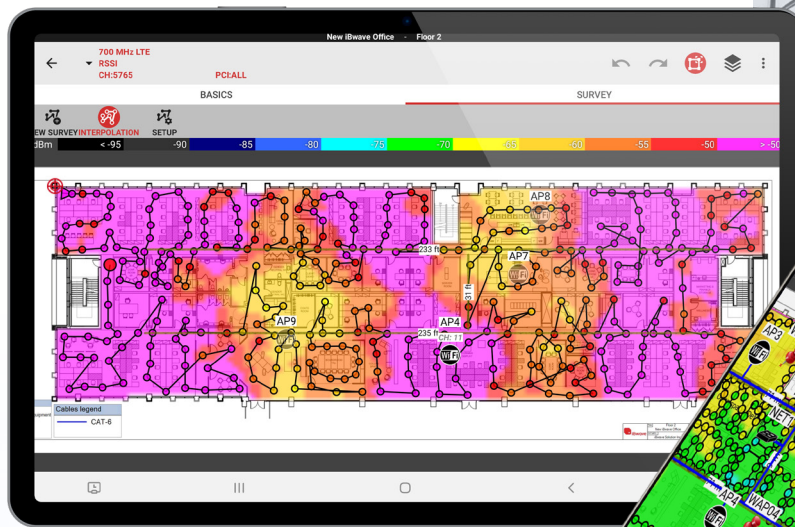


iBwave

# MOBILE SURVEY

The simplest way to survey wireless networks.





## iBwave Mobile Survey



# THE SIMPLEST WAY TO SURVEY WIRELESS NETWORKS.

**iBwave Mobile Survey** is a simple and seamless way to survey wireless networks using just your Android device (LTE, 5G & Wi-Fi) or the seamless integration to the lightweight and affordable Epiq Solutions' PRiSM™ scanner (LTE, 5G or P25).

With the choice of either using a SIM card or the Epiq PRiSM™ scanner, you have the flexibility to leverage the mobile app according to your survey needs and use cases.

In addition to collecting survey data, you can also document your site as you go by taking pictures, videos, audio and capturing notes saved to pushpins on the floorplan, making it simple to reference them during the design phase.

### ONE POWERFUL SURVEY TOOL

- › Collect survey data using just your mobile device, the Epiq PRiSM scanner OR integrate with other third-party scanning tools
- › Survey multi-technology private and single-carrier cellular networks using the Epiq PRiSM scanner
- › Collect Cellular and Wi-Fi data simultaneously (only with the iBwave Mobile app)
- › Eliminate post-processing
- › View survey interpolation heatmap to understand full wireless coverage
- › Quickly analyse active frequencies and interference with a spectrum analyzer
- › Collect site information and save to geolocated pushpins on the floorplan
- › Download and view design plans from iBwave desktop and easily transfer survey measurements back via iBwave Cloud
- › Generate survey maps report
- › Flexible Modular Licensing
- › Android-based for tablets and phones



# iBwave Mobile Survey

## Seamlessly survey cellular and Wi-Fi networks

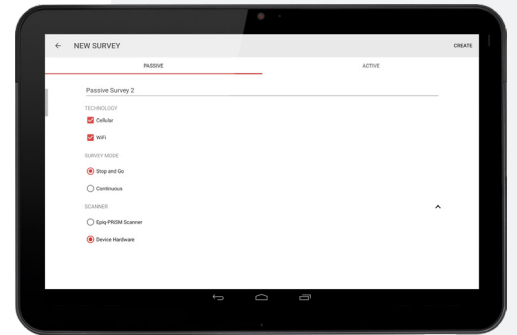
iBwave Mobile Survey gives you the flexibility of collecting both cellular and Wi-Fi data at the same time using either just your mobile device. You can also survey single carrier LTE, 5G and P25 networks by using the Epiq PRiSM scanner.

### Collect survey data using just your mobile device

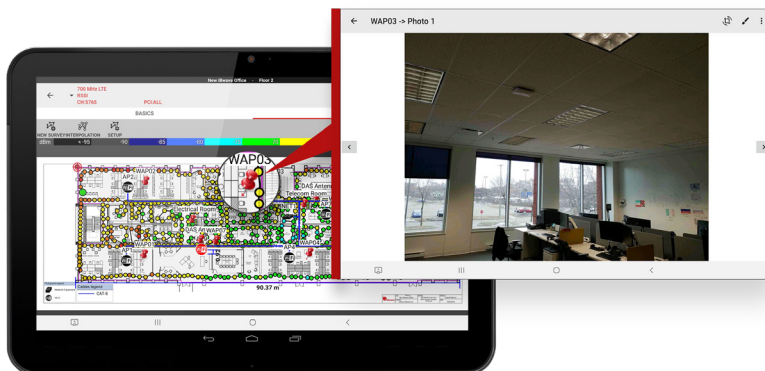
- › Technologies: LTE, 5G, 4G, 3G, 2G, 802.11 a/b/g/n/ac/ax
- › Wi-Fi KPIs: RSSI, CCI, Throughput, and more.
- › Cellular KPIs: RSSI, RSRP, RSRQ, SINR, and more.

### Survey cellular networks with the Epiq PRiSM scanner

- › Lightweight and low-visibility hand-held scanner that magnetically attaches to your phone or tablet to survey cellular networks.
- › Technologies: LTE, 5G, P25
- › KPIs: Band, Channel, RSSI, BER, SINR
- › Seamless integration to iBwave Mobile Survey for a simplified end-to-end survey and design experience.
- › Highly portable: weighs under 6 ounces (170 grams)
- › Eliminated post-processing
- › Powered from the host device: simple USB-C connects to your Android device and laptops for power - no need for batteries or chargers.
- › Web-based Spectrum Analyzer: works with the device's browser.
- › Works with unmodified devices: no device rooting necessary.
- › SDR-Driven: easily calibrated and upgraded with new capability without changing hardware.



## View design plan and collect site documentation



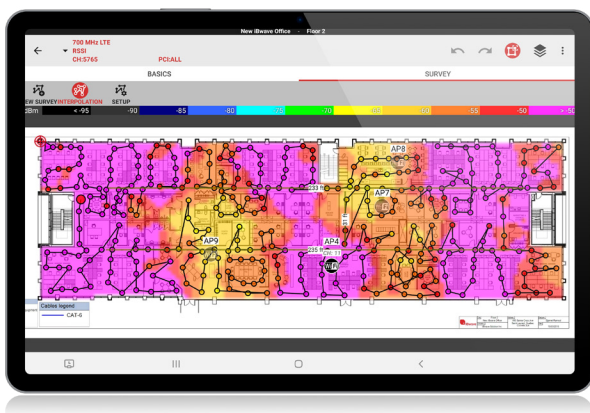
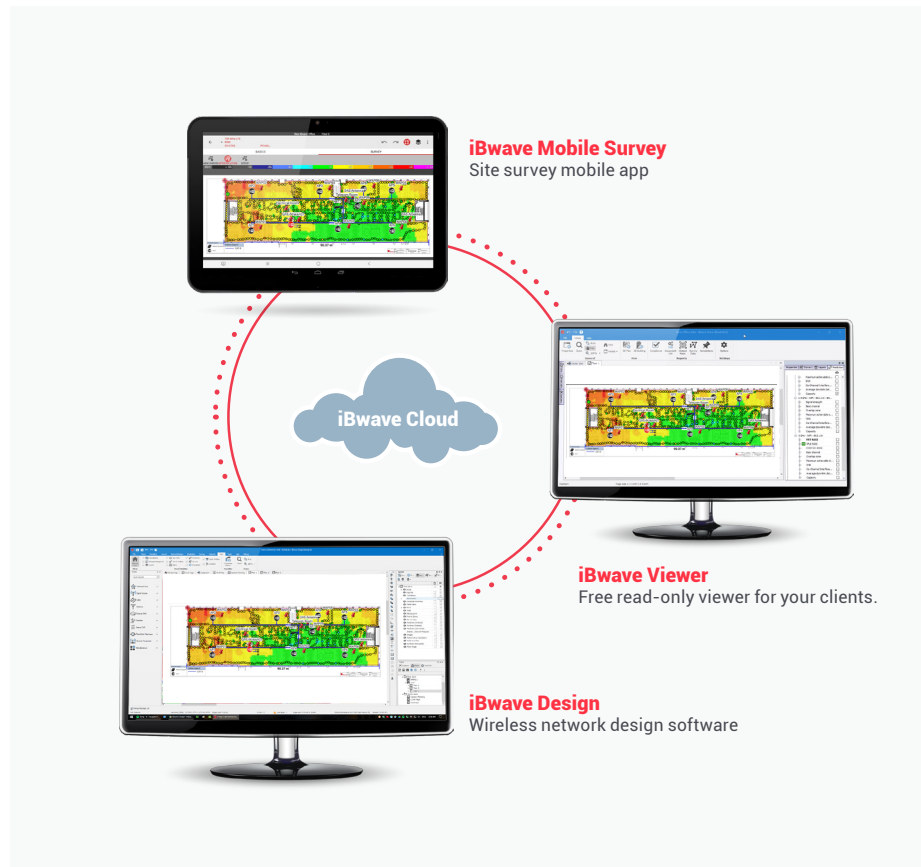
Use your mobile device's built-in camera to capture site images and videos as you walk the site and save them to geo-located pushpins on the floorplan. Add text or voice notes to note important details about what you're capturing. Once done, save it all to the cloud so you or your teammate can view your annotations on the floorplan as you do the design in iBwave desktop software.

# iBwave Mobile Survey

## Easily collaborate with your team and customers

Use iBwave cloud or iBwave's advanced cloud – iBwave Unity – to easily share survey data and site documentation gathered on-site. Save survey data and site documentation to the cloud to review during the design phase – and then use the cloud again to download and view the completed design plan as you walk the site doing your validation survey.

Also use iBwave's free read-only iBwave Viewer to share design plans and project information with your customers and other project stakeholders.



## Quickly Assess Network Coverage

Once you've collected your survey data, you can quickly visualize network coverage by running the interpolation heatmap. With this heatmap you can quickly understand the whole picture of your coverage, identify areas of weakness, and simplify troubleshooting.



# iBwave Mobile Survey

## FEATURE SET

### iBwave INTEGRATION

- ▶ Create a new project from scratch or from a template
- ▶ Download and upload projects from iBwave Cloud or iBwave Unity and work offline
- ▶ Transfer projects directly to/from iBwave Design through USB
- ▶ Store up to 10 GB of projects on iBwave Cloud
- ▶ Share projects from iBwave Cloud by email to external partners

### SITE SURVEY

- ▶ Display surrounding network signals (Network Scan)
- ▶ Internal data collection engine (Optional add-on module)
- ▶ Run interpolation of survey measurements (Optional add-on module)
- ▶ Capture site details, contact information and initial requirements
- ▶ Create, scale and geolocalize floor plans
- ▶ Add geolocated photo, text, video and audio annotations to floor plans
- ▶ Create geolocated pushpins with photo, text, video and audio annotations
- ▶ Draw and type text on photos
- ▶ Draw construction markup & cable routes on floor plans
- ▶ Integrate with 3rd party network test tools
- ▶ Share iBwave floor plans, transmitters & zones to apps on the same device
- ▶ Display back all received measurements on iBwave floor plans
- ▶ Save survey measurements in the project for access in iBwave Design

### AS-BUILT DESIGN

- ▶ Submit design changes to iBwave Design for approval:
  - > Update all component location and height
  - > Update antenna azimuth, downtilt and mount orientation
  - > Update cable routes and add measured length

## REPORTING

- ▶ Generate reports from free iBwave Viewer (PDF, PPT, DOC, XLS and more)
  - > Annotations & floor plans
  - > Survey measurements (plots)
  - > Equipment list
  - > Prediction maps
- ▶ Generate a report on the mobile device (PDF)
  - > Project summary
  - > Annotations
  - > Survey maps

## COLLECTION MODULE

- ▶ Internal data collection engine:
  - > Wi-Fi:
    - Technologies: 802.11 a/b/g/n/ac/ax
    - Wi-Fi KPIs: RSSI, CCI+O, Throughput and Channel (view KPI table)
  - > Cellular:
    - Technologies: 2G, 3G, LTE and 5G
    - Cellular KPIs: RSSI, RSRP, RSRQ, SINR, and more (view KPI table)
- ▶ External data collection:
  - > Epiq Solutions' PRiSM scanner
  - > Technology: LTE, 5G, P25
  - > P25 KPIs: BER, RSSI, SINR, Channel (view KPI table)
  - > LTE KPIs: RSSI, RSRP, RSRQ, SINR, PCI and more
  - > 5G KPIs: RSSI, RSRP, RSRQ, SINR, PCI and more

## INTERPOLATION MODULE

- ▶ Run interpolation of survey measurements on following KPIs:
  - > Cellular: RSSI, RSCP, RSRP, RSRQ, Ec/No and SINR
  - > Wi-Fi: RSSI and CCI+O

## EPIQ SOLUTIONS' PRiSM SCANNER SPECS

- ▶ FREQUENCY
  - > Range: 70 MHz - 6 GHz
  - > Accuracy: 1 ppm
- ▶ PHYSICAL
  - > Size: 87 mm x 61 mm x 12 mm
  - > Weight: Under 6 ounces (170 grams)

- ▶ POWER
  - > Power Input: USB-C
  - > Power Consumption: 3W (Active)
- ▶ POWER MEASUREMENTS
  - > Accuracy:  $\pm 2$  dB @ 25°C

## TECHNICAL REQUIREMENTS

### SOFTWARE REQUIREMENTS

- ▶ Android 8 or higher
- ▶ Android 10 or higher (Collection Module)

### RECOMMENDED COMPATIBLE DEVICES

- ▶ Smartphones:
  - > Samsung Galaxy S20 5G, S21, S22, S23
  - > Samsung Galaxy Note10, Note20 5G
  - > Samsung Galaxy XCover Pro
  - > Samsung Galaxy A51
  - > Google Pixel 6
- ▶ Tablets:
  - > Samsung Galaxy Tab S7 5G
  - > Galaxy Tab A 8.4 LTE
  - > Samsung Galaxy Tab S8

### MINIMUM VERSION FOR COLLECTION TOOLS

- ▶ Accuver - XCAL-Harmony: 2.01.088
- ▶ Accuver - XCAL-Mobile: 4.13.268
- ▶ Infovista - TEMS Pocket: 14.3.1 (single device only)
- ▶ Enhancell - Echo One: 2.0.6
- ▶ Enhancell - Echo Plus: 2.0.9
- ▶ Falcon Smart - Falcon Kit: 1.10
- ▶ Keysight - Nemo Handy: 2.70
- ▶ Keysight - Nemo Walker Air: 1.60
- ▶ PCTEL - Seehawk Engage: 2.0.6
- ▶ PCTEL - Seehawk Engage+: 2.0.9
- ▶ PCTEL - SeeHawk Touch: 1.2
- ▶ Solutelia - WINd Pro: 4.1.0
- ▶ Rohde & Schwartz - QualiPoc: 15.0
- ▶ Rohde & Schwartz - QualiPoc Freerider: 16.2

**Note:** While iBwave Mobile Survey should work on most Android™ based phones & tablets, we cannot guarantee that they will be compatible with all of them. For integration with 3rd party collection tools, you should first contact your respective vendor to determine device requirements.



## KPIs

### NETWORK KPIs

KPI	Valid Range	Example	Comments
Operator	N/A	Rogers, Bell, Telus	
MCC	001 to 999	302	3-digit Mobile Country Code
MNC	00 to 999	720	2 or 3-digit Mobile Network Code
Frequency	300 MHz to 100 GHz	1900 MHz or 2.6 GHz	
Band Number	1 to 100	B2, B66	
Band Name	N/A	PCS, AWS	

### GSM/EDGE KPIs

KPI	Valid Range	Example	Comments
LAC	0 to 65535	13000	Location Area Code
CID	0 to 65535	5781	Cell Identity
ARFCN	0 to 65535	129	Absolute RF Channel Number
RSSI	-120 to -20	-80 dBm	Received Signal Strength Indication

### HSPA/UMTS KPIs

KPI	Valid Range	Example	Comments
LAC	0 to 65535	55100	Location Area Code
RNC ID	0 to 4095	43	Radio Network Controller Identity
Cell ID	0 to 65535	9942	Cell Identity
PSC	0 to 511	158	Primary Scrambling Code
DL_UARFCN	0 to 65535	412	UMTS Absolute RF Channel Number for DownLink
UL_UARFCN	0 to 65535	12	UMTS Absolute RF Channel Number for UpLink
RSSI	-120 to -20	-80 dBm	Received Signal Strength Indication
RSCP	-120 to -24	-90 dBm	Reference Signal Code Power
Ec/No	-24 to 1	-10 dB	Energy per chip over the Noise spectral density (Android 11 only)

### LTE KPIs

KPI	Valid Range	Example	Comments
TAC	0 to 65535	25100	Tracking Area Code
eNodeB ID	0 to 1048575	50562	eNodeB Identity
Cell ID	0 to 255	23	Cell Identity
PCI	0 to 503	451	Physical Cell Identity
DL_EARFCN	0 to 70645	1075	E-UTRA Absolute RF Channel Number for DownLink
UL_EARFCN	18000 to 134280	19075	E-UTRA Absolute RF Channel Number for UpLink
Channel BW	1.4 to 20	15 MHz	Channel width or bandwidth, has only 6 possible values (1.4, 3, 5, 10, 15, or 20 MHz)
RSSI	-120 to -20	-80 dBm	Received Signal Strength Indication, range in Android is [-113, -51]
RSRP	-140 to -40	-107 dBm	Reference Signal Received Power, range in Android is [-140, -43]
RSRQ	-20 to -3	-12 dB	Reference Signal Received Quality
SINR	-20 to 50	25 dB	Signal-to-Interference-plus-Noise Ratio (typical values between -10 to 30)
CQI	1 to 15	10	Channel Quality Indicator (not reported by all devices)



## 5G KPIS

KPI	Valid Range	Example	Comments
Cell ID	0 to 68719476735	10	Cell Identity
NR-ARFCN	0 to 3279165	422000	New Radio Absolute RF Channel Number for Downlink
PCI	0 to 1007	300	Physical Cell Identity
TAC	0 to 16777215	842	Tracking Area Code
SS RSSI	-140 to -44 dBm	-90 dBm	Secondary Sync Block Received Signal Strength Indication
SS RSRP	-140 to -44 dBm	-100 dBm	Secondary Sync Signal Block Reference Signal Received Power
SS RSRQ	-43 to 20 dB	-3 dB	Secondary Sync Signal Block Reference Signal Received Quality
SS SINR	-23 to 40 dB	10 dB	Secondary Sync Signal Block Signal-to-Interference-plus-Noise Ratio

## P25 KPIs (with Epiq Solutions' PRiSM Channel)

KPI	Valid Range	Example	Comments
BER	0 to 100 %	4 %	Bit Error Rate
RSSI	-120 to -20 dBm	-80 dBm	Received Signal Strength Indication
SINR	-23 to 40 dB	12 dB	Signal-to-Interference-plus-Noise Ratio
DAQ	1 to 5	4	Delivered Audio Quality Score

## Wi-Fi KPIs

KPI	Example	Comments
SSID	iBwave	Service Set Identifier
BSSID	d8:c7:c8:44:32:40	Basic Service Set Identifier
Channel Number	1, 36	Wi-Fi Channel
RSSI	-65 dBm	Received Signal Strength Indication
CCI	4	Co-Channel Interference