

# Consultix WalkView™

## PC Software for Consultix Receivers

### User Manual



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## System requirements:

Component	Requirement
Processor	2 Gigahertz (GHz) or faster
Operating system	Windows 7 (64 bit or 32 bit) Windows 8 (64 bit or 32 bit) Windows 8.1 (64 bit or 32 bit) Windows 10 (64 bit or 32 bit)
Memory	2 Gigabyte RAM or higher
GPS Receiver	NMEA compatible device

## Installation

- 1- Extract the provided archive “Consultix Walk-View” to a relevant place
- 2- Install provided Silicon Labs Driver (CP2102)
- 3- Follow the instructions
- 4- When you open the software, you will be asked to enter the activation code in the following dialog

Registration Dialog

×

WalkView is not yet activated! In order to use WalkView without limitation please request a license by sending us an email with your information and Host ID (shown below) and our License Support team will get back to you right away.

In the meantime, you may use the software for a 30 day or 60 times evaluation period

Registration Info

Please send the following Host ID to: support@consultixwireless.com

Host ID:

AFO9B - I00NB - L6BSX - UCTF0 - FF0E3

Please enter the activation code as received

Activation code

-  -  -  -

Activate

E-mail : support@consultixwireless.com

Trial Running

Trial days left

Finished

Trial runs left

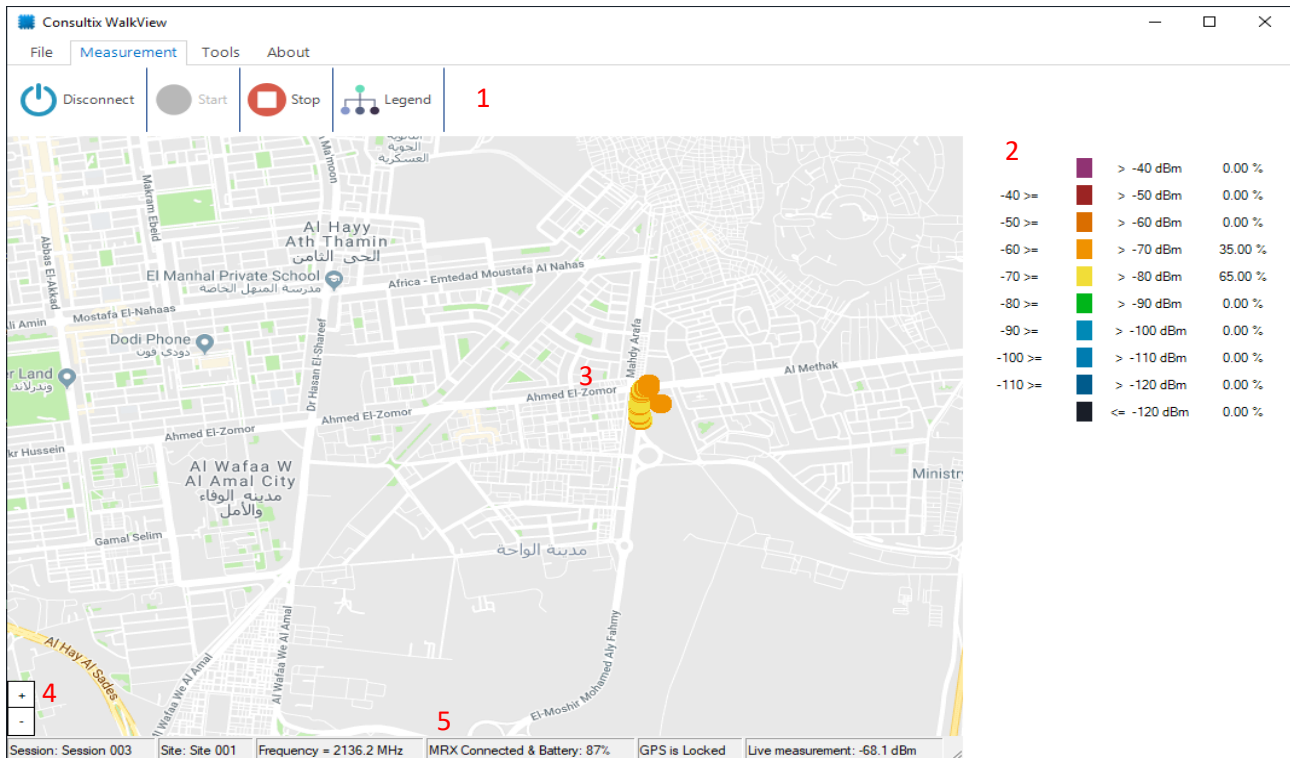
Finished

Trial Run

# Toolbar and Menus

## Software Layout

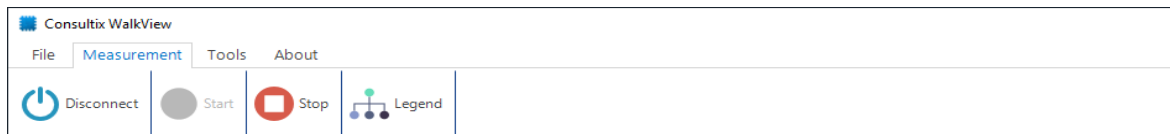
1. Software menus
2. Legend (Measurement Summary)
3. Map and plotted measurements
4. Zoom buttons
5. Status Bar



## Software Menus

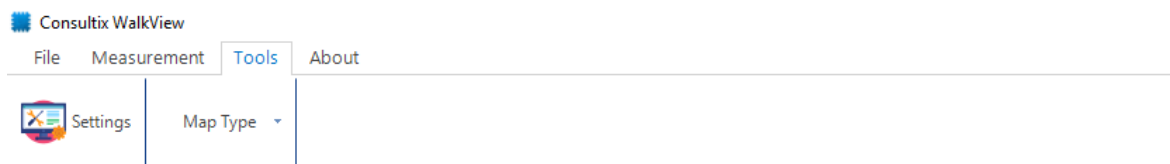
### 1. Measurement Menu

1. **Connect/Disconnect:** initiate RECEIVER and GPS connection
2. **Start:** To start your session
3. **Stop:** To stop your session
4. **Legend:** Show/Hide measurement summary



### 2. Tools Menu

1. **Setting:** Opens setting menu for ports, speed and legend configuration
2. **Map Type:** switch map type to be satellite or map(default)



### 3. About Menu

1. **About:** Opens about menu
2. **Help:** Opens help file



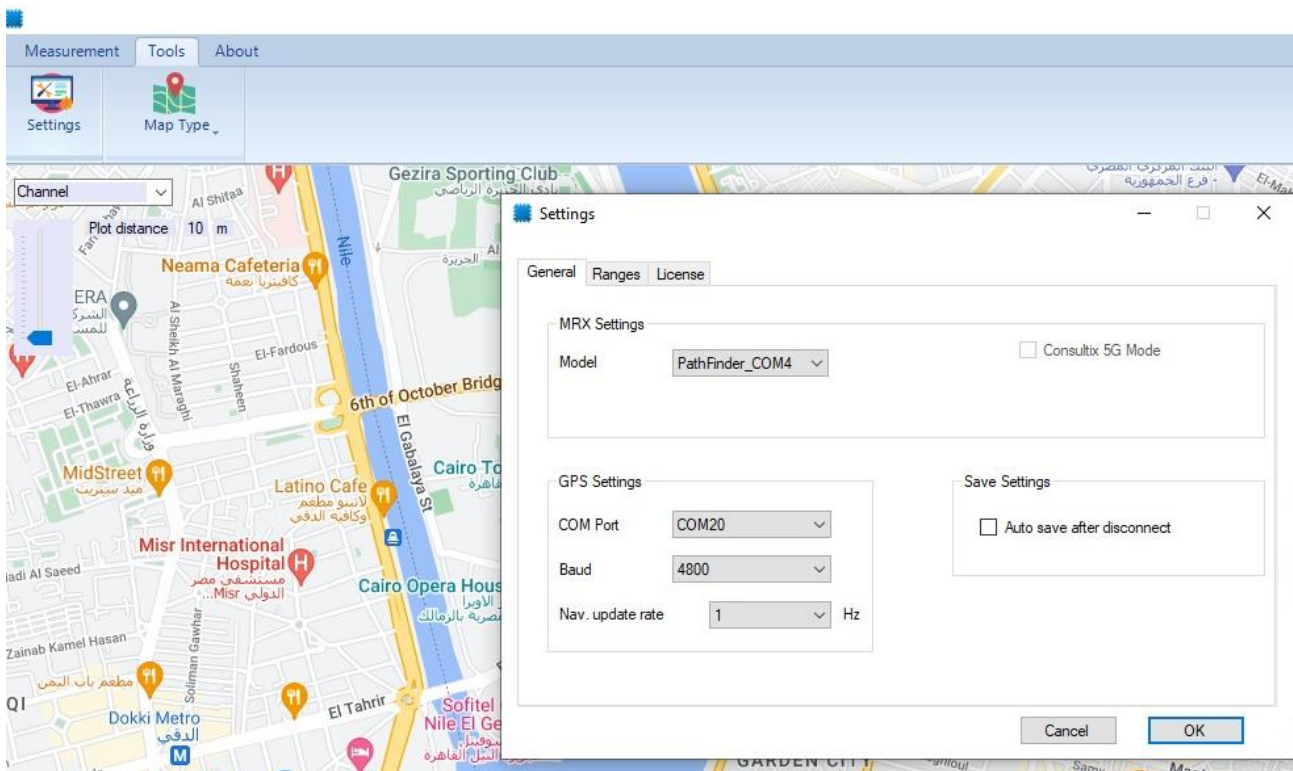
## Status Bar

1. Session Name
2. Site Name
3. Operating Frequency
4. RECEIVER status and battery level
5. GPS status
6. Live measurements

Session: Session 003	Site: Site 001	Frequency = 2136.4 MHz	MRX Connected	Battery: 38%	GPS is Locked	Live measurement: -68.1 dBm	⌵
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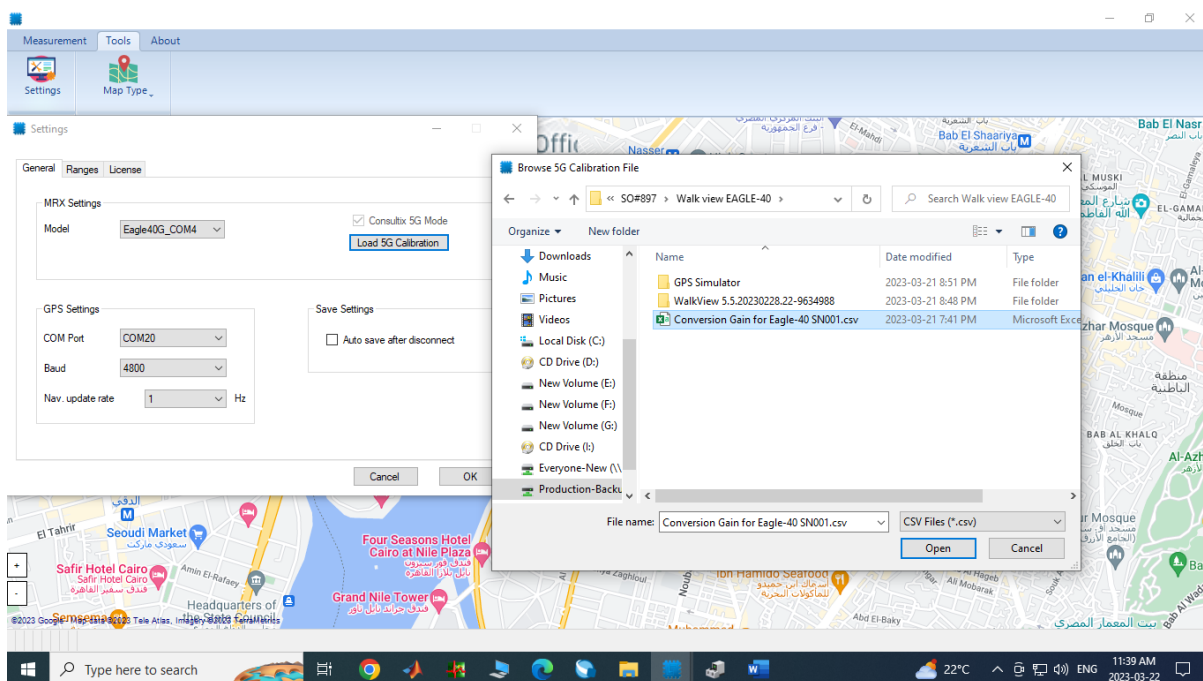
## Getting Started

1. Connect the receiver with a Mini USB-B cable
2. Click on the desktop shortcut Consultix WalkView
3. Connect the GPS receiver
4. Navigate to the **Tools** menu and press **Settings** menu
5. Under **General** submenu adjust the following:
  - a- Select RECEIVER COM Port according to your computer device manager
  - b- Select the hardware model either MRX, PathFinder or Eagle-40
  - c- Select GPS COM port and Baud Rate (Default Baud Rate is 4800)

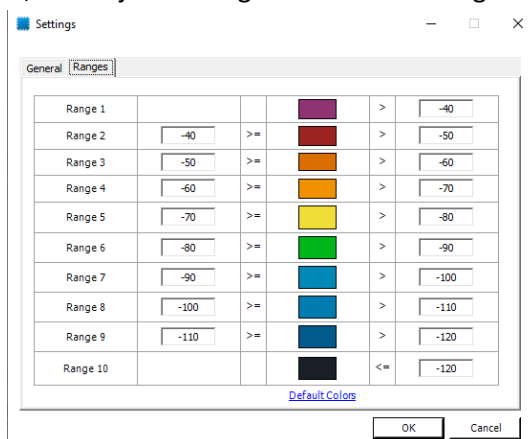




If your receiver is the Eagle-40, as shown below select the calibration file to be loaded to this instance of Walkview software (this file is provided from Consultix with each Eagle device and is required only one time per each Walkview installation)



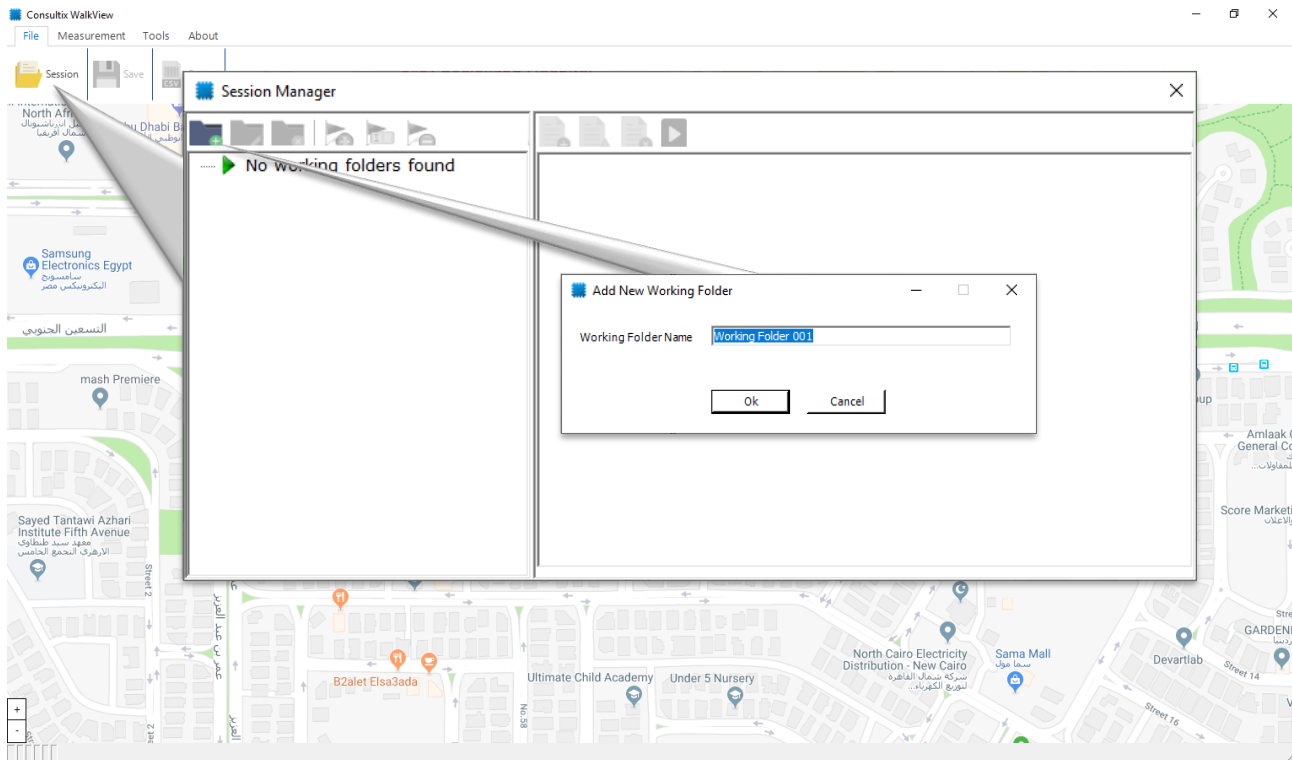
6. Enter the “Ranges” submenu, and adjust the legend colors and ranges.



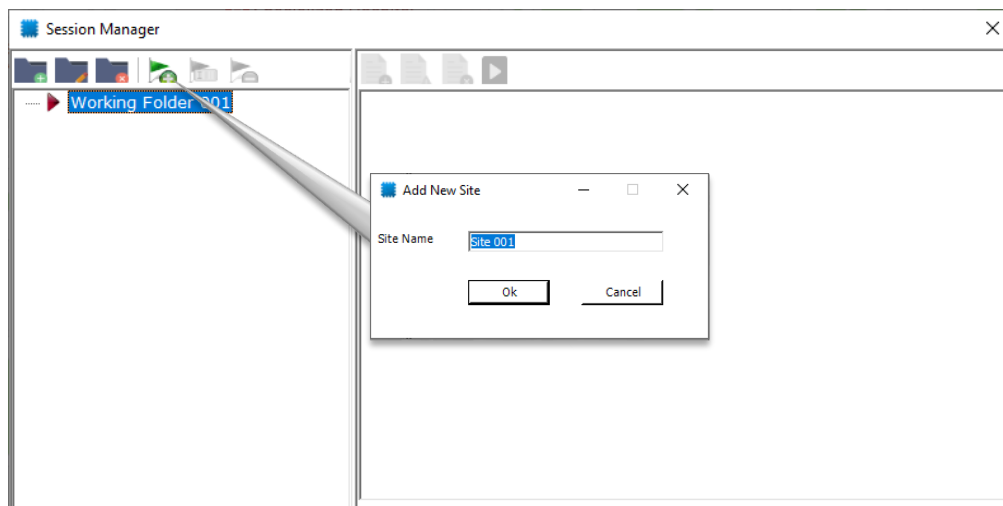
**Note:** that WalkView is compatible with GPS receivers operating with NMEA standard only.

## Prepare your test

1. Under **File** menu press **Session** to enter the Session Manager
2. Create new working folder as shown in the below figure or use an existing folder



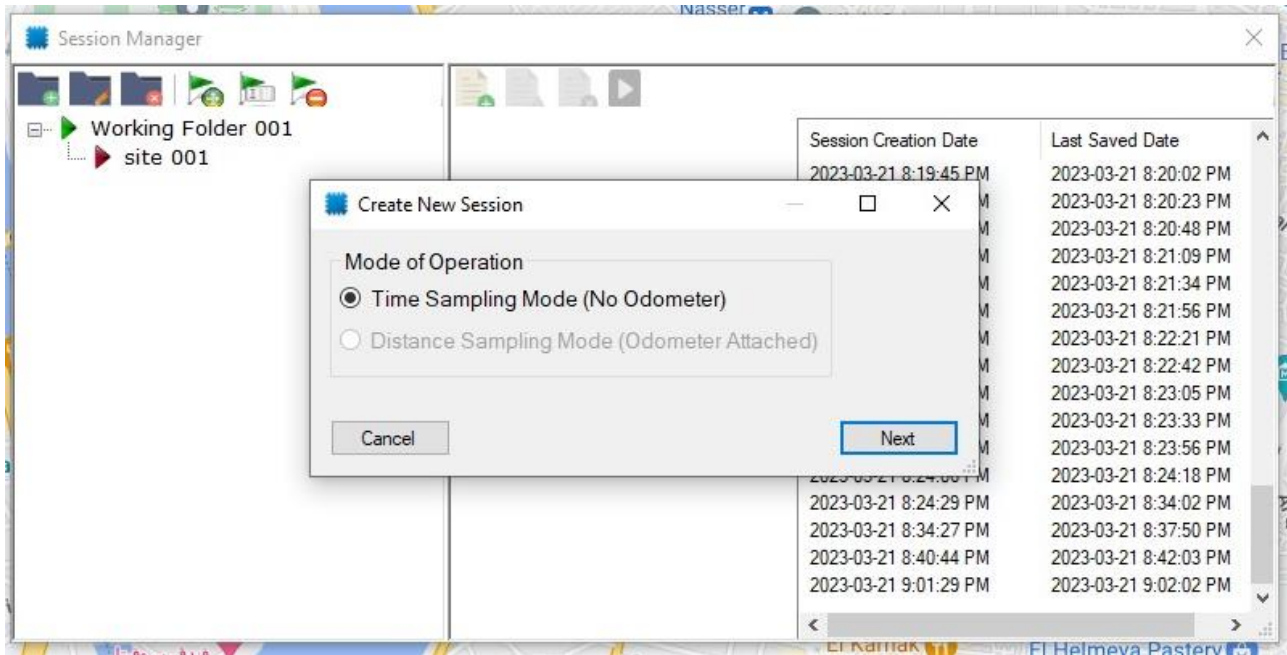
3. Add new Site or use an existing one



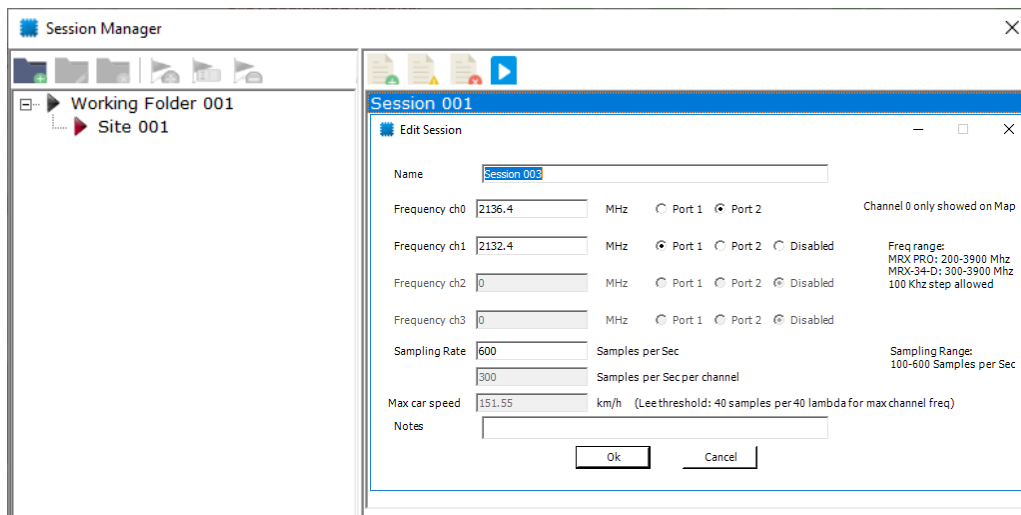
#### 4. Create New Session

You will be prompted for the sampling mode.

If you don't have a car odometer connected, then select time sampling mode



Press next



- Set your session name
- Set operating frequency of each channel
- Choose the right antenna port for each frequency channel
- Set device sampling speed to any value between 100 to 600 Samples/Second according to your operating frequency and driving speed

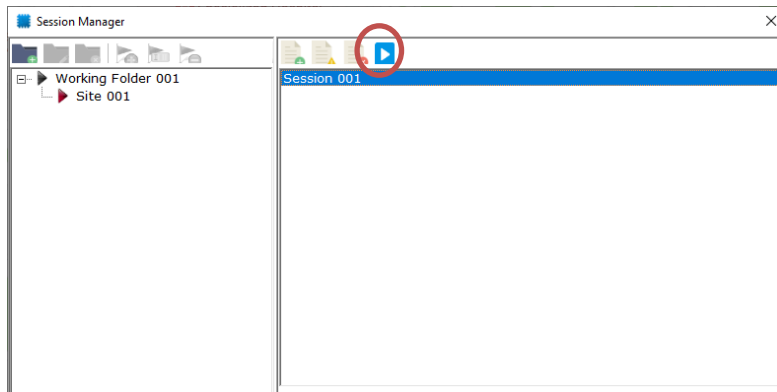
#### Notes:

- Channel 0 is always enabled
- The WalkView always plots the averaged data points of channel 0
- The sampling rate is divided among all active channels and this should affect the maximum driving speed of the test

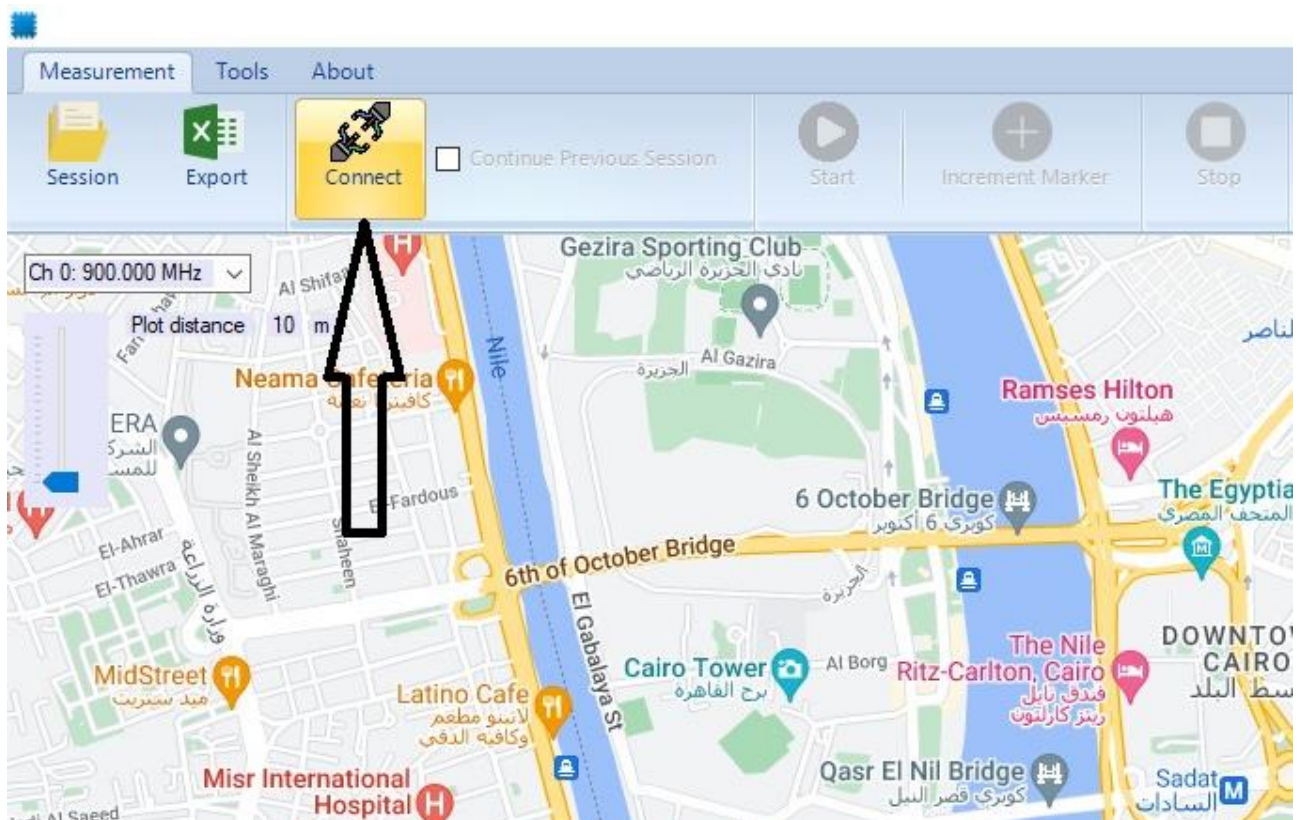
- The sampling speed should be calculated carefully to match Lee criteria, the default value is 250 Samples/Second
- Maximum car speed is calculated considering 40 samples every 40 wavelengths of the maximum operating frequency

## Start your Measurements

1. Run the session from the play icon in the session manager

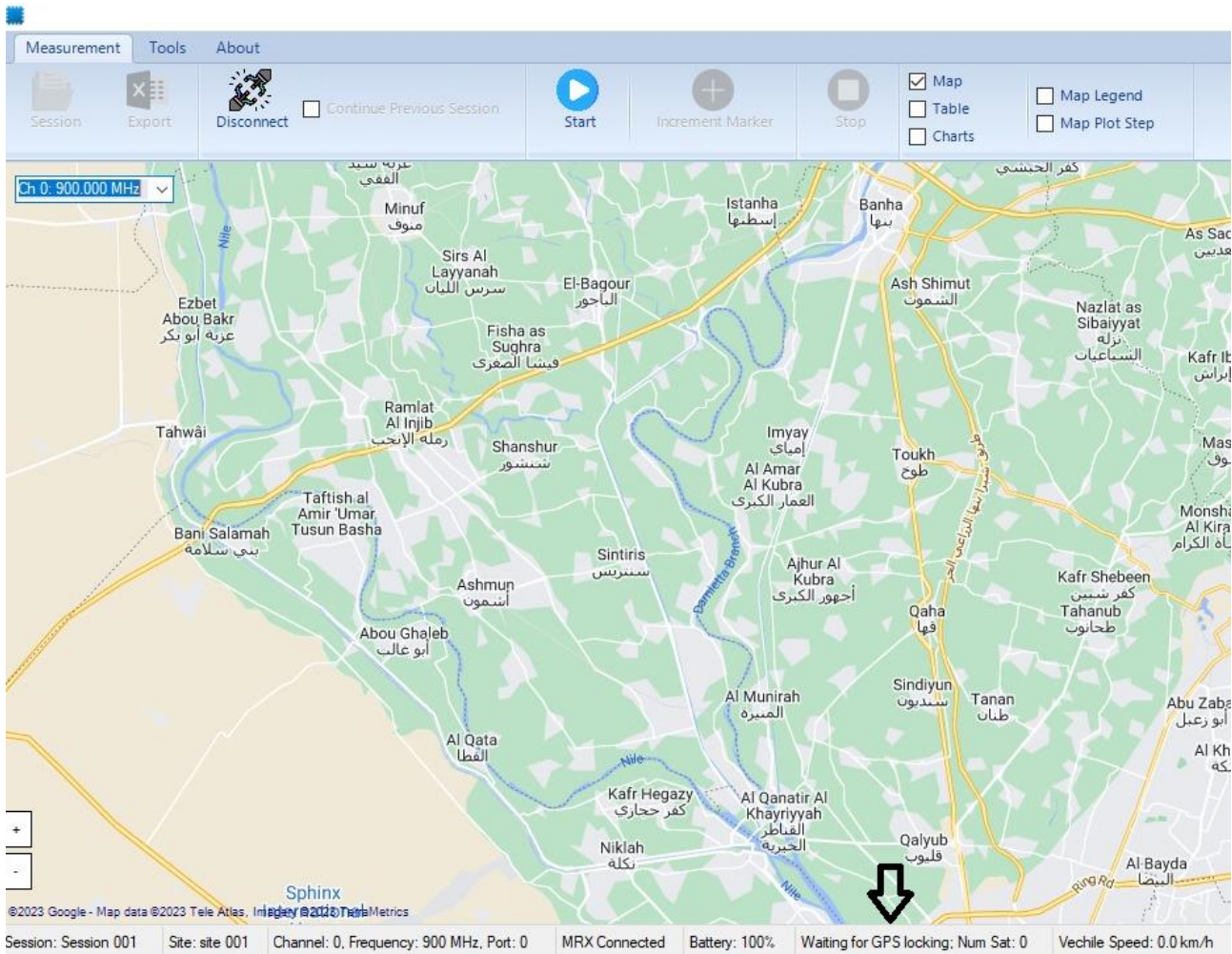


Go to **Measurement** menu and press **Connect** to start communication between the WalkView, the GPS and Consultix Receiver



Wait for GPS locking, once GPS is locked the **Start** button will become active



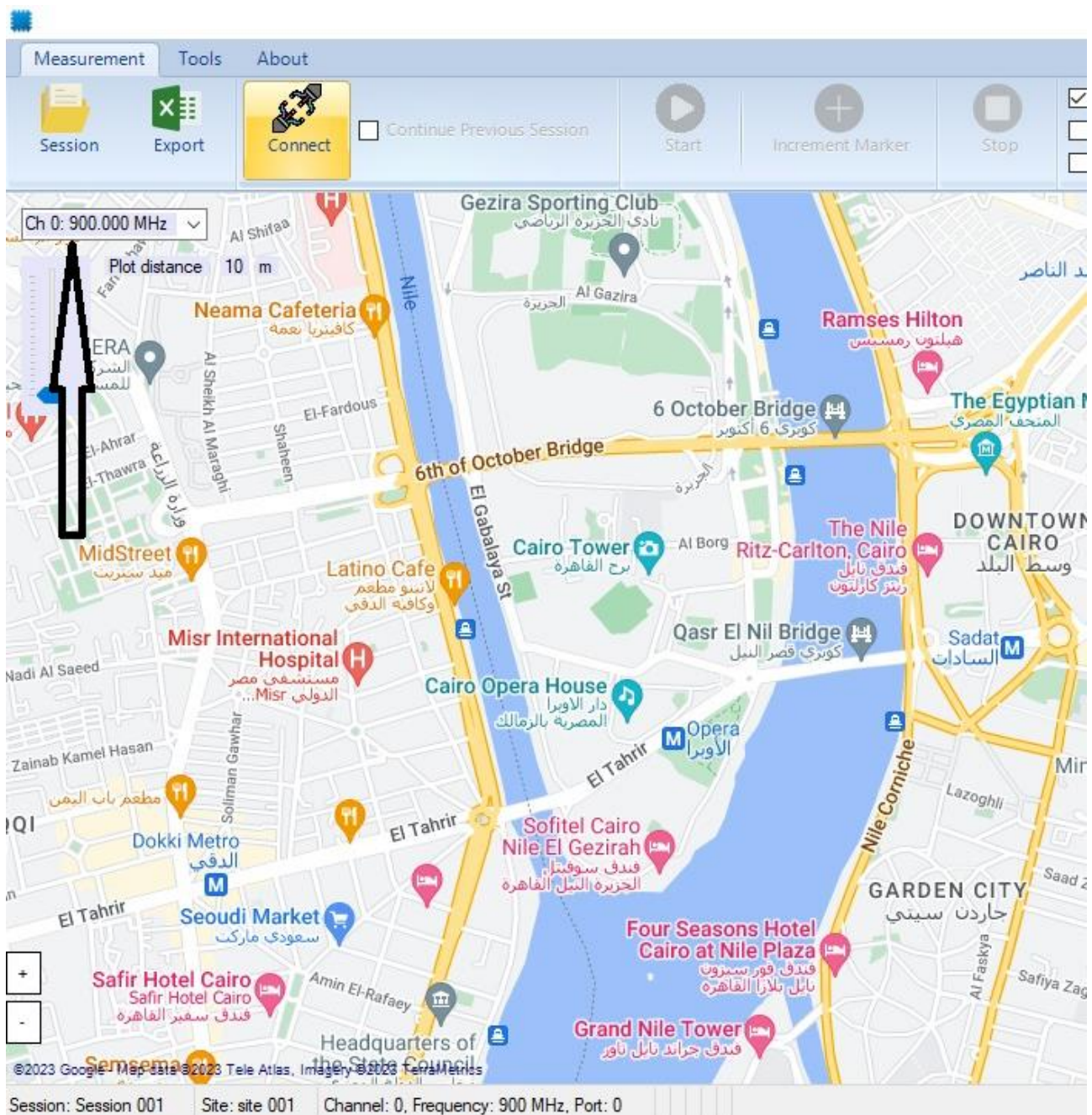


**Note:** the statuses of the RECEIVER and the GPS are always shown in the status bar

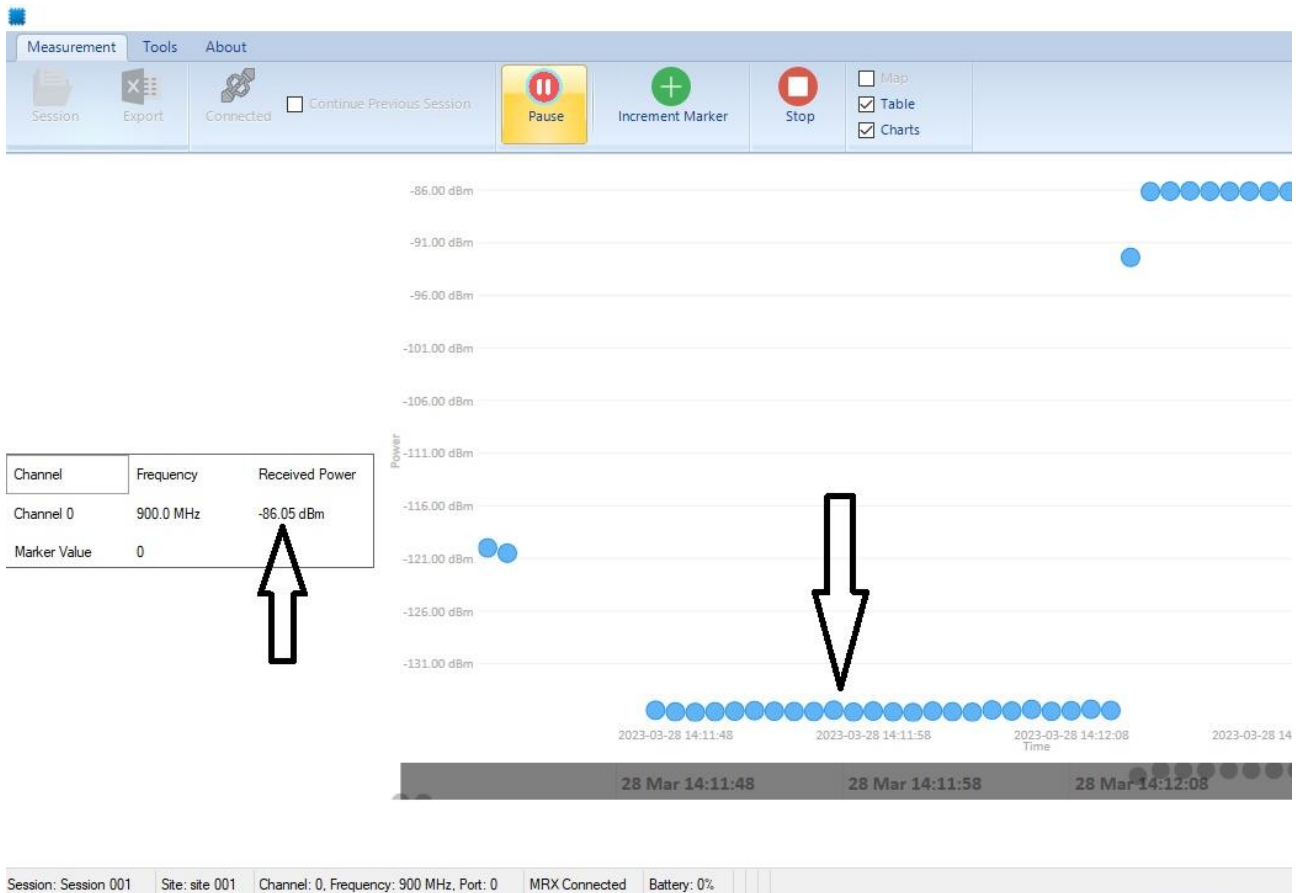
Session: Session 003	Site: Site 001	Frequency = 2136.4 MHz	MRX Connected	Battery: 38%	GPS is Locked
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1. Press Start and your measurements are collected and saved in a CSV raw data file with timestamp and GPS location.
2. All samples collected within 40 Lambda are averaged in one point plotted on the map (refer to Theory of Operation section)

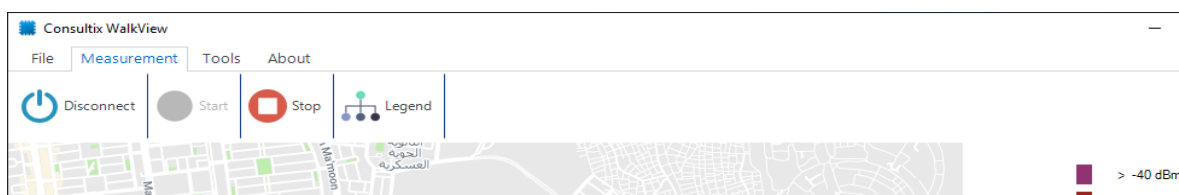
3. You can always choose which channel to draw on the map



- In addition to map view, you can view the measurements as a real time value or in a time chart as shown below



- Press the **Stop** button to stop your session.



You may alternatively press **Pause** if you intend to resume this specific session.

The session files are saved automatically to:

C:\Users\[user name]\Documents\Walkview\rawData

This helps protecting your live measurements if the connection is lost or your machine power is down

## Excel file formatting:

When you press the export button, this extracts the raw and the average data as per the format below:

### Sheet 1 (Session Info)

Information about the session including

- Working Folder
- Site
- Session
- Start time
- Stop time
- GPS Mode: (Indoor (Tunnels) -Outdoor (GPS))
- Sampling Mode: (Time Sampling -Distance Sampling)
- Max Car Speed (km/h): Maximum car speed during the session.
- Max Allowed Car Speed (km/h): Maximum car speed threshold to verify LEE criteria such that number of samples is not less than

Time Sampling only fields:

- Samples/Sec: Number of MRX device power reading samples per second.

Distance Sampling only fields:

- Odometer Circumference Factor (mm)
- Distance Sampling Mode: (Lee -ITU -Expert)
- Binning Distance in Lambda: Binning distance measured in lambda (wave length)
- Binning Distance in meter: Binning distance measured in meters
- Number of Samples per Binning Distance: Actual number of samples per binning distance

### Example:

Time Sampling

<b>Working Folder</b>	Working Folder 001	
<b>Site</b>	Nasr City	
<b>Session</b>	Sector 02	
<b>Start Date time</b>	2023-03-28 11:53:24.977	
<b>Stop Date time</b>	2023-03-28 12:16:41.157	
<b>GPS Mode</b>	Outdoor (GPS ON)	
<b>Sampling Mode</b>	Time Sampling	
<b>Samples/Sec</b>	550	
<b>Max Car Speed (km/h)</b>	60.58	
<b>Max Allowed Car Speed (km/h)</b>	324.37	
<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Port</b>
0	902	0
1	915	0



## Distance Sampling:

<b>Working Folder</b>	Working Folder 001
<b>Site</b>	site 001
<b>Session</b>	DistanceOutdoor
<b>Start Date time</b>	2023-02-21 22:02:50.959
<b>Stop Date time</b>	2023-02-21 22:22:55.759
<b>GPS Mode</b>	Outdoor (GPS ON)
<b>Sampling Mode</b>	Distance Sampling
<b>Odometer Circumference Factor (mm)</b>	2.073
<b>Distance Sampling Mode</b>	Lee
<b>Binning Distance in Lambda</b>	40.0
<b>Binning Distance in meter</b>	13.324109
<b>Number of Samples per Binning Distance</b>	36.107
<b>Max Car Speed (km/h)</b>	
<b>Max Allowed Car Speed (km/h)</b>	730.61

<b>Channel</b>	<b>Frequency (MHz)</b>	<b>Port</b>
0	900	0

## Sheet 2 (Raw data)

Raw power data is saved, has different column formats depend on Sampling Mode (Time Sampling – Distance Sampling) and GPS Mode( Indoor Tunnel or Outdoor)

- Time Sampling – Indoor (N Channels)**

ID | Battery Level (%) | Marker | Power (dBm) – Ch0 | DateTime – Ch0 | ... | Power (dBm) – Ch(N-1) | DateTime – Ch(N-1) |

- Time Sampling – Outdoor (N Channels)**

ID | Fix Type | Latitude | Longitude | Distance (m) | Vehicle Speed (km/h) | Battery Level (%) | Marker | Power (dBm) – Ch0 | DateTime – Ch0 | ... | Power (dBm) – Ch(N-1) | DateTime – Ch(N-1) |

- Distance Sampling – Indoor (1 Channels)**

ID | Distance (m) | Vehicle Speed (km/h) | Battery Level (%) | Marker | Power (dBm) – Ch0 | DateTime – Ch0 |

- Distance Sampling – Outdoor (1 Channels)**

ID | Fix Type | Latitude | Longitude | Distance (m) | Vehicle Speed (km/h) | Battery Level (%) | Marker | Power (dBm) – Ch0 | DateTime – Ch0 |

### Sheet 3 (Average data)

Average and percentile data is calculated, has different column formats depend on Sampling Mode (Time Sampling – Distance Sampling) and GPS Mode( Indoor Tunnel or Outdoor)

- **Time Sampling – Indoor (N Channels)**

ID | Battery Level (%) | Marker | Avg (dBm) – Ch0 | 10% (dBm) – Ch0 | 50% (dBm) – Ch0 | 90% (dBm) – Ch0 | DateTime – Ch0 | ... | Avg (dBm) – Ch(N-1) | 10% (dBm) – Ch(N-1) | 50% (dBm) – Ch(N-1) | 90% (dBm) – Ch(N-1) | DateTime – Ch(N-1) |

- **Time Sampling – Outdoor (N Channels)**

ID | Fix Type | Latitude | Longitude | Distance (m) | Battery Level (%) | Marker | Avg (dBm) – Ch0 | 10% (dBm) – Ch0 | 50% (dBm) – Ch0 | 90% (dBm) – Ch0 | DateTime – Ch0 | ... | Avg (dBm) – Ch(N-1) | 10% (dBm) – Ch(N-1) | 50% (dBm) – Ch(N-1) | 90% (dBm) – Ch(N-1) | DateTime – Ch(N-1) |

- **Distance Sampling – Indoor (1 Channels)**

ID | Distance (m) | Battery Level (%) | Marker | Avg (dBm) – Ch0 | 10% (dBm) – Ch0 | 50% (dBm) – Ch0 | 90% (dBm) – Ch0 | DateTime – Ch0 |

- **Distance Sampling – Outdoor (1 Channels)**

ID | Fix Type | Latitude | Longitude | Distance (m) | Battery Level (%) | Marker | Avg (dBm) – Ch0 | 10% (dBm) – Ch0 | 50% (dBm) – Ch0 | 90% (dBm) – Ch0 | DateTime – Ch0 |

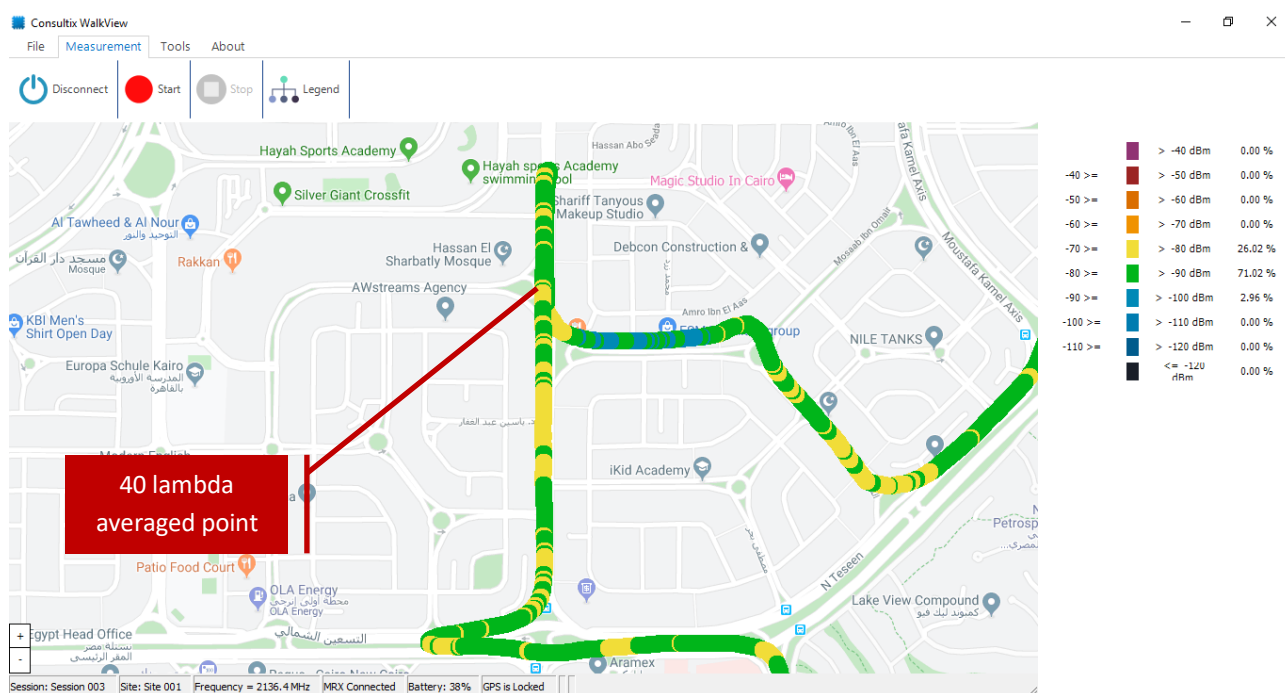
**Note:** The exported file format includes a header with the site and session name as well as the start and stop date and time. If auto-save is enabled in settings, The raw data files are automatically saved to the following path: “C:\Users\[user name]\Documents\Consultix\WalkView\ExportData”.

## Steps of Operation

Once the receiver is commanded by the WalkView application to start operation, the receiver autonomously collects and sends samples to the software. All collected samples are stored along with GPS coordinates and timestamp in a raw data file. If the car stopped moving (Speed = 0) anytime, the SW would command the receiver to stop measurements, this guarantees that your raw data file size is not filled with static useless measurements.

During the test, the WalkView geotags the averaged data point of **channel 0** on the map.

According to Lee Criteria, every 40 wavelengths, WalkView average all sampled data in this distance and plots one point (**Channel 0**) on the map with the average of all samples collected within this distance and stores the original (raw) RF samples to the raw data file.



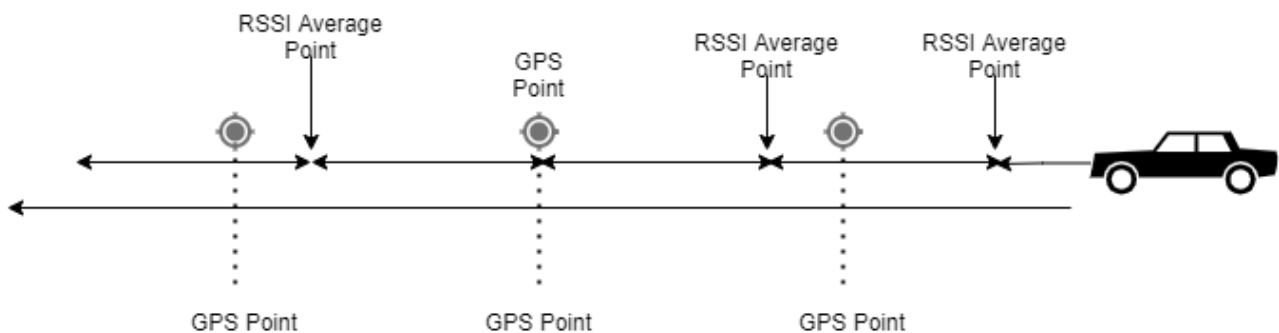
RAW and average data files for all channels are saved automatically to the default path<sup>1</sup>, while the user still can export average points plotted on the map (**Channel 0**) to an average data file with different file format such as a CSV format.

<sup>1</sup> C:\Users\[user name]\Documents\Walkview\rawData

## WalkView™ Averaging Process & GPS Correlation (time sampling)

1. RECEIVER-Pro & GPS both have internal timers.
2. The GPS reports location & time to the Walkview Software.
3. RECEIVER-Pro reports the raw RSSI readings with their time offset (reference to the start).
4. The Walkview equally distributes the raw data between each 2 GPS points (assuming the car is moving at constant speed).

For the average report, as shown in the graph below, when the Walkview calculates the average RSSI, the software assigns it to the corresponding location at that moment (calculated position at that moment between 2 consecutive GPS readings)



The plotted point is just an indication (not the average point) every 50 meters. And this 50-meter setting can be changed from the plotting menu.

The average points file is exported by default alongside the raw file to the folder C:\Users\[user name]\Documents\Walkview\rawData".

## Distance Sampling (Using odometer interface option)

### **Available in RECEIVER-Pro and PathFinder receivers only**

Sampling in this mode is controlled by a distance odometer attached to the car tire, so an accurate distance reading can reach trigger resolution of 0.001 meter.

Average is done using LEE or ITU criteria or even custom. So you can define the number of samples averaged within a certain distance, and you will get the max car speed that could be used.

If you have a car odometer, connect it to the PathFinder odometer interface. And Open distance sampling session.

Configure the session as follows:

- In the **RECEIVER settings** sub-menu, set the required frequency, used port and required mode (outdoor/indoor)
- In the **OCF** sub-menu, enter the Odometer parameters (check your car & Odometer information)
- In the **distance sampling settings** sub-menu, set the averaging scheme by entering your required parameters.

The screenshot shows the 'Distance Sampling Session' configuration window. It is divided into several sections for setting up the sampling process.

- Session Name:** Distance Sampling
- Notes:** (Empty text area)
- MRX Settings:**
  - Frequency: 942.5000 MHz
  - Port: ☒ Port 1, ☐ Port 2
  - Mode: ☒ Outdoor Mode (GPS Attached), ☐ Indoor Mode (Tunnel)
- OCF (Odometer Calibration Factor):**
  - Tire Width: 195 mm
  - Tire Aspect Ratio: 65 (%)
  - Rim Diameter: 16 inches
  - Tire Length: 2073.137 mm
  - Calculation Mode:** ☒ Tire calculation, ☐ Tire length, ☐ Custom
  - Odometer: 1000 ppr
  - OCF: 2.073 mm/Pulse
  - Calibrate OCF button
- Distance Sample Settings:**
  - Sampling Mode: Expert (dropdown)
  - Pulse Divider: 10 pulses
  - Binning distance: 3.15  $\lambda$  = 1.001959 m
  - Samples: 48.334 /binning distance
- Additional Settings:**
  - Percentile: None (dropdown) %
- Car Speed:**
  - Max speed: 41.045 km/h

Buttons: Cancel, OK

## Appendix A: Appendix A: Technical Background

7. There are two types of fading that are relevant to performing coverage measurements, fast fading, also known as Rayleigh fading, and terrain-based fading due to obstructions and propagation loss. The goal of coverage measurement is to measure the local signal strength in presence of terrain-based fading.
8. Coverage measurements must be made in a manner that rejects Rayleigh fading, so that accurate measurements of terrain-based fading can be made.
9. It is important to realize that Rayleigh fading is a spatial phenomenon not a time one. The averaging is intended to be done over a distance of 40 wavelengths. All the samples within a grid on a map are averaged to produce one point and in order to ensure rejection of Rayleigh fading, the grid size must be larger or equal than 40 wavelengths.
10. William Lee derived a well-accepted criterion for removing Rayleigh fading and retaining slower terrain-based fading, known as 40 Lambda averaging. This criterion in order to remove Rayleigh fading, you should average data for a time period equal to the time it takes to traverse 40 wavelengths in your measurement vehicle and you should have no less than 36 to 50 points in that time. This makes the averaged value very close to the real value (within several dB's)



## Appendix B: Guidelines for CW Measurement Surveys

- Inaccurate measurements → inaccurate calibration → inaccurate model
- The area under test must be scanned against existing interference
- Selected frequency must have a clearance of 400kHz from radio interference
- Measurement surveys should be obtained for distances up to 10km (or until the noise floor of the receiver has been reached).
- Equal number of samples should be conducted near as well as far from the transmitter

### **Further Help**

- For any support inquiry, kindly contact:

**Support:** [support@consultixwireless.com](mailto:support@consultixwireless.com)

Or contact our distributor covering your region (check [www.consultixwireless.com](http://www.consultixwireless.com))

- For any information about prices, specifications, future developments, recommendations, customizations, or general question, kindly contact:

**Sales:** [sales@consultixwireless.com](mailto:sales@consultixwireless.com)

