

CTT Node User Guide

support@celltracktech.com

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Introduction

The CTT NodeTM is a mini-base-station that allows you to localize LifeTagsTM, PowerTagsTM and Hybrid-TagsTM with a high degree of accuracy. If deployed in a grid fashion, and employing post-hoc analysis, the CTT Nodes can operate as pseudo-reverse-GPS, providing near GPS accuracy in optimal conditions. With the addition of calibration data, Nodes can provide presence/absence and distance estimate of instantaneous detections from supported tags.

The CTT Node uploads received tag detection data to the standard CTT SensorStationTM, creating a dense, high resolution tracking network. Solar power recharges batteries in the CTT Nodes meaning no extra power cables or external solar systems are necessary.

Each CTT Node has a detectable range of about 250-300 meters, and is able to relay data to a CTT Base Station as far away as 1.5 kilometers.

Using This Guide

Use the Quick Start Guide in the next section to get you up and running with your CTT Nodes. For more detailed information you can proceed to the sections below the Quick Start Guide. Please provide any feedback via our Customer Service Desk portal here.

Node Quick Start Guide

What you will need:

- At least one CTT Node
- An operational SensorStation and a way to connect to it, either via ethernet or wirelessly
- (optional) A test tag (LifeTag, PowerTag or HybridTag)
- 1. Unpack your Nodes.
- 2. Place Nodes outside in a sunny location and allow to fully charge for several days (more important if you will be testing with the magnet off)
- 3. Bring Nodes within range of an existing SensorStation (note: if not using antennas on your SensorStation, make sure Nodes are within a meter of the station).
- 4. Connect your computer to your SensorStation so you can view the web interface (for SensorStation operation consult the online install guide here).
- 5. Ensure your SensorStation has at least one radio tuned to detect Nodes (*if this isn't clear, consult the SensorStation online install guide*).
- 6. With the magnets still on, a Node will transmit health information once every five minutes and can do so for over two years without recharging the battery. With the SensorStation web interface open, you should begin to see Nodes checking in and showing up in the Nodes list at the top of the SensorStation webpage like in the image below. A properly functioning Node will send accurate GPS location and GPS time. Note time is always in UTC. If GPS data is empty, or GPS time is incorrect, either the Node is in a place where it cannot get a GPS fix, or the GPS needs to be forced. See Advanced Configuration via Node Client below for how to force a GPS fix.
- 6. If you have a test tag, you can place it near the Nodes and remove the magnet on the Node case. Removing the magnet activates the Node radio to listen for tags. You should begin to see tag data flowing in on SensorStation web interface under the radio(s) you programmed to listen for Nodes.
- 7. If you are deploying your Nodes, go ahead and remove the magnets and store them somewhere safe. You will want to reuse them if you ever want to shut down a Node for storage.

N	CELL T E C odes	ULAR TRACKING		СТ	T Ser	isor S	itatior	o Overview
#	Node ID	Last Heard	RSSI	Battery	Firmware	Latitude	Longitude	GPS Time
1	329073	2021-09-21 20:11:17	-69	5	1.8.0	39.000796	-74.913584	2021-09-21 20:11:18
2	3677a2	2021-09-21 20:11:12	-71	3.81	1.15.4	39.000988	-74.913784	2021-09-21 20:11:12

Figure 1: Node display on SensorStation web interface.

Radio 1						R	adio 2	2	
Current M	lode: Node	9			Current M	Мо	de: Tag		
Be	eps	39				Bee	ps	705	
No	odes	715	5			Nod	les	0	
Tele	metry	0			Те	elen	netry	0	
Time	Tag ID	RSSI	Node		20:20:56				
2021-09- 21	52073461	-78	328f12		2021-09- 20:20:56	21	334C4B61	-105	
2021-09-	1E34522D	-100	328f12		2021-09- 20:20:56	21	1E4B2A4B	-97	
21 16:20:53					2021-09- 20:20:55	21	781E0733	-103	
2021-09- 21 16:20:53	6107612A	-82	328f12		2021-09- 20:20:54	21	78782D4B	-105	
2021-09- 21	2A19194C	-99	328f12		2021-09- 20:20:51	21	4C663434	-100	
16:20:53	15254666	05	220(12		2021-09- 20:20:51	21	6107612A	-106	
2021=09= 21 16:20:52	TE2D4C66	-85	528112		2021-09- 20:20:50	21	551E1952	-103	
2021-09- 21	61667F33	-99	328f12		2021-09- 20:20:49	21	552D1E52	-88	
Node	Tag		ООК		Node		Tag	(ООК

Figure 2: Here Radio 1 is set to detect Nodes, while Radio 2 is set to detect Tags. Looking at the data displayed you can see that Radio 1 data includes a Node ID and the RSSI is the signal strength of the Tag hitting the Node, while Radio 2 data is simply the tags being directly detected by the antenna on Radio 2, and therefore the RSSI refers to the signal strength of the Tag hitting the antenna on Radio 2.

- 8. Attach your Node to an appropriately sized support structure. We recommend 1/2" 3/4" diameter EMT conduit, but there is no rule as to what can or can't be used. We also recommend placing your Nodes at least 2 meters off of the ground.
- 9. Place your Nodes in the field within 1-1.5km of your SensorStation.
- 10. Once set up, return to your SensorStation and ensure that all Nodes are checking in. Ultimately you want your Nodes to be received 100% of the time, so looking at your data after a few days will help diagnose any Nodes 'on the fringe'.
- 11. For any Nodes not being detected consistently, you should consider one of the following possible solutions:
- Move 'fringe' Nodes closer to the SensorStation
- Boost the Node power by modifying the Node's settings using the Node Client tool (see below)
- Add additional antennas pointed at the problem Node(s)
- Add additional SensorStations to fill coverage gaps

Initial Node Setup

Because of shipping laws, your Node arrives with a partially-charged Lithium battery and should be placed in the sun for several days prior to deployment to get its battery up to full charge.

Unboxing



Figure 3: Node packaged for shipping

Remove the packing material that surrounds your Node. You can do this by removing the two nuts on the mounting bracket, which will then allow you to slide the bubble wrap off of the Node and save it for future use.

Notice that there is a piece of blue tape securing a magnet to the Node.

This magnet operates the switch that determines whether your Node is searching for tags. Note that even with the magnet on the Node, your Node will send health reports every five minutes. It can do this on a fully charged battery for over two years without charging, so is fine for storage. Once you remove the magnet,



Figure 4: Node with bubblewrap removed

though, your Node will function for roughly one week without a charge. We recommend only removing the magnet when deploying your Nodes, or for temporary testing.

Once you deploy your Nodes, be sure to save the magnets for future use.

Attaching Your Node

Each Node comes with the necessary hardware for mounting it to various materials. We typically recommend 3/4" or 1/2" EMT conduit, but you can mount it to practically anything. We recommend mounting your Node either horizontally, with the solar panel facing the sky, or vertically, with the solar panel facing south, for optimal recharging performance.

A note about solar recharging

Note that mounting your Node in shade, or canopy cover, will reduce recharge times and may require you to periodically move the Node to a sunny location for recharging, or subsidize the Node with an additional battery back (each Node comes with a USB port which can be used for attaching an additional power supply).

SensorStation Pairing

There is no need to pair a Node to a SensorStation. Simply placing the Node within the range of a SensorStation antenna will cause the SensorStation to detect and process Node data.

Operation Tips

As a rule of thumb we recommend placing all Nodes within 1-1.5km of a SensorStation. It is possible to increase the distance depending on your choice of antennas, but this distance has proved effective for many installations. Topography, density of vegetation, and other factors may impact the detection distance.



Figure 5: Note the black dot on the Node indicates where the magnet must be aligned when not in use



Figure 6: Node mounted horizontally at Bernheim Forest, Kentucky



Figure 7: Node mounted upright and facing south, at The Nature Conservancy's South Cape May Meadows Preserve, Cape May, NJ

Since each Node transmits health information every five minutes, one good benchmark when testing you Nodes is to ensure that your SensorStation is detecting each Node at least every five minutes. If not, you will likely be losing some data which will only be recoverable by opening the Node, removing and reading the internal SD card. Put another way, any data not received by the SensorStation will not be sent later, but resides only on the internal Node SD card. Using a Node without a SensorStation is not recommended and outside of the manufacturer specs.

Connecting to the external USB port

Each shipment of Nodes comes with a 4-pin to USB-A adapter. This allows you to access the USB



Figure 8: Node with USB cover installed

Opening your Node

If you need to access the internal SD card, or troubleshoot a Node, you can access it by removing the single screw on the bottom of the case, and separating the top of the Node from the bottom with a little squeeze and pull procedure.

On the board you will notice several buttons. Pressing them has the corresponding effect:

- SW1 Long-press forces the Node to restart.
- SW2 Long-press forces the Node to send a health message (requires a SensorStation to determine success).
- SW3 Long-press forces the Node to look for new firmware on the SD card, and if it finds it, to install it.

The Micro USB port is also apparent in the lower right side of the board, and labled USB. You can use this port to connect your Node directly to a computer.

Updating your Node Firmware

If you want to, or need to, update your Node's firmware, you can do this in one of two ways.



Figure 9: Node with USB cover removed, exposing 4 pins



Figure 10: Node with 4-pin to USB-A adapter inserted



 $Figure \ 11: \ First \ remove \ the \ screw \ in \ the \ bottom \ of \ the \ Node$



Figure 12: Then apply equal pressure to the long sides of the case, and pull the top and bottom apart



Figure 13: Closeup of the Node board

Option #1: Direct File Transfer via SD Card

With the Node open:

- 1. Remove the SD card
- 2. Put the SD card into a card reader connected to a computer
- 3. Copy the latest firmware file (downloadable from the #ctt_Nodes channel in Slack) titled node3.firmware to the SD card
- 4. Re-insert the SD card into the Node
- 5. Long-press the SW3 button on the board to initiate firmware update
- 6. Confirm firmware update either by:
- Connecting directly to the Node via Node Client (see section below on Node Client)
- Checking your SensorStation Node List at the top of the SensorStation Interface after ~6 minutes (Node Health files are sent every 5 minutes)
- Download Current Data from the SensorStation Interface after ~6 minutes (Node Health files are sent every 5 minutes) and look in the data table

Option #2: Push-button Firmware update using Node Client

- 1. Download the latest firmware file (downloadable from the #ctt_nodes channel in Slack) titled node3.firmware to the SD card
- 2. Follow the directions below to connect to your Node via Node Client and access the Local Console
- 3. At the bottom of the Local Console is the Firmware button, which will allow you to upload the firmware file.
- 4. Confirm the updated firmware following Step 6 in the instructions above.

Advanced Configuration via Node Client

You can use a development program we've created called Node Client to troubleshoot your Node and modify several parameters. The latest version of Node Client can be downloaded from our support Slack workspace under the #ctt_nodes channel. If you don't already have access, please email us at support@celltracktech. com. You can connect your node to a computer using either the provided 4-pin -> USB adapter and the port on the underside of the Node, or the micro-usb port directly on the board (after opening the Node).

Opening Node Chem

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Desktop #	InstallMacOSX	8/5/2020 11:50 AM	File folder					
🔯 Downloads 🛛 🖈	node-client 0 2 0 0	8/18/2020 1:26 PM	File folder					
🛅 Documents 🛛 🖈	DESKTOPITEMS	8/25/2020 11:52 AM	File folder					
🔤 Pictures 🛛 🖈	Screenshots	1/3/2021 2:03 PM	File folder					
🛅 iCloud Drive (Ma 🖈	New folder (2)	3/11/2021 1:22 PM	File folder					
Box Sync (Mac) 🚿	New folder	3/19/2021 9:53 PM	File folder					
Drophov	ABS ppt	5/15/2021 8:54 AM	File folder					
	📕 arm	5/19/2021 1:38 PM	File folder					
andituata	📕 arm64	5/19/2021 1:38 PM	File folder					
EZ Jazz	📕 x64	5/19/2021 1:38 PM	File folder					
Numbers	📕 x86	5/19/2021 1:38 PM	File folder					
📜 Windows 10.pvm	ctt-node-1_12_xxx	5/19/2021 2:01 PM	File folder					
This DC	📕 CTT App Launcher	9/1/2021 2:14 PM	File folder					
- THIS PC	macOS - El Capitan	8/4/2020 3:04 PM	File	0 KB				
Intwork 🔮 🔿	macOS	8/4/2020 4:28 PM	File	0 KB				
	📄 El Capitan	8/4/2020 5:14 PM	File	0 KB				
	7450d04e459a1af79dfba175a9878b05	10/9/2020 11:21 AM	JPG File	74 KB				
	🖀 dpinst	1/8/2021 11:15 PM	XML Document	12 KB				
	CP210xVCPInstaller_x64	1/8/2021 11:47 PM	Application	1,026 KB				
	CP210xVCPInstaller_x86	1/8/2021 11:47 PM	Application	903 KB				~
304 items 1 item selected							800	

After downloading the node-client_0_2_0_0.zip folder to your computer, expand it in your location of choice and open the now-uncompressed folder.

🖉 📜 💌 🛛 node-client	_0_2_0_0				- 0
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⇒ × ↑ 🖡 > This	PC > Desktop > node-client_0_2_0_0 >				✓ ひ
Quick access	Name	Date modified	Туре	Size	
Desktop 🖈	Assets	1/3/2021 12:59 PM	File folder		
Downloads 🖈	📕 bin	1/3/2021 12:55 PM	File folder		
Documents 🖈					
Pictures 🖈					
iCloud Drive (Ma 🖈					
Box Sync (Mac) 🖈					
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ns					

Figure 14: Inside the node-client folder you'll find two folders, Assets and bin

You will see two folders. Open the one labeled bin, and then the one labeled Debug.

Within Debug you will find the application file node-client. Double-click node-client to run the program.

Upon opening Node Client you will see the main screen with Steps 1 - 4 outlined. The window to the right is actually a screenshot of Device Manager - not Device Manager itself (hence "Figure 1"), but gives you an idea of what your Device Manager should look like if you have the proper drivers installed. If not, the blue link that says "Driver" can be clicked to take you to the Silicon Labs website. Click on the DOWNLOADS tab to access the appropriate driver for your operating system. After installing the driver you must restart your computer. You must have the Silicon Labs driver installed to run Node Client.

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$\leftarrow \rightarrow \checkmark \uparrow \blacksquare \rightarrow$ This PC :	> Desktop > node-client_0_2_0_0 > bin >				・ ジ 、 Search bin	
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Box Sync (Mac)						
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Figure 15: Inside the bin folder you'll see a folder titled Debug

📕 🕑 📕 🔻 Debug					-	×
File Home Share	View					~ 🕐
$\leftarrow \rightarrow \checkmark \uparrow \blacksquare$ > This	PC > Desktop > node-client_0_2_0_0 > bin > Debug			Ŷ	・ ひ	
 ✓ ★ Quick access ■ Desktop 	Name	Date modified 11/9/2019 12:56 AM	Type Application extension	Size 684 KB		
Downloads #	 NewtonsottJson node-client 	11/9/2019 12:51 AM 7/22/2020 3:17 PM	XML Document Application	692 KB 1,169 KB		
■ Pictures * ■ iCloud Drive (Ma * ■ Box Sync (Mac) *						
Dropbox * banditData EZ Jazz						
Numbers Windows 10.pvm						
>						
3 items						

Figure 16: Contents of the Debug folder showing the node-client application

🚄 CTT Node Cli	ent		-				
USB	Step 1	Update the list of available devices. This is necessary when the device is plugged into the computer after	Device Manager File Action View Help	- 0			
Local Console		correct port, try the update button.					
File Transfer		Update Ports	Keyboards Mice and other pointing devices Micros				
About	Step 2	Select COM port from the drop down list. The correct port can be discovered based on instructions from Figure 1.	 Ports (COM & UP) Ports (COM & UP) Silicon Labs CP210x USB to UART Bridge (COM51) USB Serial Device (COM3) 				
	COM3	~	> 🖃 Print queues				
Step	Step 3	Set the baudrate (The rate at which the device talks	 Processors Processors Processors 				
	with the computer). I his value should be set to 115200 unless otherwise instructed by CTT.		Figure 1				
			The Windows Device Manager is capable of displaying all devices connected to the PC through USB. The port				
	115200	×	number for which the node is connected is identified				
S	Step 4	Open the COM port by pressing the button below. If the port succesfully opens, you will see the button label change to "Close". At this point the device should	as a Silicon Labs CP210X USB to UART Bridge. You can navigate to the device manager through the following path:				
		be communicating with the program.	Control Panel -> Device Manager -> Ports (COM LPT)			
		Open	If you cannot find the device, you may need to install the driver.	<u>Driver</u>			

Figure 17: Opening screen of Node Client

🚄 CTT Node Cli	ent		
USB	Step 1	Update the list of available devices. This is necessary when the device is plugged into the computer after the program has been opened. If you cannot find the	≝ Device Manager — □ File Action View Help
Local Console		correct port, try the update button.	
File Transfer		Update Ports	A matrix Reyboards W Mice and other pointing devices Wince and other pointing devices
About	Step 2	Select COM port from the drop down list. The correct port can be discovered based on instructions from Figure 1.	 Petwork adapters Ports (COM & LP) Silicon Labs CP210x US8 to UART Bridge (COM51) US8 Serial Device (COM3)
	COM3	~	> 🚍 Print queues
	Step 3	Step 3 Set the baudrate (The rate at which the device talks	D Processors M Security devices
		with the computer). This value should be set to 115200 unless otherwise instructed by CTT.	Figure 1
			The Windows Device Manager is capable of displaying
	115200	~	number for which the node is connected is identified
	Step 4	Open the COM port by pressing the button below. If the port succesfully opens, you will see the button label change to "Close" At this point the device should	as a Silicon Labs CP210x USB to UART Bridge. You can navigate to the device manager through the following path:
		be communicating with the program.	Control Panel -> Device Manager -> Ports (COM LPT)
		Open	If you cannot find the device, you may need to install the driver.

Figure 18: Clicking on Update Ports should populate both steps 2 and 3 values. If not you may need to install the proper driver.

With the proper driver installed, you can click on Update Ports which will then populate Steps 2 and 3 with values for available COM ports and default Baud Rate. You may have multiple COM ports available, so ensure that the one selected refers to your Silicon Labs driver port.

🚄 CTT Node Clie	nt		×
U SB Local Console	Step 1	Update the list of available devices. This is necessary when the device is plugged into the computer after the program has been opened. If you cannot find the correct port, try the update button.	
File Transfer		Update Ports	S = Keyboards S = 0 Mice and other pointing devices S = Monitors
About	Step 2	Select COM port from the drop down list. The correct port can be discovered based on instructions from Figure 1.	>
	COM3	~	> Print queues
	Step 3	Set the baudrate (The rate at which the device talks	> □ Processors > ■ Security devices
		with the computer). This value should be set to 115200 unless otherwise instructed by CTT.	Figure 1 The Windows Device Manager is capable of displaying
	115200	×	all devices connected to the PC through USB. The port
	Step 4	Open the COM port by pressing the button below. If the port succesfully opens, you will see the button label change to "Close". At this point the device should be communicating with the program.	as Silicon Labs CP210x USB to UART Bridge You can as Silicon Labs CP210x USB to UART Bridge You can navigate to the device manager through the following path: Control Panel -> Device Manager -> Ports (COM LPT)
		Open	If you cannot find the device, you may need to install the driver.

Figure 19: Clicking Open will open the USB connection between the Node and your computer.

Once you have selected the appropriate port and baud rate, click the Open button in Step 4.

This opens the port; once the port is open, the button will change to Close. Clicking on Close will close your connection- so leave it open and click on the Local Console button on the left sidebar of the window (upper left corner, under the USB button).

Once in the Local Console section you'll see three windows: Device Info, Tag Detections and Settings Summary. Each of these windows have associated menus and buttons.

Device Info Window

Device Info provides several pieces of information by default:

- BatteryVolts current battery voltage
- SolarCurrent instantaneous information on solar current being pushed into the battery
- SolarVolts instantaneous information on solar voltage being received via the solar panel

CTT Node Cli	ent		
USB Local Console	Step 1	Update the list of available devices. This is necessary when the device is plugged into the computer after the program has been opened. If you cannot find the correct port, try the update button.	Everice Manager - □ File Action View Help Image: Im
File Transfer		Update Ports	Keyboards Wile and other pointing devices Wile and other pointing devices Wile and there are a set of the set of th
About	Step 2	Select COM port from the drop down list. The correct port can be discovered based on instructions from Figure 1.	Very Network adapters Forts (COM & LPT) Silicon Labs CP210x USB to UART Bridge (COM51) Silicon Labs CP210x USB to UART Bridge (COM51)
	COM3	~	> 🚍 Print queues
	Step 3	Set the baudrate (The rate at which the device talks with the computer). This value should be set to 115200 unless otherwise instructed by CTT.	Processors Figure 1
			The Windows Device Manager is capable of displaying
	115200	~	all devices connected to the PC through USB. The port
	Step 4	Open the COM port by pressing the button below. If the port succesfully opens, you will see the button label change to "Close". At this point the device should be communicating with the program.	number for which the node is connected is identified as 8 Silicon Labs CP2 VIX USB to LARF Bridge. You can navigate to the device manager through the following path: Control Panel -> Device Manager -> Ports (COM LPT)
		Close	If you cannot find the device, you may need to install the driver.

Figure 20: Once the port is open, the button under Step 4 will show Close. Clicking on it again will then close the port and disconnect the node from the computer.

🚄 CTT Node Clie	ent								-	- 🗆 🗙
USB	Device Info		Tag Detections				Settings Su	mmary		
000	Name	→ Value	Detection Time [Local]	Tag Id	Signal [dBm]	^	Setting	Value	Units	Update
Local	BatteryVolts	2.65	9/7/2021 5:08:12 PM	1e55662d0f	-70					
Console	SolarCurrent	1	9/7/2021 5:08:12 PM	1e615252	-71					
	SolarVolts	0.02	9/7/2021 5:08:12 PM	2d521e4ca0	-42					
File Transfer	TemperatureCelsius	26	9/7/2021 5:08:12 PM	072a6152ff	-72					
			9/7/2021 5:08:12 PM	19071e2a80	-60					
About			9/7/2021 5:08:12 PM	4c1e784c14	-60					
			9/7/2021 5:08:12 PM	4c2a196668	-81					
			9/7/2021 5:08:13 PM	4c33072a92	-79					
			9/7/2021 5:08:13 PM	52524b4c0d	-72					
			9/7/2021 5:08:13 PM	611e664b	-88					
			9/7/2021 5:08:13 PM	2d4b615203	-78					
			9/7/2021 5:08:13 PM	783419558e	-45					
			9/7/2021 5:08:13 PM	52192d2dcc	-67					
			9/7/2021 5:08:13 PM	4b554b2aef	-48					
			9/7/2021 5:08:13 PM	3461550707	-64					
			9/7/2021 5:08:13 PM	34192a34c9	-73					
			9/7/2021 5:08:14 PM	34343355d1	-79					
			9/7/2021 5:08:14 PM	5555663344	-76					
			9/7/2021 5:08:14 PM	52074b2adc	-57	v				
	SerialNumber		~ Firmware					Refresh	Sa	ve
	s	Submit								

Figure 21: With the port now open, you can click on Local Console to interact with your node in real-time.

USB	Device Info		Tag Detections				Settings Su	mmary		
055	Name	A Value	Detection Time [Local]	Tag Id	Signal [dBm]	^	Setting	Value	Units	Update
	BatteryVolts	2.65	9/7/2021 5:08:40 PM	0733615267	-78					
onsole	SolarCurrent	1	9/7/2021 5:08:40 PM	4c784b5230	-70					
_	SolarVolts	0.02	9/7/2021 5:08:40 PM	4c55075245	-55					
Fransfer	TemperatureCelsius	26	9/7/2021 5:08:40 PM	523334558d	-66					
			9/7/2021 5:08:40 PM	7819664c72	-85					
bout			9/7/2021 5:08:40 PM	1e4c1e1911	-43					
			9/7/2021 5:08:40 PM	2a334c2d6a	-73					
			9/7/2021 5:08:40 PM	524b552a21	-62					
			9/7/2021 5:08:40 PM	2d19196162	-69					
			9/7/2021 5:08:40 PM	2a5261190f	-65					
			9/7/2021 5:08:40 PM	52345578b8	-91					
			9/7/2021 5:08:40 PM	342a33336a	-70					
			9/7/2021 5:08:40 PM	2d4c552dc2	-83					
			9/7/2021 5:08:41 PM	1e4b340771	-69					
			9/7/2021 5:08:41 PM	331e2a2ae7	-50					
			9/7/2021 5:08:41 PM	55665552fe	-40					
			9/7/2021 5:08:41 PM	4b55784b09	-50					
			9/7/2021 5:08:41 PM	66552d19cd	-54					
			9/7/2021 5:08:41 PM	7819663308	-55	~				
	SerialNumber SerialNumber		Firmware				1	Refresh	Save	ctivate

Figure 22: Device info showing dropdown options

• TemperatureCelcius - the instantaneous temperature of the node board

At the bottom of the Device Info window there is a dropdown menu. Select any of the dropdown menu items and click the Submit button to issue a command to the node. Below are the menu items and their respective actions.

- Serial Number causes the Device Info window to display the DeviceID and Firmware version.
- GPS Fix causes the Node to take a GPS fix, and display the Latitude and Longitude in the Device Info window.
- Health Report causes the Node to transmit a health report. If a SensorStation is within range, the SensorStation should detect the health report. Note that there is no acknowledgment of success within Node Client.
- Relay Beeps causes the Node to transmit whatever beep data is currently in the buffer. If a SensorStation is within range, the SensorStation should detect the beep records. Note that there is no acknowledgment of success within Node Client.
- Dynamics this has no current application and is legacy option from a specific modified node that is not currently in production.



Figure 23: Here GPS Fix is selected from the dropdown, and the Submit button has been pressed, causing the Node to take a GPS fix and display the results in the Device Info window.

Tag Detections Window

If there are any tags within range of the node, you will see detection data populating in the Tag Detections window. These data include:

- Detection Time (Local) a date/time stamp in your local timezone.
- Tag Id the 8-digit tag ID from either a LifeTag, PowerTag or HybridTag
- Signal (dBm) the signal strength of the tag detection, measured in dBm, or the power level measured in decibels relative to one milliwatt.

While the Tag Detections window is pretty self explanatory, it also contains the button for updating the node firmware. If you have downloaded a more recent firmware version, you can load that firmware onto your node by pressing the Firmware button which will then open your file explorer. Updating the firmware is covered more extensively in the Updating Your Node Firmware section.

act Node Clie	ent								-		×
USB	Device Info		Tag Detections				Settings Summ	ary			
000	Name	 Value 	Detection Time [Local]	Tag Id	Signal [dBm]	^	Setting 🔺	Value	Units	Updat	e ^
	BatteryVolts	2.64	9/7/2021 5:10:21 PM	334c4b61	-46		AccActivityThreshold	250	mili-Gees	0	
Console	Latitude	39.000893	9/7/2021 5:10:21 PM	664c19520e	-75		AccActivityWaterm		Detections	0	2
	Longitude	-74.913666	9/7/2021 5:10:21 PM	19331e0709	-80		AccDataRange	4	+/- Gees	Ó	
File Transfer	SolarCurrent	1	9/7/2021 5:10:21 PM	5219613424	-38		AccDataRate	50	Hz	Ö	
	SolarVolts	0.02	9/7/2021 5:10:21 PM	2a1e4b07	-62		AccLogMode	Day	Option	Ő	
About	SunIsUp	1	9/7/2021 5:10:21 PM	3433342ad6	-55		AccSnapshotInterval	600	Seconds	Ő	
	Sunrise	9/7/2021 5:48:00 AM	9/7/2021 5:10:21 PM	072a6152ff	-68		GpsCutoffVoltage	3.6	Volts	Ő	
	Sunset	9/6/2021 8:07:00 PM	9/7/2021 5:10:21 PM	662d661e22	-96		GpsEnabled		Boolean	Ő	<i>i</i> –
	TemperatureCelsius	26	9/7/2021 5:10:21 PM	52074b2adc	-57		GpsInterval	7200	Seconds	Ő	£
			9/7/2021 5:10:22 PM	2d4b615203	-79		GpsOn Time	90	Seconds	Ő	() ()
			9/7/2021 5:10:22 PM	2d2d610717	-96		GpsResumeVoltage		Volts	Ő	
			9/7/2021 5:10:22 PM	4c2a2a4c78	-71		GpsTimeout	300	Seconds	Ő	<i>.</i>
			9/7/2021 5:10:22 PM	2d0761335f	-46		LedCutoffVoltage	3.7	Volts	Ő	, T
			9/7/2021 5:10:22 PM	1e55662d0f	-71		Led Resume Voltage	3.75	Volts	Ő	£
			9/7/2021 5:10:22 PM	52524b4c0d	-67		OperationMode	Day+Night	Option	Ő	Ē.,
			9/7/2021 5:10:22 PM	2d521e4ca0	-43		RadioCutoffVoltage	3.5	Volts	Ő	
			9/7/2021 5:10:22 PM	4b554b2aef	-49		Radio Enabled	1	Boolean	Ő	
			9/7/2021 5:10:23 PM	523334558d	-67		RadioHealthInterval	300	Seconds	Ő	
			9/7/2021 5:10:23 PM	552a4b1ee0	-60		Radio RelayInterval	300	Seconds	Ő	
	Health Report	v hmit	Firmware				Refre	sh	Sav	e	

Figure 24: Pressing the Refresh button under the Settings Summary window causes the available settings to populate and gives you the opportunity to edit setting values.

Settings Summary Window

This window will initially be empty until you press the **Refresh** button. Once pressed, the available settings will populate the window, each with a gear button in the rightmost column.

To modify a setting's parameter, click on the associated **gear** icon which will open a popup window specific to that setting.

🚝 CTT Node Clie	ent							-		\times
USB	Device Info	Tag Detections				Settings Summa	ary			
	Name 🔺 Value	Detection Time [Local]	Tag Id	Signal [dBm]	^	Setting 🔺	Value	Units	Update	^
Local	BatteryVolts 2.64	9/7/2021 5:10:36 PM	19331e0709	-87		AccSnapshotInterval	600	Seconds	0	
Console	Latit 🖳 RadioTxPower	-		-79		GpsCutoffVoltage	3.6	Volts	O	
	Lon: Notes			-56		GpsEnabled		Boolean	O	
File Transfer	Sola			-87		GpsInterval	7200	Seconds	Q.	
	Sola			-76		GpsOn Time	90	Seconds	0	
About	Sun			-82		GpsResumeVoltage	3.7	Volts	0	
	. Sunt			-90		GpsTimeout	300	Seconds	O	
	Sun: 0			-84		LedCutoffVoltage	3.7	Volts	0	
	Tem	Send		-58		LedResumeVoltage	3.75	Volts	O	
			_	-70		Operation Mode	Day+Night	Option	0	
		9/7/2021 5:10:42 PM	19071e2a80	-60		RadioCutoffVoltage	3.5	Volts	Q	
		9/7/2021 5:10:42 PM	61662a4b21	-90		RadioEnabled		Boolean	0	
		9/7/2021 5:10:42 PM	662d661e22	-96		RadioHealthInterval	300	Seconds	0	
		9/7/2021 5:10:42 PM	34192a34c9	-71		RadioRelayInterval	300	Seconds	O	
		9/7/2021 5:10:43 PM	2d2d610717	-95		RadioRelayWaterm	50	Detections	0	
		9/7/2021 5:10:43 PM	6107614b	-71		RadioResumeVoltage	3.7	Volts	0	
		9/7/2021 5:10:43 PM	34786652f5	-94		RadioTxFrequency	433249984	Hz	Ó	
		9/7/2021 5:10:43 PM	1e194c78f3	-53		RadioTxPower		dBm	0	
		9/7/2021 5:10:43 PM	52524b4c0d	-70	v	Stop Radio And Gps	0	Boolean	Ô	~
	Health Report	×				Defer		Cours		
	Submit	nimware				Hefres	in	Save		

Figure 25: Clicking on the gear icon in the rightmost cell of each setting row opens the parameterization window for that setting.

Here we have selected the RadioTxPower setting, which allows us to increase the power output of our onboard 434Mhz radio, thereby increasing the reach of our node to a nearby SensorStation. These parameters haven't been fully documented, so please consult with support@celltracktech.com before modifying settings unless otherwise specified in this guide. For instance, RadioTxPower can be modified up to 10dBm, but should not be set greater than that. To modify a value down below zero, use the negative value, for example, a value of -10 for RadioTxPower would reduce the power output by -10dBm.

To save these settings you first must click the Send button on the popup dialogue, and then click the Save button at the bottom of Settings Summary. To confirm that the settings have been set and saved, click the Refresh button at the bottom of theSettings Summary window.

1160	Device Info	Tag Detections			Settings Sumr	nary		
036	Name A Value	Detection Time [Local]	Tag Id	Signal [dBm]	^ Setting	⊾ Value	Units	Update ^
	Batten/Volts 2.64	9/7/2021.5:10:45 PM	781e781e5c	-43	AccSnapshotInterva	600	Seconds	0
Console	Latit 💀 RadioTxPower	-		-43	GpsCutoffVoltage	3.6	Volts	0
	Lons Notes			-76	GpsEnabled	1	Boolean	0
File Transfer	Sola			-72	GpsInterval	7200	Seconds	0
	Sola			-79	GpsOn Time	90	Seconds	0
About	Sun			-75	GpsResumeVoltage	3.7	Volts	0
	Sun			-55	GpsTimeout	300	Seconds	0
	Sun: 10			-61	LedCutoffVoltage	3.7	Volts	0
	Tem	Send		-93	LedResumeVoltage	3.75	Volts	0
				-86	Operation Mode	Day+Night	Option	0
		9/7/2021 5:10:46 PM	19071934b1	-84	RadioCutoffVoltage	3.5	Volts	0
		9/7/2021 5:10:46 PM	3355612d	-81	RadioEnabled	1	Boolean	0
		9/7/2021 5:10:47 PM	5219613424	-38	RadioHealthInterval	300	Seconds	0
		9/7/2021 5:10:47 PM	2d4c552dc2	-85	RadioRelayInterval	300	Seconds	Ó
		9/7/2021 5:10:47 PM	19331e0709	-88	RadioRelayWaterm.	. 50	Detections	0
		9/7/2021 5:10:47 PM	52074b2adc	-58	RadioResumeVoltag	e 3.7	Volts	0
		9/7/2021 5:10:47 PM	072a6152ff	-70	Radio TxFrequency	433249984	Hz	Ô
		9/7/2021 5:10:51 PM	2a1e4b07	-63	RadioTxPower	0	dBm	0
		9/7/2021 5:10:52 PM	521e4c5555	-98	✓ Stop Radio And Gps	0	Boolean	Ô.
	Health Report	~						
	Colorat	Firmware			Refr	esh	Sav	e

Figure 26: Here you can modify the value, click Send, close the popup window, and then click Save and then Refresh at the bottom of the Settings Summary window.

🚄 CTT Node Clie	nt								-		×
USB	Device Info		Tag Detections				Settings Summ	ary			
000	Name	 Value 	Detection Time [Local]	Tag Id	Signal [dBm]	^	Setting A	Value	Units	Update	^
Local	BatteryVolts	2.63	9/7/2021 5:10:55 PM	2a4b1907c7	-49		AccSnapshotInterval	600	Seconds	0	
Console	Latitude	39.000885	9/7/2021 5:10:55 PM	331e2a2ae7	-51		GpsCutoffVoltage	3.6	Volts	Ö	
	Longitude	-74.913803	9/7/2021 5:10:55 PM	1e4b340771	-71		GpsEnabled		Boolean	Ö	
File Transfer	SolarCurrent	1	9/7/2021 5:10:55 PM	5233344c	-72		GpsInterval	7200	Seconds	Ó	
	SolarVolts	0.02	9/7/2021 5:10:56 PM	551e1952	-55		GpsOn Time	90	Seconds	Ö	
About	SunisUp	1	9/7/2021 5:10:56 PM	1961194c66	-81		GpsResumeVoltage		Volts	0	
	Sunrise	9/7/2021 5:48:00 AM	9/7/2021 5:10:56 PM	66072a4bed	-84		GpsTimeout	300	Seconds	Ó	
	Sunset	9/6/2021 8:07:00 PM	9/7/2021 5:10:56 PM	52666619	-80		LedCutoffVoltage		Volts	Ö	
	TemperatureCelsius	27	9/7/2021 5:10:56 PM	66552d19cd	-55		Led Resume Voltage	3.75	Volts	Ő	
			9/7/2021 5:10:56 PM	4b19664bf4	-85		OperationMode	Day+Night	Option	Ő	
			9/7/2021 5:10:56 PM	2d551e4cb6	-53		RadioCutoffVoltage	3.5	Volts	Ő	
			9/7/2021 5:10:56 PM	4c1e4c4bac	-91		Radio Enabled		Boolean	Ő	
			9/7/2021 5:11:00 PM	55334b558e	-60		Radio Health Interval	300	Seconds	Ö	
			9/7/2021 5:11:00 PM	520734614b	-73		Radio RelayInterval	300	Seconds	Ő	
			9/7/2021 5:11:00 PM	52192d2dcc	-69		Radio Relay Waterm	50	Detections	Ő	
			9/7/2021 5:11:00 PM	1e4c1e1911	-44		Radio Resume Voltage		Volts	Ő	
			9/7/2021 5:11:00 PM	4c33072a92	-77		RadioTxFrequency	433249984	Hz	Ő	
			9/7/2021 5:11:00 PM	1e4b340771	-72		RadioTxPower (10	dBm	Ő	
			9/7/2021 5:11:01 PM	194c2d1ea0	-85	~	Stop Radio And Gps	0	Boolean	Ő	~
	Health Report	~									
	S	lubmit	Firmware				Refre	h	Sav	•	

Figure 27: If done correctly, you should see the setting value updated in the Settings Summary table.

USB	Directory				Update
	- Name	Size	Last Modified	Download	Delete
Local	test.txt	0	2017-1-1	Ð	Ū
Console	beep_0.csv	26215561	2020-8-23	Ð	Ū
	gps.csv	22458	2021-9-7	Ð	Ū
File Transfer	beep_1.csv	26214779	2020-8-28	Ð	Ū
	beep_2.csv	26215592	2017-1-1	Ð	Ū
About	beep_24.csv	26214956	2021-5-22	Ð	Ū
	- beep_25.csv	26215027	2017-1-1	Ð	Ŵ
	beep_26.csv	7762002	2021-9-7	Ð	Ū
	beep_3.csv	26214986	2021-3-17	Ð	1
	beep_4.csv	26214501	2021-3-24	Ð	Ū
	beep_5.csv	26214800	2021-3-27	Ð	Ū
	beep_6.csv	26214528	2021-3-30	Ð	Ū
	beep_7.csv	26215264	2021-4-2	Ð	Ū
	beep_8.csv	26215234	2021-4-5	Ð	1
	beep_9.csv	26214834	2021-4-10	Ð	Ū
	beep_4.csv	4096	2021-4-6	Ð	Ū
	beep_9.csv	4096	2021-4-6	Ð	Ū
	beep_10.csv	26214842	2021-4-14	Ð	Ū
	beep_11.csv	26214991	2021-4-17	Ð	Ū
	beep_12.csv	26215099	2021-4-20	Ð	Ū
	beep_13.csv	26215516	2021-4-22	÷.	Ū

Above you can see that the RadioTxPower has been successfully updated to +10dBm.

Figure 28: The Directory window in the File Transfer section.

File Transfer

Moving back to the left sidebar you see another button under Local Console; this one for File Transfer. Clicking on this button brings you to the Directory window.

Initially the window is empty, but clicking on Update in the upper right corner of the window will cause the console to list out all of the files on the SD card.

These are typically .csv files with either beep data, or gps data. From here you can either download or delete these files via the console.

Note: Since the USB transfer rate is very slow, it is recommended that you don't use this console for downloading beep files, rather you can remove the SD card and use a 3rd party SD card reader to transfer these files to your computer, if desired.

🚑 CTT Node Clie	nt		x
USB Local Console	Step 1	Update the list of available devices. This is necessary when the device is plugged into the computer after the program has been opened. If you cannot find the correct port, try the update button.	Everice Manager File Action View Help ←
File Transfer	Stop 2	Update Ports	
About	Step 2	Select COM port from the drop down list. The correct port can be discovered based on instructions from Figure 1.	✓ I Ports (COM & LPT) I Silicon Labs CP210x USB to UART Bridge (COM51) I USB Serial Device (COM3)
	COM3	Set the baudrate (The rate at which the device talks	
		with the computer). This value should be set to 115200 unless otherwise instructed by CTT.	Figure 1 The Windows Device Manager is capable of displaying
	115200	~ ~	all devices connected to the PC through USB. The port
	Step 4	Open the COM port by pressing the button below. If the port succesfully opens, you will see the button label change to "Close". At this point the device should	as a Silicon Labs CP210x USB to UART Bridge. You can navigate to the device manager through the following path:
		be communicating with the program.	Control Panel -> Device Manager -> Ports (COM LPT)
		Close	If you cannot find the device, you may need to install the driver.

Figure 29: Once you're done working with your node, return to the USB section and click Close under Step 4. Now it is safe to disconnect your Node.

Frequently Asked Questions (FAQ)

Q1. Do the Nodes send out radio frequency signals to the SensorStation?

A1. The Nodes send two types of data to the SensorStation: first is the health report, sent every five minutes; and second is the beep data sent either after the buffer is filled, or after a timer expires. All data is sent from the Node to the SensorStation on the frequency 433.25MHz, which is just slightly different than the frequency of the tags (434MHz). This is why you must assign an antenna to either detect Nodes, or Tags via the SensorStation interface. Nodes **do not** send over unique frequencies, instead they transmit their unique Node ID to the station. This is how the SensorStation recognizes individual Nodes.

Q2. Is there a limit to the number of Nodes that a single SensorStation can receive?

A2. Technically, no, but the more Nodes you deploy the more opportunity there is for radio congestion at the receiving end. There are many Node grids deployed with greater than 60 Nodes sending data to a single station with no apparent impact, but your mileage may vary depending on your setup.

Final Thoughts

This User Guide is a living document. Your experiences and input are greatly appreciated so please don't hesitate to reach out to us regarding what you'd like to see included here. You can submit your suggestions and any errors to our Customer Service Desk here and we will work to incorporate them in future revisions. All material © Cellular Tracking Technologies, 2023.