

# SeeHawk™ Monitor



POLICE



FIRE



EMS



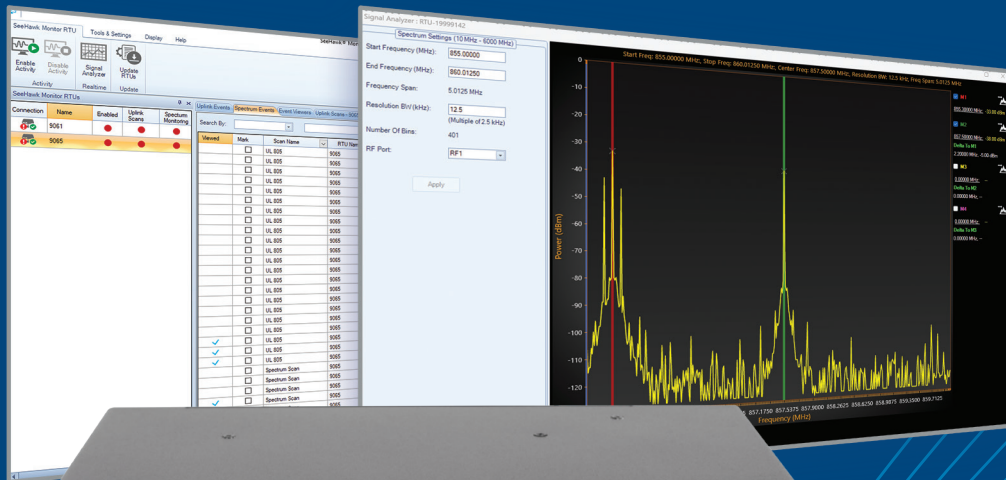
BUSINESS CRITICAL  
/ LIFE SAFETY



UTILITIES & CRITICAL  
INFRASTRUCTURE



4G/5G NETWORK  
DOWNLINK  
PERFORMANCE



## Multi-Application System for Critical Communications

- INTERFERENCE MONITORING
- OUTDOOR UPLINK TESTING
- IN-BUILDING UPLINK GRID TESTING
- BDA COMMISSIONING TESTING
- RADIO METRICS
- DOWNLINK PERFORMANCE MONITORING



**MADE IN THE USA**  
of U.S. and imported parts

**PCTEL**  
an Amphenol company

# INTERFERENCE MONITORING

## Improve network quality by quickly identifying interference and noise issues

- Continuously monitor spectrum across multiple radio sites
- Rapidly detect under-detected service impacting problems
- Characterize the potential source of the problem
- Troubleshoot with real-time spectrum analysis
- Easily manage Remote Test Units (RTUs) from one software platform

“The PCTEL SeeHawk Monitor system is very useful for monitoring interference and for BDA system testing.”

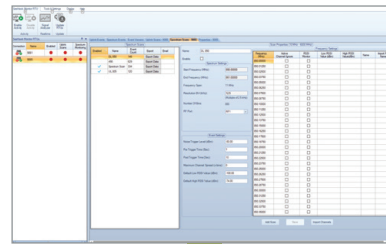
– Lewis Cheatham  
MANAGER, CITY OF GREENSBORO  
TECHNICAL SERVICES DIVISION

## How Spectrum Monitoring Works



### 1 CONFIGURE

User configures Remote Test Unit (RTU) monitoring, including noise thresholds and other parameters in the SeeHawk Monitor Platform Manager software



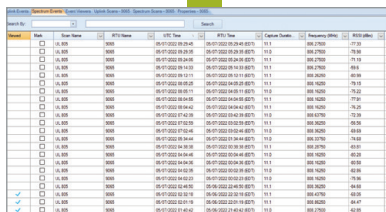
### 2 MEASURE

RTU located at site detects spectrum anomaly on the network (*noise floor rise, intermittent spike, etc.*), records and sends event data to Platform Manager via the cloud



### 3 NOTIFY

Platform Manager notifies the user of new events via email

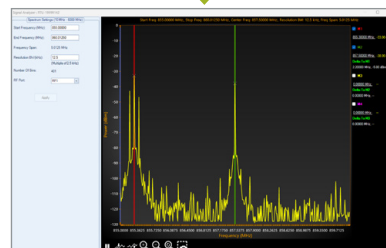


Recorded events



### 4 INVESTIGATE

User investigates the event and identifies ongoing issues using Platform Manager's event replay and real-time spectrum analyzer



Event replay and real-time spectrum analysis

## RADIO METRICS

### Use frequency offset to help determine when radios require maintenance

- Track frequency offset, radio usage and other KPIs
- Sort and filter data by radio ID
- Identify usage of lost or stolen radios
- Detect unauthorized radios

# AUTOMATED UPLINK TESTING

## Easily verify P25 radio uplink signal quality and channel power for all technologies

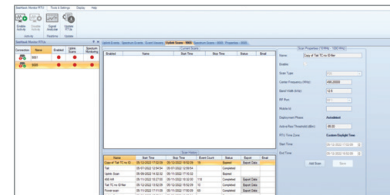
- Automate uplink testing with SeeHawk® *Touch* software throughout your network
  - In-building **grid-based testing** for NFPA, IFC, and local code compliance
  - In-building system **commissioning and FCC compliance** testing
  - Indoor/outdoor **walk testing and drive testing** for network design, optimization and troubleshooting
- Prevent or mitigate interference between in-building systems and the outdoor network
- Objectively measure P25 uplink signal quality (BER and SINR) and channel power for any technology
- Easily schedule testing for multiple radio sites on the SeeHawk™ *Monitor* Platform Manager

## How Uplink Testing Works



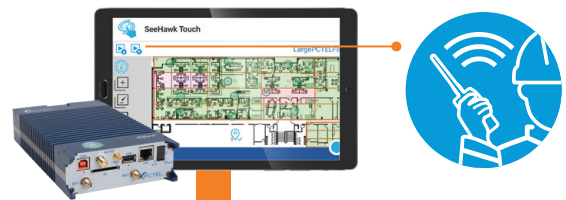
### 1 PREPARE

Remotely schedule uplink testing on SeeHawk *Monitor* (no on-site support required)



### 2 TEST UPLINK

A single technician can conduct uplink testing with the PCTEL® Public Safety Network Testing Solution by activating a test radio during grid, drive or walk testing



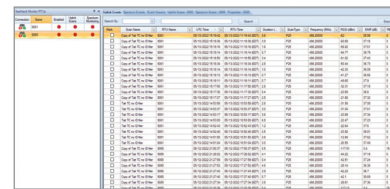
### 3 RECORD

Remote Test Unit at radio site automatically measures the uplink signal, records the results, and sends data back to Platform Manager



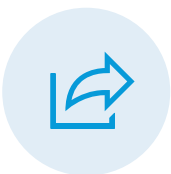
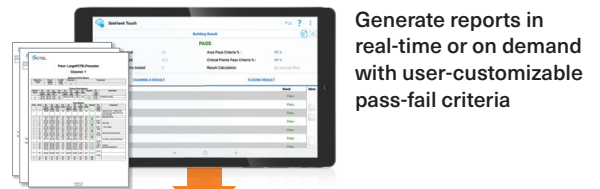
### 4 EXPORT DATA

Authorized user exports uplink data from Platform Manager for import and synchronization in SeeHawk *Touch* software (included with the PCTEL Public Safety Network Testing Solution)



### 5 REPORT

SeeHawk *Touch* automatically synchronizes data from SeeHawk *Monitor* and generates reports. Drive test reports can be generated automatically in SeeHawk *Reports* software.



### 6 SHARE (OPTIONAL)

Users share and track grid test results online with the SeeHawk® *Central* cloud platform



# DOWNLINK PERFORMANCE MONITORING AND NETWORK DETECTION

## Monitor spectrum for 4G/5G networks and rapidly detect service-impacting issues

- Monitor spectrum for 4G/5G coverage and service quality
- Rapidly identify service-impacting issues
- Detect rogue base stations
- Manage multi-tenant or cross-border spectrum usage
- Support coverage at live events, major venues, and critical infrastructure

### How Downlink Monitoring Works



#### 1 CONFIGURE

RTU scans user-selected spectrum for 4G/5G networks, providing a list of active cell IDs and channels with baseline measurements of KPIs such as RSSI, RSRP, and SINR. User configures events in the SeeHawk *Monitor* Platform Manager.



#### 2 MONITOR

RTU continuously scans spectrum and sends data via the cloud to Platform Manager. Platform Manager compares new data to established baselines and event thresholds.



#### 3 NOTIFY

Platform Manager notifies user of events via email. Events may include KPIs significantly higher or lower than baseline, disappearing channels, or the presence of a new channel or cell ID.



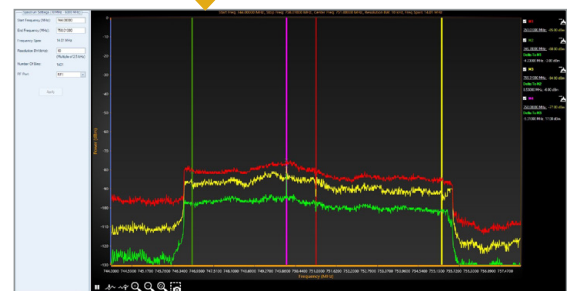
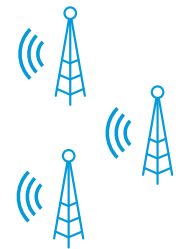
#### 4 INVESTIGATE

Real-time monitoring aids in identifying ongoing issues by providing continuously updated measurements and health ratings compared to a baseline.



| Cell ID             | Channel             | Band                | Power               | Health              | Signal              | Quality             | Signal              | Quality             | Signal              | Quality             |
|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 |

| Cell ID             | Channel             | Band                | Power               | Health              | Signal              | Quality             | Signal              | Quality             | Signal              | Quality             |
|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 | 1000000000000000000 |



Real-time monitoring

# SeeHawk™ Monitor Specifications

## RTU SPECIFICATIONS

### P25 (Phase 1 and Phase 2)

|   |  |
|---|--|
| Measurement modes   | UL Decode, RSSI  |
| Data modes  | SINR, RSSI, Frame BER, Network ID, Auto Classification of Phase and Modulation Type    |
| Channel bandwidths  | 12.5 kHz   |
| Measurement rate  | 5.4 Decodes/sec (maximum), 2.7 Decodes/sec (typical), 100 RSSI/sec                     |
| Dynamic range (SINR)  | 1 dB minimum detection   |
| SINR Relative accuracy for Phase 1 C4FM and Phase 2 HDQPSK<br>BER Relative accuracy | ±1 dB over 8 to 25 dB; ±2 dB over 3 to 8 dB, 25 to 30 dB<br>±1 dB over -118 to -10 dBm |
| Adjacent channel rejection  | 49 dB  |

### 5G New Radio (NR)

|                            |  |
|----------------------------|--|
| Measurement modes          | Blind Scan: Synchronization channels (PSS/SSS) & PBCH;<br>Layer 3 Reporting: MIB, SIB1 |
| Data modes                 | PCI, SSS-RQ [dB], SS-CINR [dB], SSS-CINR [dB], SSS-RP [dB]                             |
| Sub carrier spacing        | 15/30 kHz  |
| Max. number of channels    | 24   |
| Max. number of PCIs        | 8  |
| Max. number of beams/PCI   | 8  |
| Measurement rate (typical) | 30/sec   |
| Dynamic range (CINR)       | PSS/SSS CINR -10 to +33 dB<br>PBCH DMRS CINR -8 to +40 dB                              |
| Min. detection level       | RP SCS @15 kHz: -135 dBm, SCS @30 kHz: -132 dBm  |
| Accuracy (CINR)            | PSS/SSS, PBCH DMRS ±2 dB   |

### LTE FDD and TD-LTE

|                                     |  |
|-------------------------------------|--|
| Measurement modes                   | Mobile Blind Scan: Synchronization Channel Reference Signal (P-SCH/S-SCH) and Resource Block (Wideband, Subband); Dynamic Spectrum Sharing (DSS);<br>Layer 3 Reporting: MIB, SIB 1 |
| Data modes                          | RP, RQ, CINR   |
| Channel bandwidths                  | 1.4 / 3 / 5 / 10 / 15 / 20 MHz   |
| Max. number of channels             | 24   |
| Measurement rates                   | Sync Channel RS LTE FDD: 50/sec; TD-LTE: 25/sec  |
| Dynamic Range (CINR) @ 10/15/20 MHz | RS -25 to +40 dB<br>P-SCH/S-SCH -10 to +18 dB  |
| Min. detection level                | P-SCH/S-SCH & RS -140 dBm (RSRP @ 15 kHz)  |
| Accuracy (CINR)                     | P-SCH/S-SCH & RS ±1 dB   |
| Max. number of PCIs                 | 16   |

### Power Measurements

|  |  |
|--|--|
| Accuracy   | ±1 dB (across basic RF input power range)    |
| Dynamic range  | -120 to -20 dBm @ 30 kHz                     |
| Custom channel power 12.5 kHz (P25, DMR, EDACS, Analog LMR)      | 25,500 ch/sec (maximum, contiguous channels) |
| Custom channel power 25 kHz (TETRA, EDACS, Analog LMR)           | 14,025 ch/sec (maximum, contiguous channels) |
| Enhanced Power Scan (EPS™) 5 kHz to 20 MHz in 2.5 kHz increments | 1,000 MHz/sec @ 5 MHz (typical)              |
| Spectrum analysis Range: >90 dB                                  | >270 MHz/sec (single sweep)                  |

## RF Characteristics

|  |  |
|--|--|
| Frequency range                        | 10 MHz - 6 GHz   |
| Internally generated spurious response | -110 dBm (typical)   |
| Conducted local oscillator             | -75 dBm max.   |
| RF operating range                     | -15 dBm max.   |
| Desensitization Adjacent channel       | >55 dB   |
| Desensitization Alternate channel      | >65 dB   |
| Safe RF input range                    | 10 dBm   |
| Frequency accuracy                     | ±0.1 ppm   |
| Intermodulation-free dynamic range     | 2 tone (level 2) @ -40 dBm, 6 GHz, -68 dBc (typical),<br>-12.6 dBm TOI; @ -25 dBm, 6 GHz, -70 dBc (typical),<br>10 dBm TOI |

## Physical

|                               |  |
|-------------------------------|--|
| Power switch                  | Front panel rocker switch, On/Off  |
| Maximum power                 | +9V to +18V DC<br>22 W typical, 40 W when operating in a hot environment and both fans are providing maximum cooling |
| Size (without a shelf)        | 12" wide<br>12" deep<br>1.7" tall  |
| Weight                        | 5.8 pounds   |
| Temperature range             | Operating 0° C to +50° C<br>Storage -40° C to +85° C   |
| Data communications interface | Ethernet 10/100/1000 via rear panel RJ-45<br>Cellular Modem via Ethernet   |

# SYSTEM REQUIREMENTS

## Network Requirements

|   |              |
|---|--------------|
| Maximum speeds                            | 150 Mbs      |
| Total daily average transmissions per RTU | 25-30 MB/day |

## Computer Requirements

|                             |  |
|-----------------------------|--|
| Supported operating systems | <ul style="list-style-type: none"><li>• Windows 11 Professional Edition, U.S. version only</li><li>• Windows 10 (64bit) Professional Edition (U.S. Version Only)</li></ul>   |
| Recommended specifications  | <ul style="list-style-type: none"><li>• PC or laptop with Intel Core i5, 2.60 GHz or higher processor</li><li>• Windows 10 (64bit) Professional Edition (U.S. Version Only)</li><li>• 16 GB RAM or higher</li><li>• 512 GB or larger hard disk for collecting data</li></ul> |

*Specifications subject to change without notice. Supported bands, technologies, data modes, software features, and frequency ranges vary by configuration. Upgrades may be available for previously purchased RTUs. Please contact a sales representative for more information.*

# SeeHawk™ Monitor System

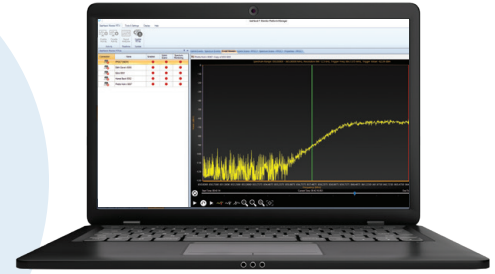
## AT A GLANCE



Remote Test Units (RTUs) installed at each radio site or deployed at critical coverage areas monitor spectrum and radios, and send data to Platform Manager.



Internet Connection



Platform Manager software remotely configures RTUs, schedules uplink testing and interference monitoring, and reports test results, radio metrics, downlink performance, and interference problems.

## COMPLETE YOUR SOLUTION

Gain visibility and insight into your wireless network with real-world data and easy-to-use testing solutions.

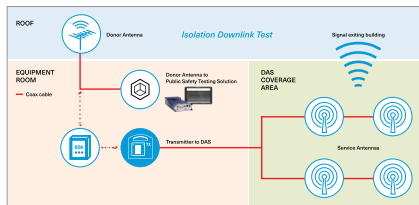
### Public Safety Network Testing Solution

Verify and document critical communications coverage, including uplink test data from SeeHawk™ Monitor



### SeeWave® Interference Locating System

Accelerate interference hunting for improved network performance



**BDA Commissioning Test Option**  
Automated testing and reporting for FCC-compliant installation and configuration

### SeeHawk® Central

Automated Workflow Management and collaboration platform for public safety testers, radio systems, and AHJs



**SeeHawk® Reports**  
Automatically generate drive and walk test reports from PCTEL testing solution data



### CW Transmitter (OP714) 100 MHz – 2.5 GHz

Portable CW and programmable sweep transmitter for network commissioning and design



PCTEL, Inc.

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“I would recommend this solution to anyone in a congested RF environment.”

– Les Potts  
OPERATIONS MANAGER,  
BEARCOM