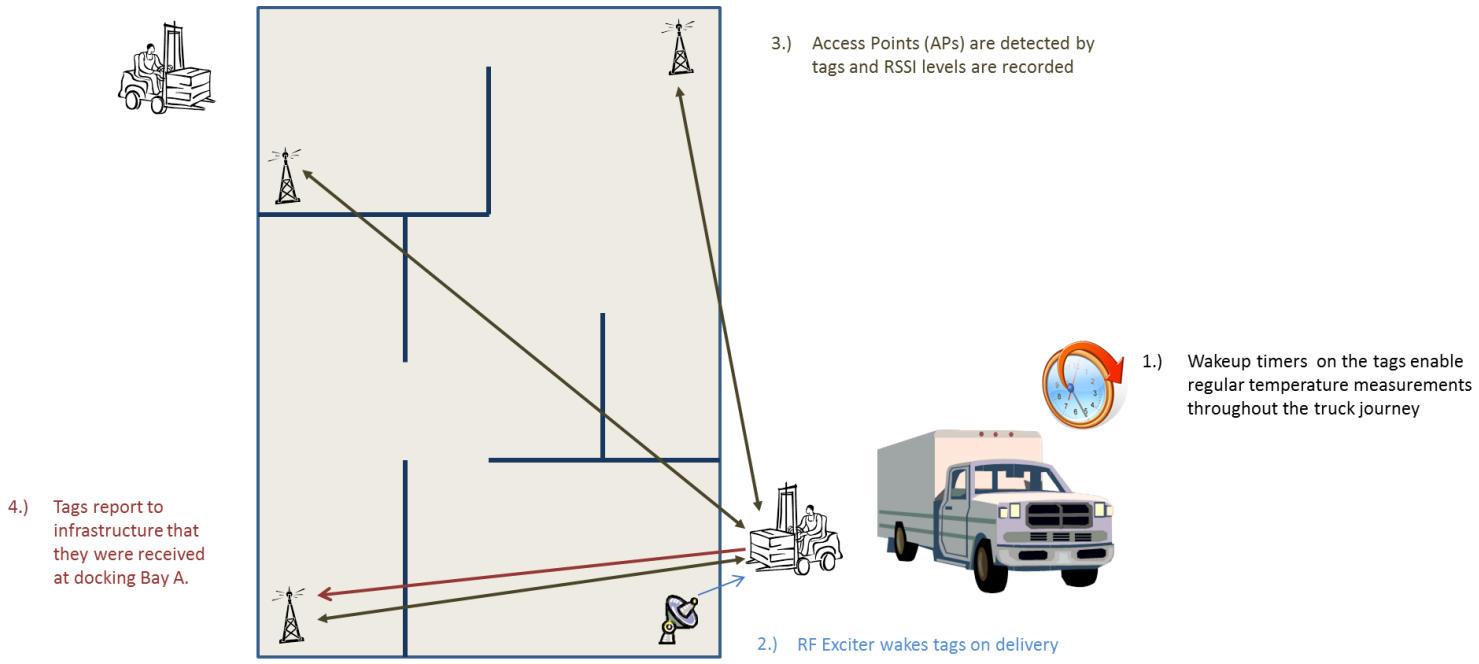
WiFLY® WebScan™

WebScan is a special firmware release based on the standard WiFLY firmware that is designed to run on all Roving Networks Wi-Fi™ modules such as the RN-171 and RN-131. The Webscan firmware adds Real-Time Location System (RTLS) capability and is designed specifically to address the key requirements in asset tracking implementations, cost and simplicity.

The firmware is designed to operate in the tag that is directly connected to the assets, when tags wake from sleep, WebScan measures the RSSI levels from the local infrastructure's access points. The calculated RSSI values are then returned to the asset management server in a TCP packet. Using simple triangulation algorithms, third party software can then be estimated with reasonable accuracy. Servers may use this information to display the location information with shipment records or serve websites that offer enhanced mapping capability.

Tags can be woken from sleep using many mechanisms, including timers, sensor inputs, and RFID choke point triggers. The wake mechanism is added to report made to the server so that further accuracy could be gathered, sleep states extended and battery life extended.



Example Application:

In this example, goods are monitored by a tag attached to the pallet, they arrive at docking bay A and are woken by an MAG exciter positioned near the docking bay door. The tag immediately probes for access points and measures their RSSI level. The RSSI data is then transmitted, by the tag, to the company's server via Wi-Fi.
The tags also report the other logged data recorded prior to their arrival at the warehouse such as refrigeration truck temperatures taken at timed intervals depicted by wakeup timers on the tag.

The string sent to the servers can include a collection of data variables as illustrated below. The data includes GPIO status and the reason for the tag's wake status, in addition to the various MAC and RSSI values.

String Format

tag <id> tag <MAC>	bss <MAC>	RTC <GPIO Status> <Wake Reason> <Count>	<Access Point/RSSI Readings>	<Exciter Address> <Leave Flag>

Example: SCAN output:

GET/test.php?id=WiFlyGSX&mac=00:06:66:12:34:56&bss=00:05:55:67:89:AB&rtc=154&io=1913&wake=2&cnt=3&data=001802706530,1,-41|0030BD9B4922,3,-77|0017F2E21D67,9,-53,-54,-53

id	<deviceid>	Tag or deviceid as configured using "set o d <string>" command[1]
mac	<address>	MAC address of the Wifly tag/module
bss	<address>	MAC address of the AP that the tag/module has associated with
rtc	<num>	Real Time Clock value Number of seconds that have expired since batteries were installed or a hard reboot occurred.
IO	<HEX Value>	2 ASCII HEX bytes representing GPIO Status/Wake Reason: **Upper 12 bits:** GPIO 4-13 **Lower 4 bits:** 1) Wake on Power-UP 2) Wake from sleep timer 3) Sensor input
wake	<HEX Value>	Value of wake-up register 1 Sensor 0 2 Sensor 1 4 Sensor 2 8 Sensor 3 1000 Sleep Timer 4000 Choke Point
Cnt	<num>	# of reading to follow
Data	<ssid address><RSSI reading>	Reading of RSSI values from one or more APs. Each reading is separated by a '|' (pipe charater).
cp	<address> or leaving	MAC address of optional Choke Point that woke the tag/module using the magnetic receiver option. If 'leaving' is sent then module report it is leaving the magnetic field of a previously discovered choke point.
Note: 1) See WiFLY GSX user guide available for download from **http://www.rovingnetworks.com**		

Two connection modes are supported by Webscan, the first is Server Mode where the server initiates a request to a tag of a known address, and the second is Client Mode in which the tag initiates the connection.

SERVER MODE:

When the tag/module is remotely connected to via a TCP socket (default port 2000) data will flow automatically. This feature provides a mechanism to test modules and examine data formats/values.

Tags/modules may be remotely configured by entering command mode using the standard '$$$' command, see WiFLY GSX user guide. While in command mode through this method, data will not flow.

CLIENT MODE:

To automatically send data to a remote web server, tags/modules should be configured to <auto connect out>. In such a scenario the wakeup timer may also be set.

Example configuration:

```
set wlan ssid <ssid>
set wlan pass  <phrase>          // for wpa 1 or 2 security
set wlan join 1                  // to automatically join the network on power-up
set sys auto 255                 // automatically attempt to connect out upon power-up
set ip host <host addr>          // to use fixed host IP address
set dns name <name>
set ip host 0                    // to use DNS mode
set ip remote <port>             // default is 80 which is a typical web server port.
```

PREFIX string:

Set the prefix string with "set c r *<string>*"

Example:

set c r GET$/yourphp.php?

Default is "GET /test.php?"

SCAN INTERVAL
the scan count is fixed at just one single scan.

SCAN TIME
Default time per channel is 100ms. This setting usually provides enough scan time while also minimizing power consumption. Total scan time is the product of scan time and channel mask; long scan times on all channels will therefore result in far shorter battery life. If scan times or the number of channels is reduced battery life can be extended substantially.

Example:

set option time 200 // for example to go 200 ms/channel.

PASSIVE MODE
In passive mode tags sit in receive mode waiting for AP's to transmit an SSID, whereas in active mode tags probe for access points. Passive mode is OFF by default, and active probing is used. By doing this tags save battery power by reducing their receive ON time.

set 0x1 // turns on passive mode.
set 0x0 // turns it off

DEVICE ID
Used for creating the id string

set o d *<deviceid>*

Example:

set o d TAG1234

CHANNEL MASK
Used to configure channel mask , default is 1 thru 13.

set wlan mask <hex value>

scan time can be reduced by limiting channels

Example:
If your infrastructure uses only channels 1, 6 and 11 :

set w m 0x421

HOSTNAME added to POST
" HTTP/1.0\nHost:<dns hostname>" is automatically added to the end of the post, in case of virtual servers it is required. The system will also need "set d n <your server name>", when using DNS this is likely already configured

QUICK CONNECT AND AUTO-SLEEP MODE

If "set sys auto 255" is enabled, the device will connect immediately upon power up and once connected a scan will automatically occur. The tag/module will return to sleep after the server receives the data and closes the port.

Note: Most web servers automatically close the connection after they reply with the "200 OK:" status .

In cases where servers do not close the data connection, it is good practice to implement an idle timer set to close the connection automatically. To do this the tag/module can be configured using the following examples:

```
set comm idle 5          //modules returns to sleep after 5 seconds
set sys sleep 5          //module will automatically return to sleep if connection fails
set sys wake 60          //creates an automatic wake-up every 60 seconds.....
```