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## InterSense Application Note AN-09-11-1: API for Wireless Devices

The InterSense tracker interface library (version 3.87 and later) supports a method of configuring wireless devices with the *isradio.ini* file. The IDs for each device to be configured can be listed in the *isradio.ini* file, which is read by the InterSense interface library during initialization. The ID is part of the device serial number, which is printed on the label of each unit. Each entry in the file maps a device to a port with a receiver and assigns a channel. The format of *isradio.ini* consists of single-line entries of the following forms.

Syntax	DeviceOption = option								
Compatibility	Library version 3.87 and later								
Description	<p>Optional integer flag used to specify special global parameters. This entry should appear at most once. The following OR-able options are available. Either decimal or hexadecimal (prefixed by 0x) format may be used.</p> <table><tr><td>0x02</td><td>Specifies full search. This is required if configuring a device that is not already connected to a receiver.</td></tr><tr><td>0x04</td><td>Disables the wake-up sequence during initialization. This is useful for speeding up initialization when it is known that devices are not asleep.</td></tr><tr><td>0x08</td><td>Disable RF detection. Useful in cases where radio interference prevents host communication with receiver. Setting this option disables the radio so that receiver can communicate with host to, for example, change its channel to a clear one. Note if receiver radio is already enabled, receiver must be power cycled for this setting to have an effect.</td></tr><tr><td>0x40</td><td>Enables verbose logging of wireless configuration activity to <i>isense.log</i>.</td></tr></table>	0x02	Specifies full search. This is required if configuring a device that is not already connected to a receiver.	0x04	Disables the wake-up sequence during initialization. This is useful for speeding up initialization when it is known that devices are not asleep.	0x08	Disable RF detection. Useful in cases where radio interference prevents host communication with receiver. Setting this option disables the radio so that receiver can communicate with host to, for example, change its channel to a clear one. Note if receiver radio is already enabled, receiver must be power cycled for this setting to have an effect.	0x40	Enables verbose logging of wireless configuration activity to <i>isense.log</i> .
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Syntax	Device = device ID:channel
Compatibility	Library version 3.87 and later
Description	<p>The device ID is derived from the serial number, which is of the form PPP-YYMMIII-R. The device ID is the middle numeric portion, YYMMIII. The application software can relate the handles returned by the library to individual devices by way of the device ID.</p> <p>Channel is a number in the range 0-15. No more than 4 devices can have the same channel.</p> <p>With library version 4.13 or later, if device ID is 99999, a receiver is set to the specified channel without the need to supply a valid device ID. Note that devices that are on the same former channel will be anonymously assigned to the receiver and changed to the new channel also.</p>

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Syntax	Device = device ID:channel:port
Compatibility	Library version 3.90 and later
Description	<p>Port specifies the port number to use starting at one (e.g., 1=COM1) as compared to the previous form, with which ports are assigned automatically. If the port syntax is used, port must be specified with all device entries in the file and all entries with the same port must also use the same channel.</p> <p>If device ID is 99999, the receiver on the specified port is set to the specified channel without the need to supply a valid device ID. Note that devices that are on the same former channel will be anonymously assigned to the receiver and changed to the new channel also.</p>

Syntax	Device = device ID:channel:[port]:[power][:gain]																				
Compatibility	Library versions 4.13 and later and transmitter revisions 45 and later																				
Description	<p>This form allows transmit power and/or receive gain to be set. If an optional parameter is omitted and it is followed by another parameter, the colon delimiter preceding the omitted parameter must be included.</p> <p>Valid range for transmit power is 1-100 where 100 is maximum and 1 is minimum. The power-up default setting is 100. Examples of corresponding output power are shown below.</p> <table><tr><th>Power Setting</th><th>Output Power (dBm)</th><th>Power Setting</th><th>Output Power (dBm)</th></tr><tr><td>100</td><td>0</td><td>48</td><td>-7</td></tr><tr><td>87</td><td>-1</td><td>35</td><td>-10</td></tr><tr><td>74</td><td>-3</td><td>23</td><td>-15</td></tr><tr><td>61</td><td>-5</td><td>10</td><td>-25</td></tr></table> <p>Valid range for receive gain is 1-100 where 100 selects automatic gain control (default) and 1-99 sets fixed gain (1 minimum, 99 maximum).</p> <p>If multiple devices are configured per receiver, all devices sharing a receiver must be assigned the same power and/or gain. Power/gain is applied to both receiver and transmitter(s).</p> <p>If device ID is 99999, the specified power/gain is set for the specified port. If port is omitted, the port on the specified channel is set to the specified power/gain (a receiver is changed to that channel if necessary).</p> <p>If devices share a receiver, it is not necessary to explicitly specify the same settings for each device. Settings can be specified for one device per receiver and omitted for the others and the settings will be applied to all of the devices sharing the receiver:</p> <p>Device = device ID:chan::power:gain Device = device ID:chan : Device = device ID:chan</p> <p>Or, power can be specified for the port and omitted for the devices:</p> <p>Device = 99999:chan:[port]:power:gain Device = device ID:chan : Device = device ID:chan</p>	Power Setting	Output Power (dBm)	Power Setting	Output Power (dBm)	100	0	48	-7	87	-1	35	-10	74	-3	23	-15	61	-5	10	-25
Power Setting	Output Power (dBm)	Power Setting	Output Power (dBm)																		
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	Communication with remote device(s) may be lost if power/gain is set too low. If necessary, communication can be restored by cycling power on the remote devices to return to default settings.
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If the library cannot connect to a specified device during initialization, it will not return a handle to that device.

Whitespace in file entries is ignored.

Check log file *isense.log* for warnings and errors. The log file is written to the working directory.

### *Normal vs. Anonymous*

The Wireless Configuration Tool in ISDEMO also uses *isradio.ini* to set radio configuration. The tool has a mode option that can be set to anonymous or normal. In normal mode, wireless configuration is determined by the mappings in *isradio.ini*.

When configured in normal mode, the devices store basic configuration settings (channel and slot number) in non-volatile memory. Power and gain settings are not stored. The basic configuration can also be set with DeviceTool, where channels are manually chosen and devices are manually paired with connected receivers.

In anonymous mode, devices are connected to receivers based only on their stored basic configuration. A receiver simply connects to a device on its channel. If there are multiple devices on the channel, the receiver connects to up to 4 of them if they have unique slot numbers. If *isradio.ini* is not present or does not contain any mappings, the library will default to anonymous mode.

Anonymous mode can make it convenient to swap in devices that are appropriately pre-configured (reinitialization is required). Normal mode is recommended especially when there may be other devices within range that could be mistakenly connected to.

### *Location of isradio.ini*

On Windows, the interface library checks for *isradio.ini* first in the working directory and then in the WINDOWS directory (typically C:\WINDOWS). Note that the ISDEMO Wireless Configuration Tool writes *isradio.ini* to the WINDOWS directory and, if a file exists in the working directory, it writes it there as well.

On other supported operating systems, the interface library checks only in the working directory.

### *Library API Functions*

The API functions below have the indicated special when used with wireless devices.

ISD_OpenAllTrackers()	When ISD_OpenAllTrackers() is called, depending on the content of the <i>isradio.ini</i> file, the library searches for the specified devices, automatically pairs them with the specified receivers and sets the specified channels and radio parameters. The function returns the number of devices found and outputs a null-terminated array of handles, one handle for each device.
ISD_OpenTracker()	ISD_OpenTracker() is similar to the above function, but it obtains handles individually. This function does not support the full search option.
ISD_CloseTracker()	When called with a non-zero handle, ISD_CloseTracker() has no effect until the last handle is closed.

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### *Battery Status*

Battery condition is reported in `ISD_STATION_STATE_TYPE.Battery` and in `ISD_STATION_EXTENDED_DATA_TYPE.Battery`. The meaning of this value is:

- 0 = Status not available.
- 1 = Battery is low.
- 2 = Battery is ok.

### *Sleep Mode*

To place a device in sleep mode, set `ISD_STATION_INFO_TYPE.State` to 0. To wake a device up, set `State` to 1. Sleep mode is not available with all devices.