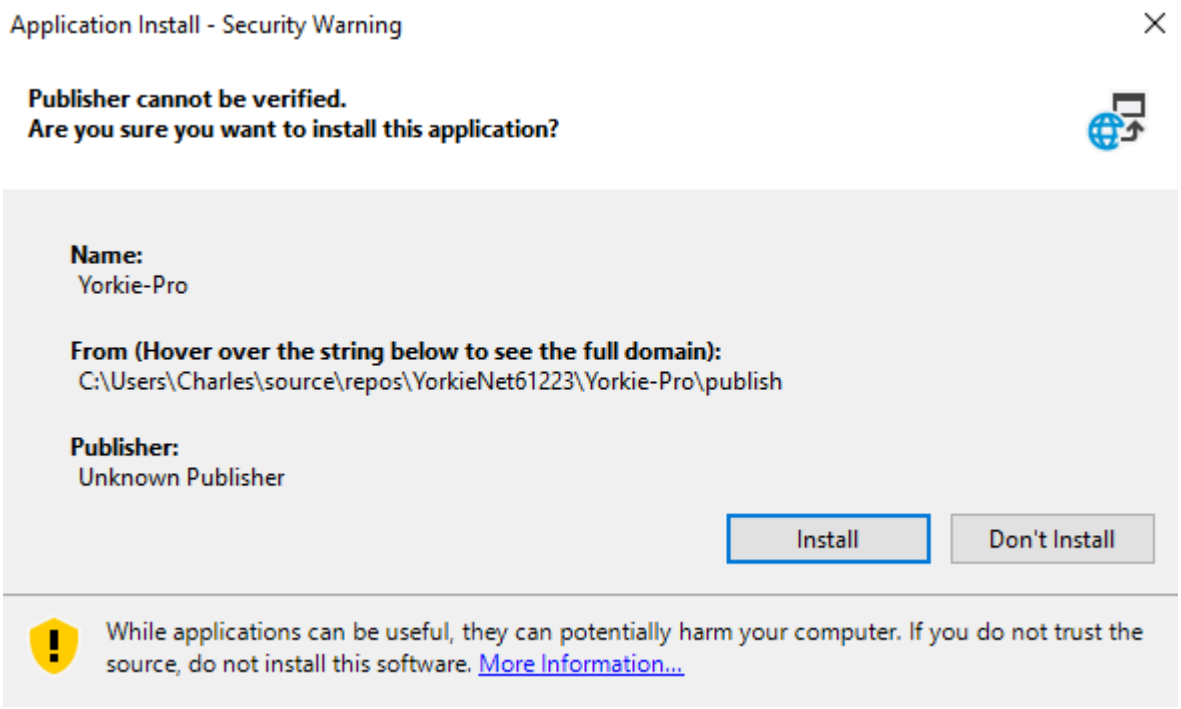
Installation

1. Make sure your current. Net Framework is 4.8 or higher.

2. Open the installation folder and click on setup.exe file.

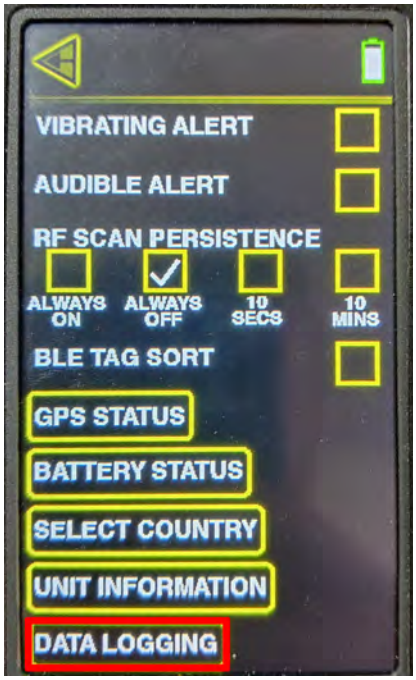


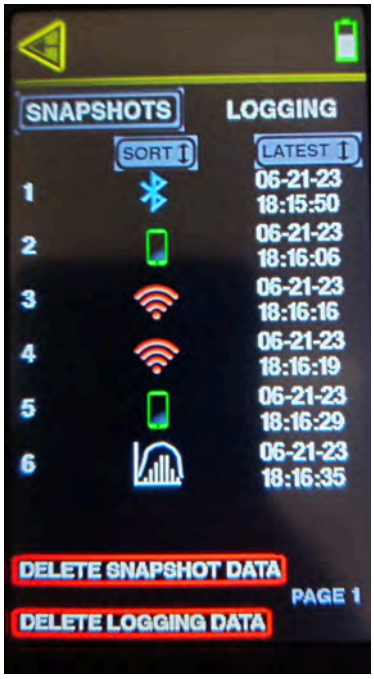
2. Next, click on the Install.



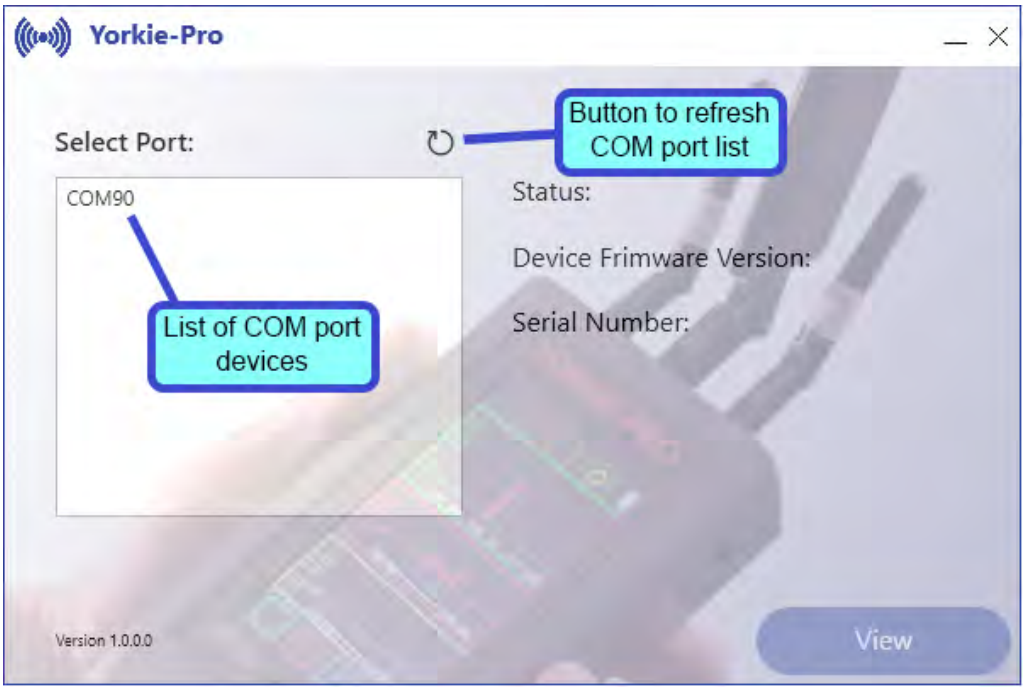
Getting Started

!Keep the Yorkie-Pro in the **Data Logging** screen during the Data Downloading to improve data transfer. To get there go to the **Main MENU** on the Yorkie-Pro and click on the **DATA LOGGING**

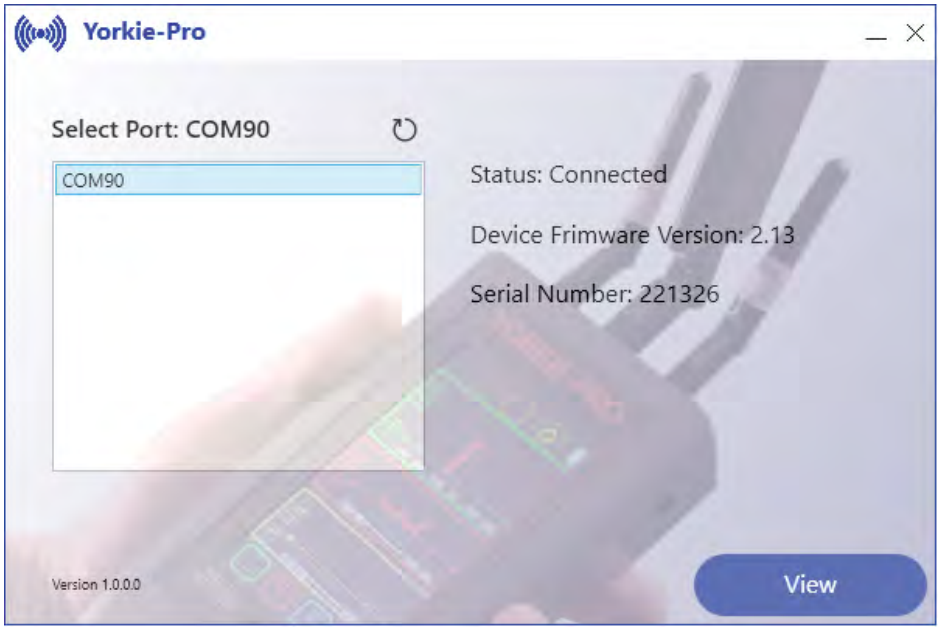




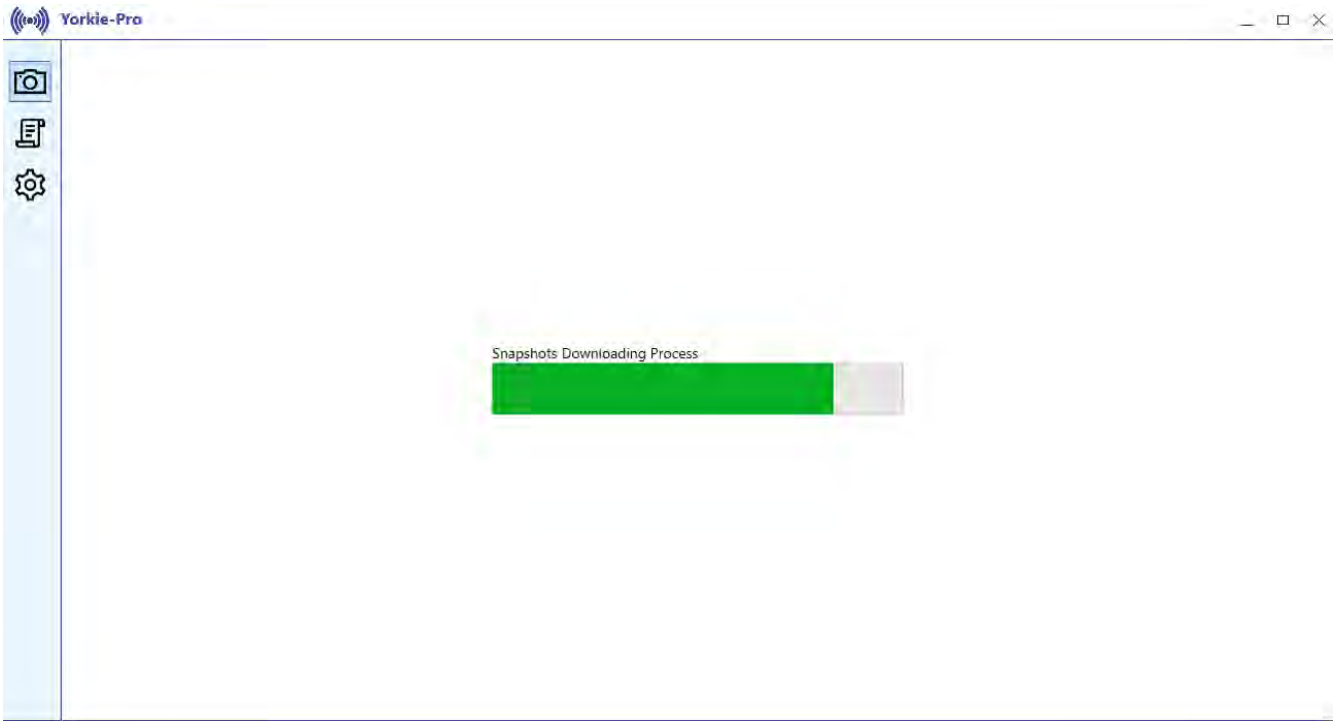
Connect Yorkie-Pro to the PC using the Mini-USB cable and launch the Yorkie-Pro application. Make sure to select proper COM port.



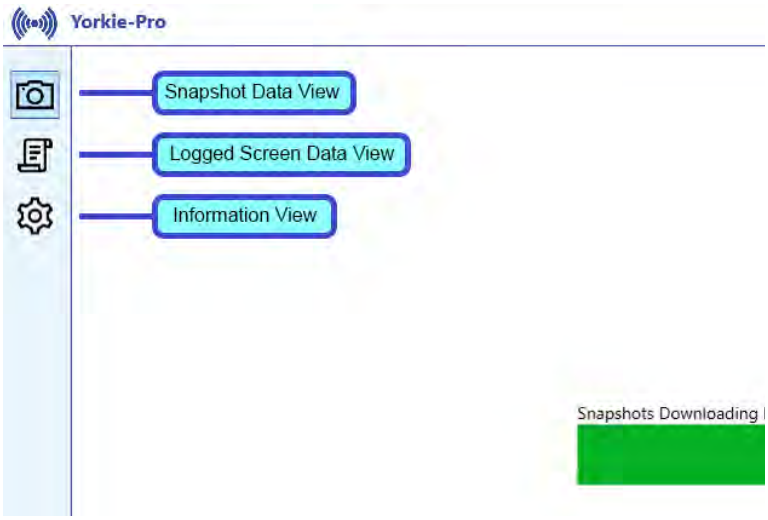
Once the Yorkie-Pro COM port is selected you will see that Status switched to “Connected” and other information data is filled. Otherwise, if you select the wrong device, you will get an error. Next click the “View” button.



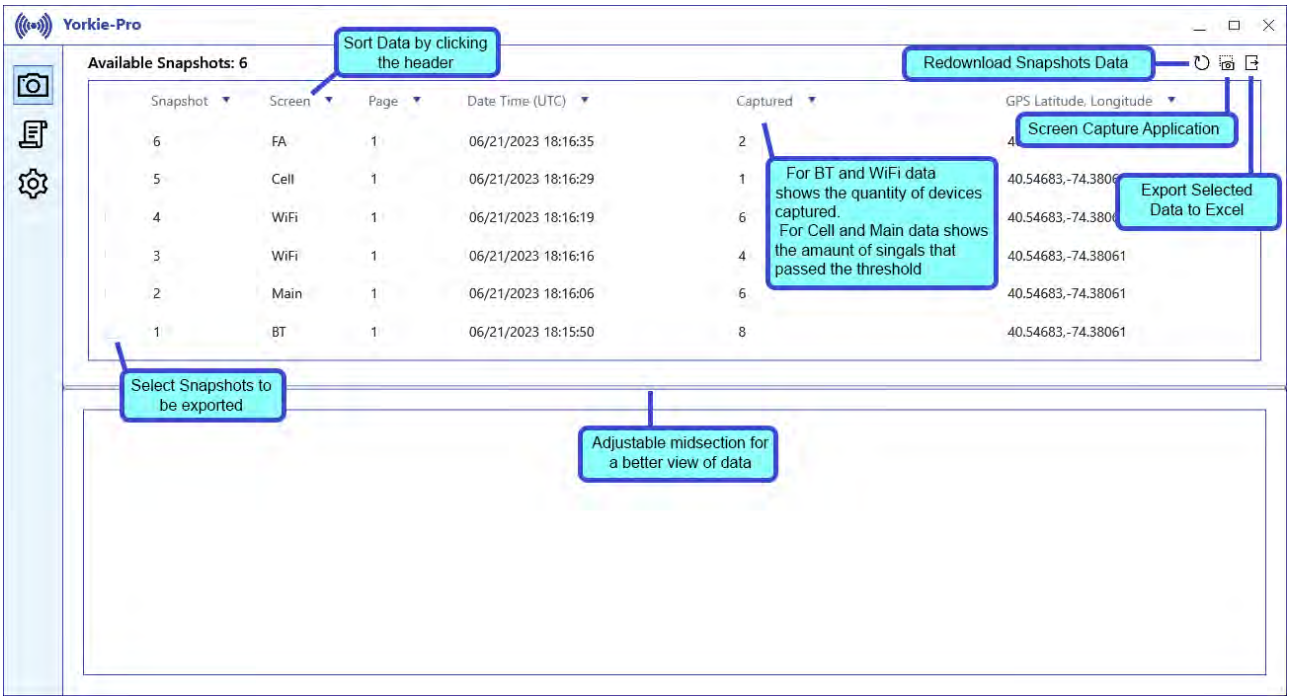
The main window will open up and it will start downloading Snapshot Data.



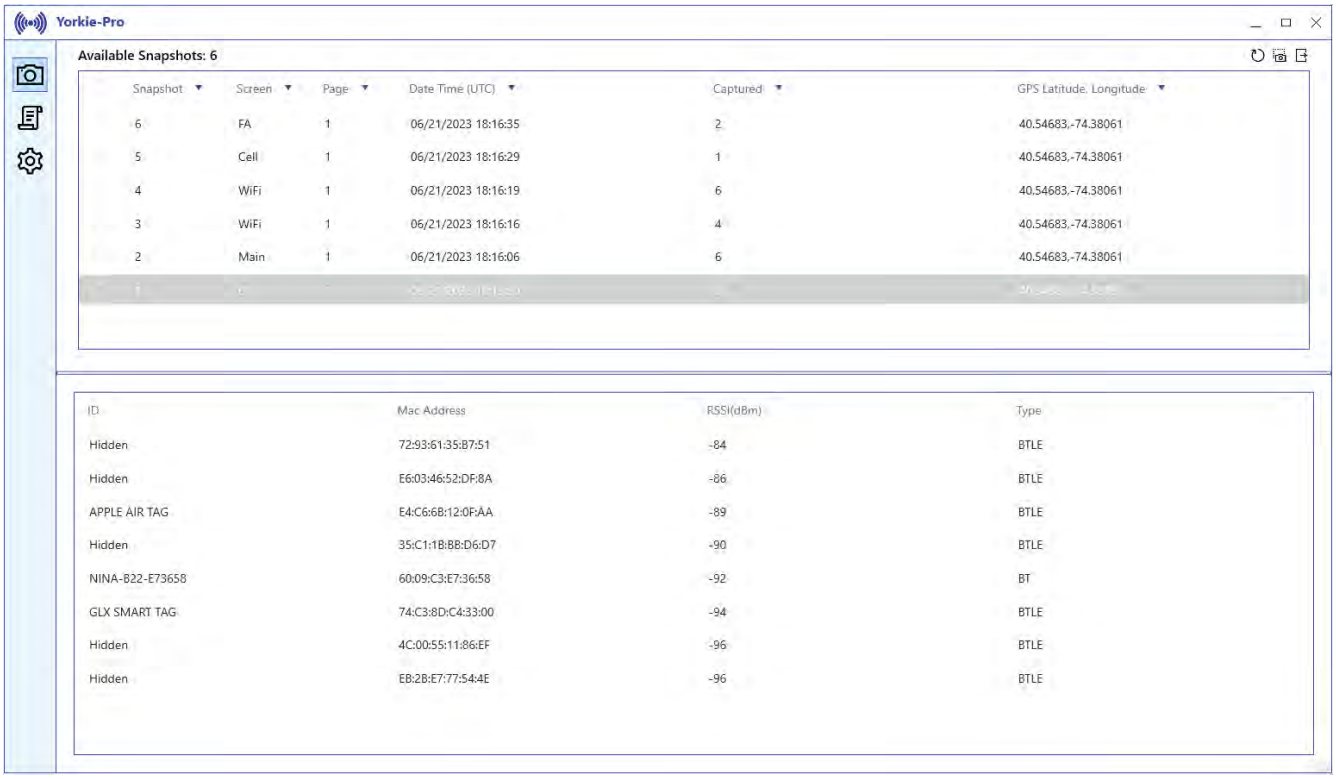
You can move between different views on the navigation bar on the left.



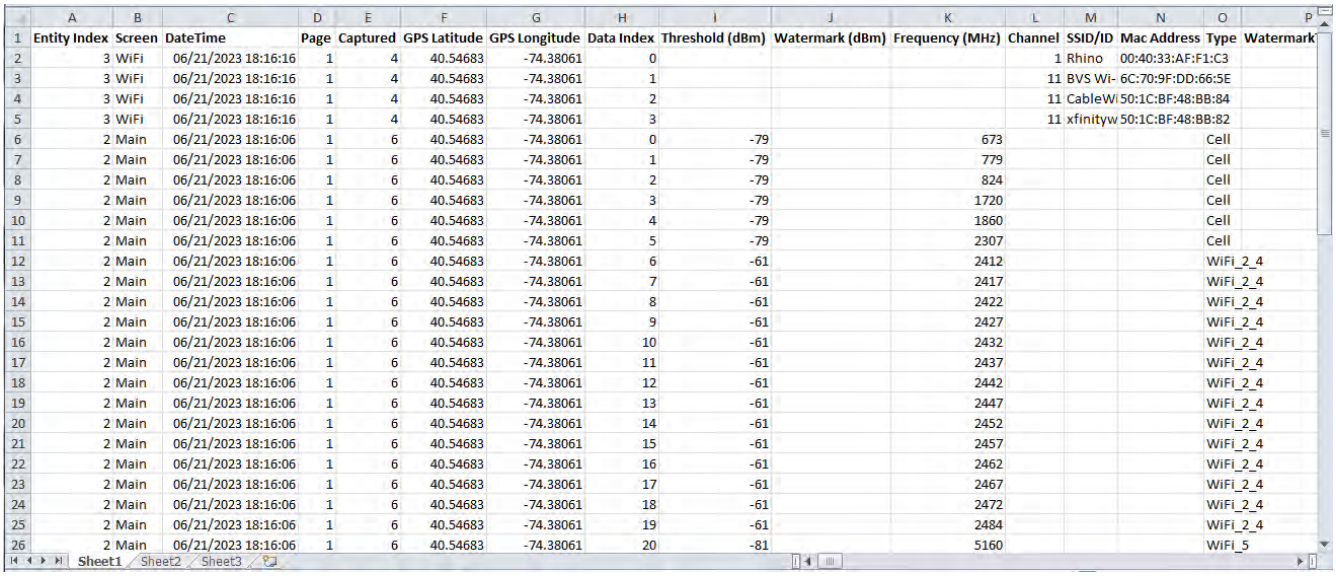
When all the Snapshots got downloaded you will see a list with populated data. And in the mean time the application will start downloading the Logged Screen Data.



Click on the relative Snapshot to further view the data contents



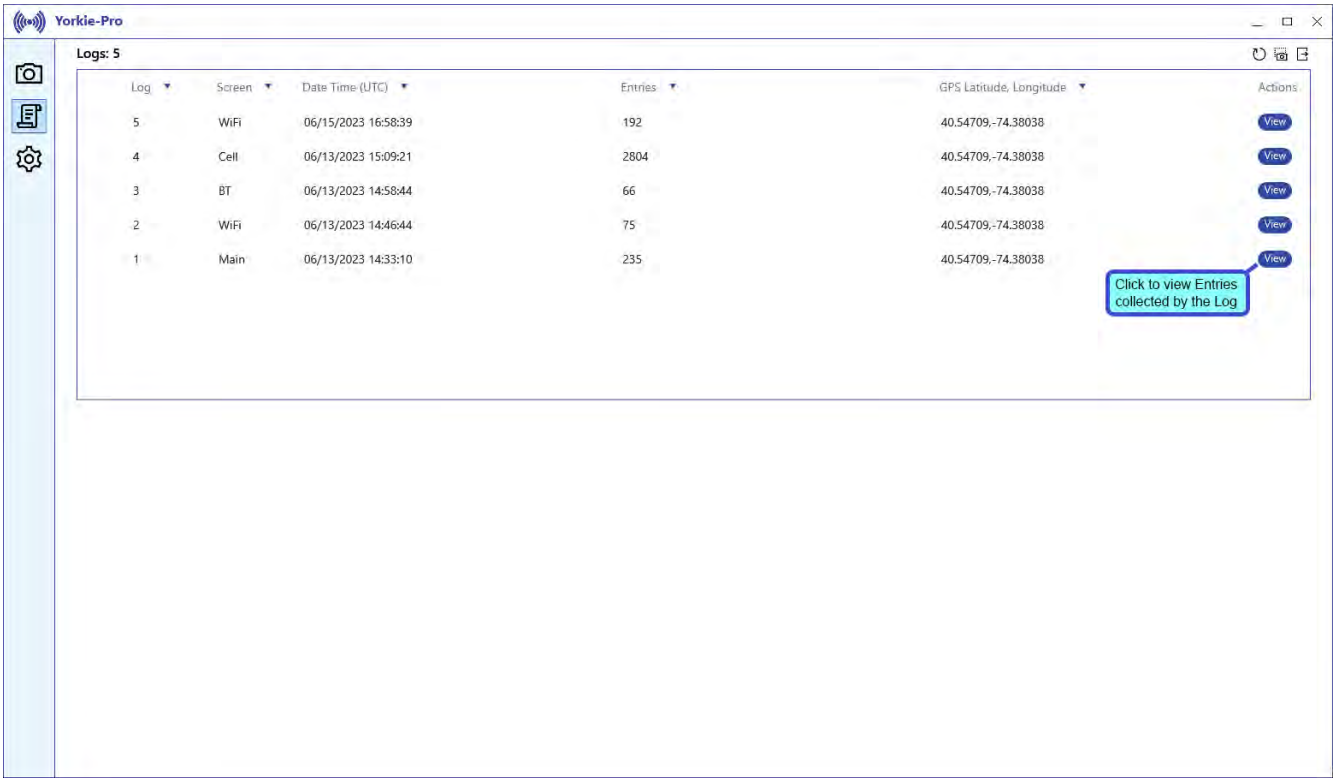
Example view of exported Snapshot Data to Excel



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Entity Index	Screen	DateTime	Page	Captured	GPS Latitude	GPS Longitude	Data Index	Threshold (dBm)	Watermark (dBm)	Frequency (MHz)	Channel	SSID/ID	Mac Address	Type	Watermark
2	3	WiFi	06/21/2023 18:16:16	1	4	40.54683	-74.38061	0				1	Rhino	00:40:33:AF:F1:C3		
3	3	WiFi	06/21/2023 18:16:16	1	4	40.54683	-74.38061	1				11	BVS Wi-	6C:70:9F:DD:66:5E		
4	3	WiFi	06/21/2023 18:16:16	1	4	40.54683	-74.38061	2				11	CableWi	50:1C:BF:48:BB:84		
5	3	WiFi	06/21/2023 18:16:16	1	4	40.54683	-74.38061	3				11	xfinityw	50:1C:BF:48:BB:82		
6	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	0	-79		673				Cell	
7	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	1	-79		779				Cell	
8	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	2	-79		824				Cell	
9	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	3	-79		1720				Cell	
10	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	4	-79		1860				Cell	
11	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	5	-79		2307				Cell	
12	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	6	-61		2412				WiFi_2_4	
13	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	7	-61		2417				WiFi_2_4	
14	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	8	-61		2422				WiFi_2_4	
15	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	9	-61		2427				WiFi_2_4	
16	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	10	-61		2432				WiFi_2_4	
17	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	11	-61		2437				WiFi_2_4	
18	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	12	-61		2442				WiFi_2_4	
19	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	13	-61		2447				WiFi_2_4	
20	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	14	-61		2452				WiFi_2_4	
21	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	15	-61		2457				WiFi_2_4	
22	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	16	-61		2462				WiFi_2_4	
23	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	17	-61		2467				WiFi_2_4	
24	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	18	-61		2472				WiFi_2_4	
25	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	19	-61		2484				WiFi_2_4	
26	2	Main	06/21/2023 18:16:06	1	6	40.54683	-74.38061	20	-81		5160				WiFi_5	

Sheet1 Sheet2 Sheet3

When Logged Screen Data has finished downloading, data will be available to view. Each log has multiple records of Entry data.



After selecting View on the relative Log you will be able to see the collected data. Also, you can Export to Excel the whole log or select one or more entries of that log to be exported.