

Ctek SkyCloud

TIB006

Visual Access and Management System

(SkyRouter Release 4.02.02 and newer)



Ctek – Things That Move Data

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1 Preface

Welcome to the Ctek SkyCloud Technical Information Bulletin. This manual covers the SkyCloud application features and functionality with Ctek SkyRouters running firmware release 4.02.02 or newer. The document will explain the basic operation of the application and take you through the necessary settings to put your SkyRouter wireless application platform into a selected cloud. Additional information and applicable technical notices can be found at www.ctekproducts.com.

2 Introduction

SkyCloud provides users with an intuitive, geographically based user interface that presents the status of and access to a homogenous network (cloud) of cellular endpoints and the applications at each endpoint. The composition of a network itself is determined by the user who can group endpoint assets in non-intersecting clouds by whatever characteristics make up the most effective presentation for the overall management of the network.

3 SkyCloud Services

SkyCloud offers three levels of service, basic DDNS, Location Services, and Network Management Services. In addition, SkyCloud also supports the legacy EW/UDP DDNS service for endpoints that are not SkyCloud capable.

3.1.1 SkyCloud – DDNS

SkyCloud DDNS (Dynamic Domain Name Service) provides basic name resolution for endpoints. Endpoints using this service will update their DDNS entry upon startup and whenever their IP address changes. DDNS enables users to access their endpoint with a fully qualified domain name. An example would be **test-unit1.ctekskycLOUD.com**. Devices using basic DDNS appear in the Asset Details section of the SkyCloud presentation under the Other Assets tab but will not appear in the mapping presentation.

3.1.2 SkyCloud Location Services

SkyCloud Location Services provides the first level of endpoint visualization. The endpoint will appear as a color-coded pin on the visual display. Only the Main information tab is presented at this level of service. See the section on **Pin Information – Main Tab** below.

3.1.3 SkyCloud Network Management Services (Requires Location Services)

SkyCloud Network Management Services is the highest level of service available. Building on the capabilities of Location Services, Network Management provides user access to detailed up-to-date as well as historical information about the performance of the endpoint and importantly about the performance of the network as well. See the **Pin Information** section below for details.

4 Theory of Operation

Devices connected to the Ctek SkyCloud provide both periodic and ad-hoc (change initiated) updates to the SkyCloud. The SkyCloud system organizes the information provided by the endpoints and makes it available for presentation to all members of a specific network or cloud. The endpoint's network connection (bearer channel) is used only when a user connects to the first member of a cloud, or when the user connects directly from the cloud to an endpoint using SkyCloud's Dynamic Domain Name Service (DDNS). It is important to note that endpoint devices connected to Ctek's

SkyCloud operate autonomously, meaning that they will continue to perform the applications for which they were deployed regardless of the state of their SkyCloud connection.

4.1 Data Paths

Figure 1 provides details of the information flowing to and from the SkyCloud system. Each subset of the information is color coded and numbered such that 1 (green) is the initial SkyCloud connection, 2 (blue) depicts the graphical interface presentation, 3 (red) shows the update paths, and 4 (orange) shows DDNS operation.

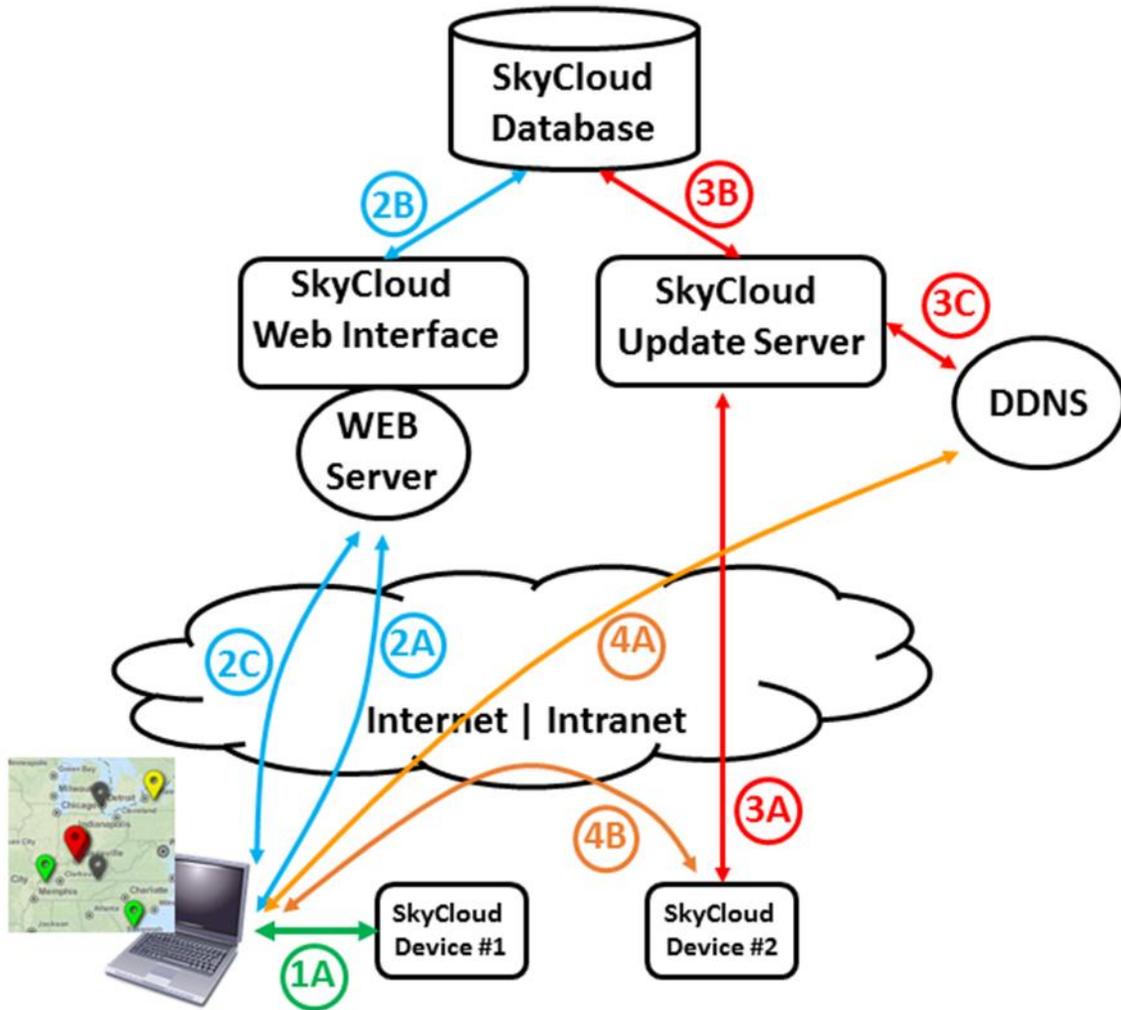


Figure 1 - Information Flow

4.1.1 Initial Connection

When the user authenticates and connects to a device that is a member of the desired cloud, they are presented with a menu option to view the entire cloud. Selecting that menu item initiates sequence 2.

4.1.2 [SkyCloud Presentation](#)

Selecting the cloud menu button redirects the user's browser to a SkyCloud server. The desired cloud ID is passed to the server with this transaction. The server organizes information about this particular cloud that is stored in the SkyCloud database and returns the information as a presentation of all endpoints in the cloud displayed as color-coded pins on a map. Through this presentation the user is able to interact with the server in a variety of ways to obtain additional information. The details of these interactions are covered in the User Interface section.

4.1.3 [SkyCloud Update](#)

Each endpoint updates the SkyCloud server with information that has been preselected during the endpoint's configuration. The three basic types of update transaction are DDNS update, a location update, and a network management update. In addition, the endpoint will provide an update when conditions impacting its pin's color or when the application wishes to display changes in preselected application values. In Figure 1 we see the update going to the SkyCloud update server which updates both the database and the DDNS information.

4.1.4 [DDNS Lookup](#)

Users can connect to an endpoint using its fully qualified domain name. The DDNS lookup is routed as a standard Internet transaction to SkyCloud's DDNS service, which will return the IP address corresponding with at FQDN.

5 User Interface

5.1 Primary Interface

Access to an individual cloud is gained by authenticating and logging on to any member of the cloud. As we see in Figure 2 a successful login to a SkyCloud enabled endpoint presents the user with a menu item (button) that will select the entire cloud labeled Generators. Using the SkyRouter's multilevel security mechanism, the Admin Facilities button and if desired the Automation Control Panel button could easily be omitted from the top level login for a specific user, thereby allowing cloud access but otherwise restricting the user from accessing features of the endpoint that were unrelated to their responsibilities.



Figure 2 - Cloud Access Button

Selecting the Generator cloud menu item redirects the user's browser to a SkyCloud presentation server that will display an initial visual management screen similar to that shown in Figure 3.

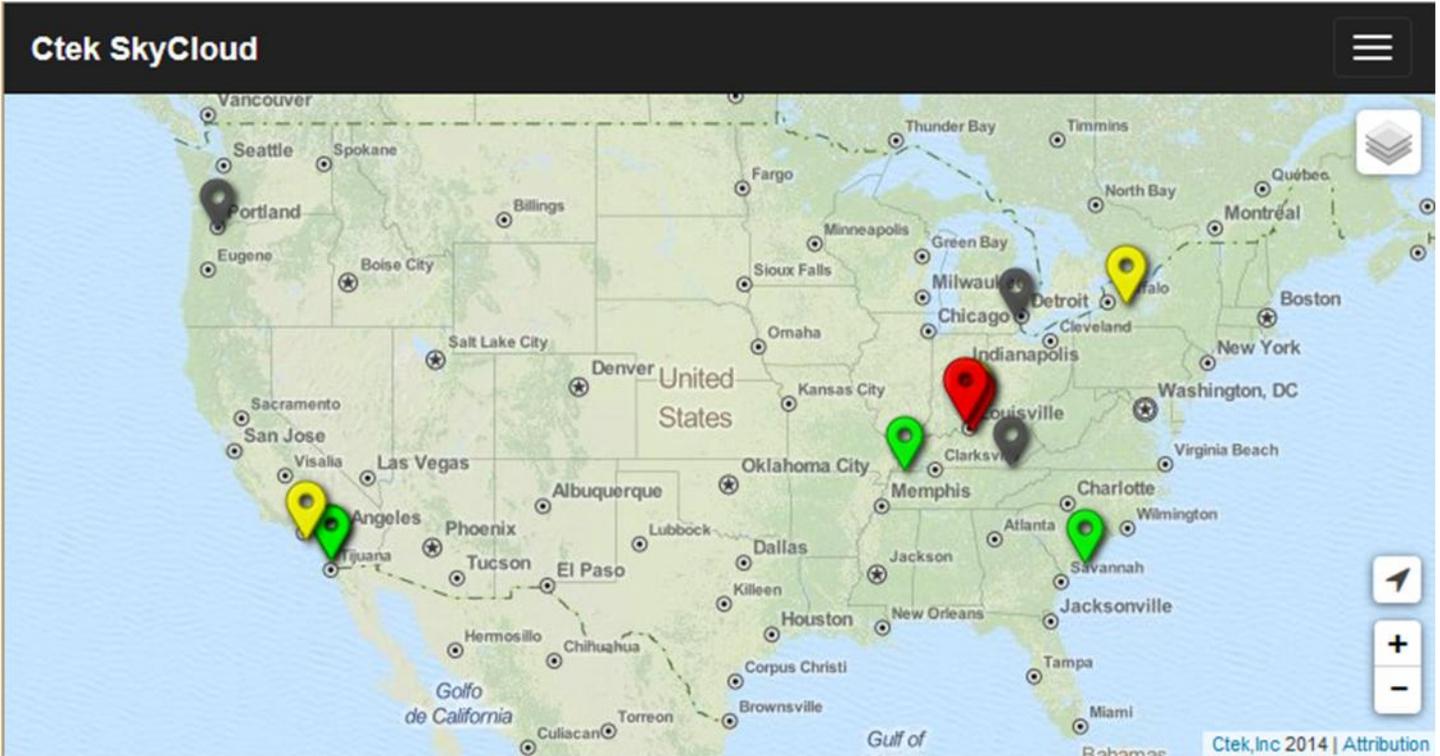


Figure 3 - Primary Interface

Each of the colored pins displayed on the map represents a single endpoint. The underlying map is appropriately scaled for the geographic span of the universe of pins making up a single cloud. For instance, if all of the endpoints in a specific cloud spanned a single state the display would be focused on that state and cover approximately the length and width of the state.

5.2 Pin Color and Priority

Pins displayed on the SkyCloud presentation will be either green, yellow, red, or gray. Gray is a special case meaning that the unit has not communicated or provided an update in 24-hours. For the red, yellow, and green conditions both the device (platform) and the application have an opportunity to set the pin's color. In all cases, the following prioritization applies:

Device Setting	Application Setting	Display Pin Color
Green	Green	Green
Yellow	Yellow	Yellow
Red	Red	Red
Green	Yellow	Yellow
Yellow	Green	Yellow
Green	Red	Red
Red	Green	Red
Yellow	Red	Red
Red	Yellow	Red
24-hours without communications		Gray

Table 1 - Pin Color Determination

5.3 Pin Information – 1st Level (hover)

Hovering over an individual pin with a mouse provides a first level of information about the endpoint. Referring to Figure 4 we see from top to bottom endpoint's latitude and longitude, the endpoint's location or name, and its status. The location (name) is determined from the Automation Control application's Unit Configuration if available. Otherwise this field is populated with the unit's FQDN.

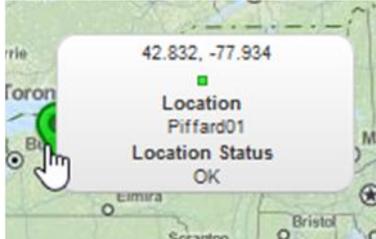


Figure 4 - Hover Display

5.4 Pin Information – Click

Clicking on an individual pin produces a display as seen in Figure 5. The tabs and fields are explained below.

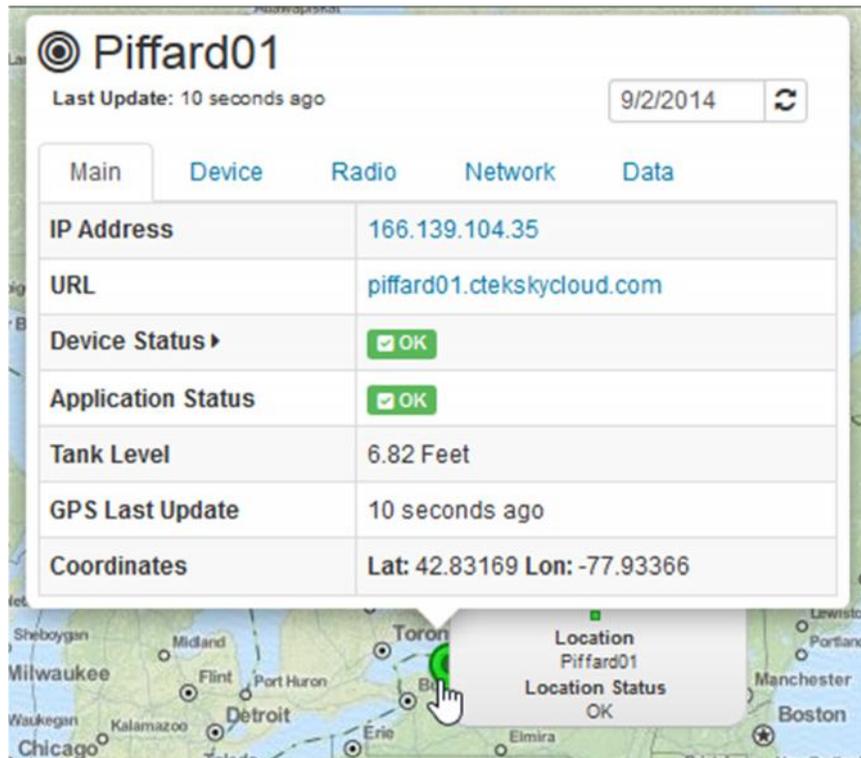


Figure 5 - Pin Information (Main)

Note: If the Network Management level of service is not enabled the Main tab will be the only tab available. See **SkyCloud Services** section above.

5.4.1 The Main Tab

When the pin for an endpoint is clicked the pop-up display becomes visible and is positioned in the Main tab. Note the tabs Main, Device, Radio, Network, and Data along the top of the pop-up. At the top of the pop-up window the machine name is displayed along with a time stamp indicating when it got its last update. The Main Tab table provides the following additional pieces of information.

IP Address -- The current V4 IP address of the unit:

URL – The fully qualified domain name of the unit URL

Device Status – The last reported red/yellow/green status of the device or platform. Note that an additional click on the arrow immediately following Status will display the four parameters that constitute device status. They are:

1. RSSI – Signal strength – less than -88 = yellow, less than -98 = red
2. Uptime - % of time the network was available less than 90% = yellow, less than 75% = red
3. Data – Data is at threshold as defined in TCOPlus WAN management feature
4. GPS – No location update during defined interval. Greater than 900 minutes = yellow, greater than 3600 minutes = red.

Application Status - The last reported red/yellow/green status of the application. Defined under application program control

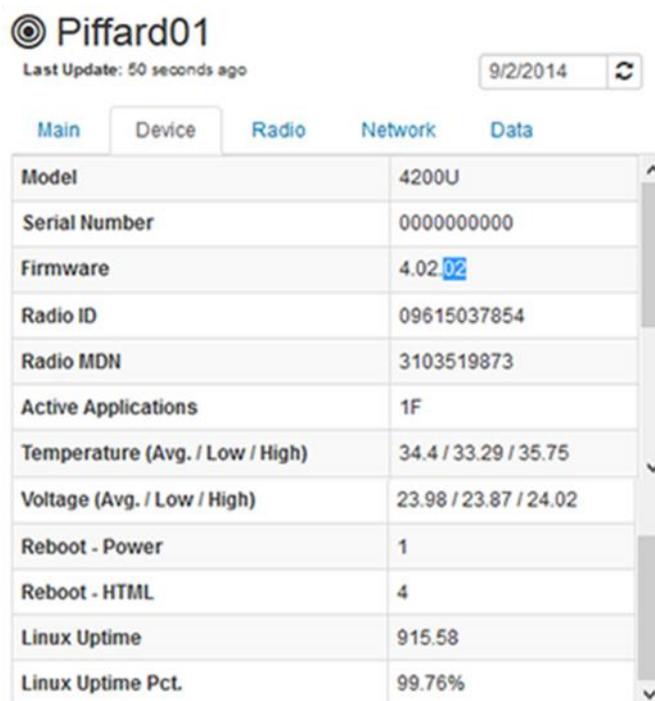
Application Elements – In Figure 5 Tank level is an example of an application element being reported. Up to eight application elements can be defined in the Automation Control application.

GPS Last Update – Length of time since last GPS (location) update

Coordinates. – Last Lat/Lon reported.

5.4.2 Device Tab

Selecting the Device Tab from the Pin icon displays the following information as seen in Figure 6.



The screenshot shows a web interface for a device named 'Piffard01'. At the top, it indicates 'Last Update: 50 seconds ago' and a date of '9/2/2014'. Below this are navigation tabs: 'Main', 'Device', 'Radio', 'Network', and 'Data'. The 'Device' tab is selected, displaying a table with the following data:

Model	4200U
Serial Number	0000000000
Firmware	4.02.02
Radio ID	09615037854
Radio MDN	3103519873
Active Applications	1F
Temperature (Avg. / Low / High)	34.4 / 33.29 / 35.75
Voltage (Avg. / Low / High)	23.98 / 23.87 / 24.02
Reboot - Power	1
Reboot - HTML	4
Linux Uptime	915.58
Linux Uptime Pct.	99.76%

Figure 6 - Device Tab

Model – The model identification of the endpoint device

Serial Number – The serial number of the endpoint device

Firmware – The firmware revision resident on the endpoint device

Radio ID – The ESN or IMEI of the radio module contained in the endpoint

Radio MDN – The phone number assigned to the devices radio

Active Applications – A bit mask representing the applications active on this device

Temperature (Avg/Low/High) – Temperature ranges over the last reporting period

Voltage (Avg/Low/High) – Input voltage ranges over the last reporting period

Reboot – Power – Reboots caused by power cycling or fluctuations

Reboot – HTML – Reboots caused by the Restart screen

Linux Uptime – The length of time during this reporting period that Linux was running

Linux Uptime Pct. – The percentage of time over this reporting period that Linux was up

5.4.3 Radio Tab

Selecting the Radio Tab from the Pin icon displays the following information as seen in Figure 7.



The screenshot shows the 'Radio' tab selected for device 'Piffard01'. The interface includes a header with the device name, a 'Last Update: 47 minutes ago' timestamp, and a date '9/2/2014' with a refresh icon. Below the header are five tabs: 'Main', 'Device', 'Radio' (highlighted with a dashed border), 'Network', and 'Data'. A table displays the following data:

Band	PCS
Network SID	22 == 6
Network Service	1xRTT/EvDO Rev A == 6
Roaming	NO == 6
RSSI (Avg / Low / High)	46 / 41 / 63

Figure 7 - Radio Tab

Band – The frequency or band name that the devices radio is operating on

Network SID – The FCC assigned system ID of the portion of the network that the device is using. The number following the dual arrows indicates the number of times that this parameter has changed during this reporting period.

Network Service – Specifies the type of air interface that is supplying the data connection. The number following the dual arrows indicates the number of times that this parameter has changed during this reporting period.

Roaming – Indicates the roaming status of the devices radio module. The number following the dual arrows indicates the number of times that this parameter has changed during this reporting period.

RSSI (Avg/Low/High) – Records the range of RSSI (signal strength) measured during the last reporting period.

5.4.4 Network Tab

Selecting the Network Tab from the Pin icon displays the following information as seen in Figure 8.

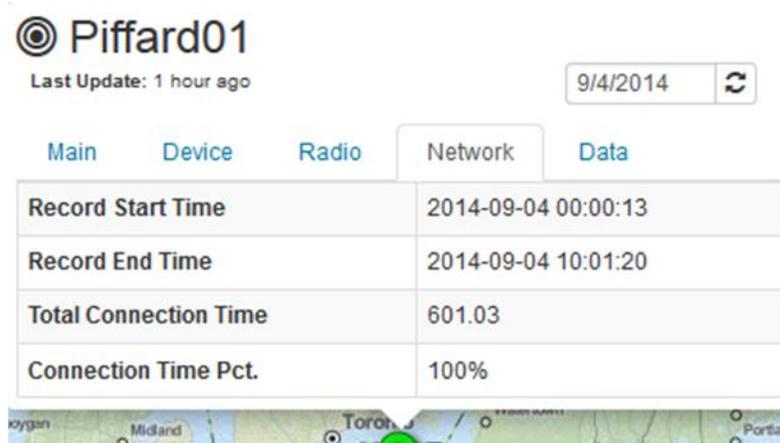


Figure 8 - Network Tab

Record Start Time – The beginning date/time stamp for all values updated during a network record update.

Record End Time – The ending date/time stamp for all values updated during a network record update.

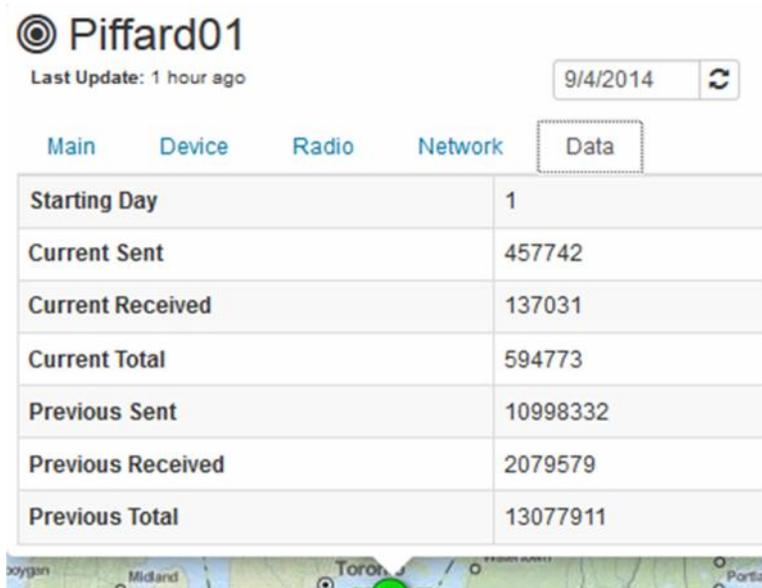
Total Connection Time – The amount of time in minutes that the device had a network connection during this reporting period.

Connection Time Pct. - The percentage of time that the device had a network connection during this reporting period.

5.4.5 Data Tab

Selecting the Data Tab from the Pin icon displays the following information as seen in Figure 9.

Note: The Data Tab and its associated values is populated on SkyRouters from the settings made in the WAN Management screen provided with TCOPlus.



The screenshot shows the 'Piffard01' interface with a 'Data' tab selected. The table below contains the following data:

Category	Value
Starting Day	1
Current Sent	457742
Current Received	137031
Current Total	594773
Previous Sent	10998332
Previous Received	2079579
Previous Total	13077911

Figure 9 - Data Tab

Starting Day – Indicates the day of the month that the billing plan starts on

Current Sent – Displays the amount of data (in bytes) sent during the current billing cycle

Current Received – Displays the amount of data (in bytes) received during the current billing cycle

Current Total - Displays the total amount of data (in bytes) sent and received during the current billing cycle

Previous Sent – Displays the amount of data (in bytes) sent during the previous billing cycle

Previous Received – Displays the amount of data (in bytes) received during the previous billing cycle

Previous Total - Displays the total amount of data (in bytes) sent and received during the previous billing cycle

5.5 Pin Controls

As shown in Figure 10 the following controls are available on the SkyCloud pin display.

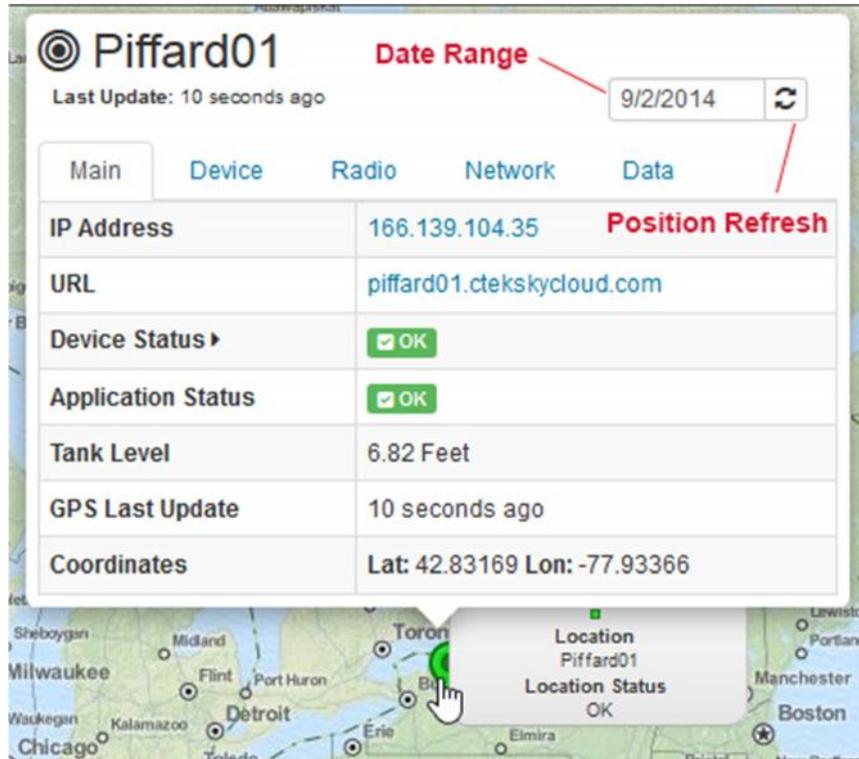


Figure 10 - Pin Display Controls

Date Range – When the Date Range field is selected a calendar pop-up allows the user to select by day a historical view of network management data that is displayed on the device, radio, and network tabs.

Position Refresh – The Position Refresh control allows the user to update the display with the latest positioning (GPS) information while keeping the pin display open. This feature provides a mechanism to follow and endpoint over a period without the need to resize the display after each location record update.

5.6 Primary Interface Controls

As shown in Figure 11 the following controls are available on the SkyCloud primary display screen.

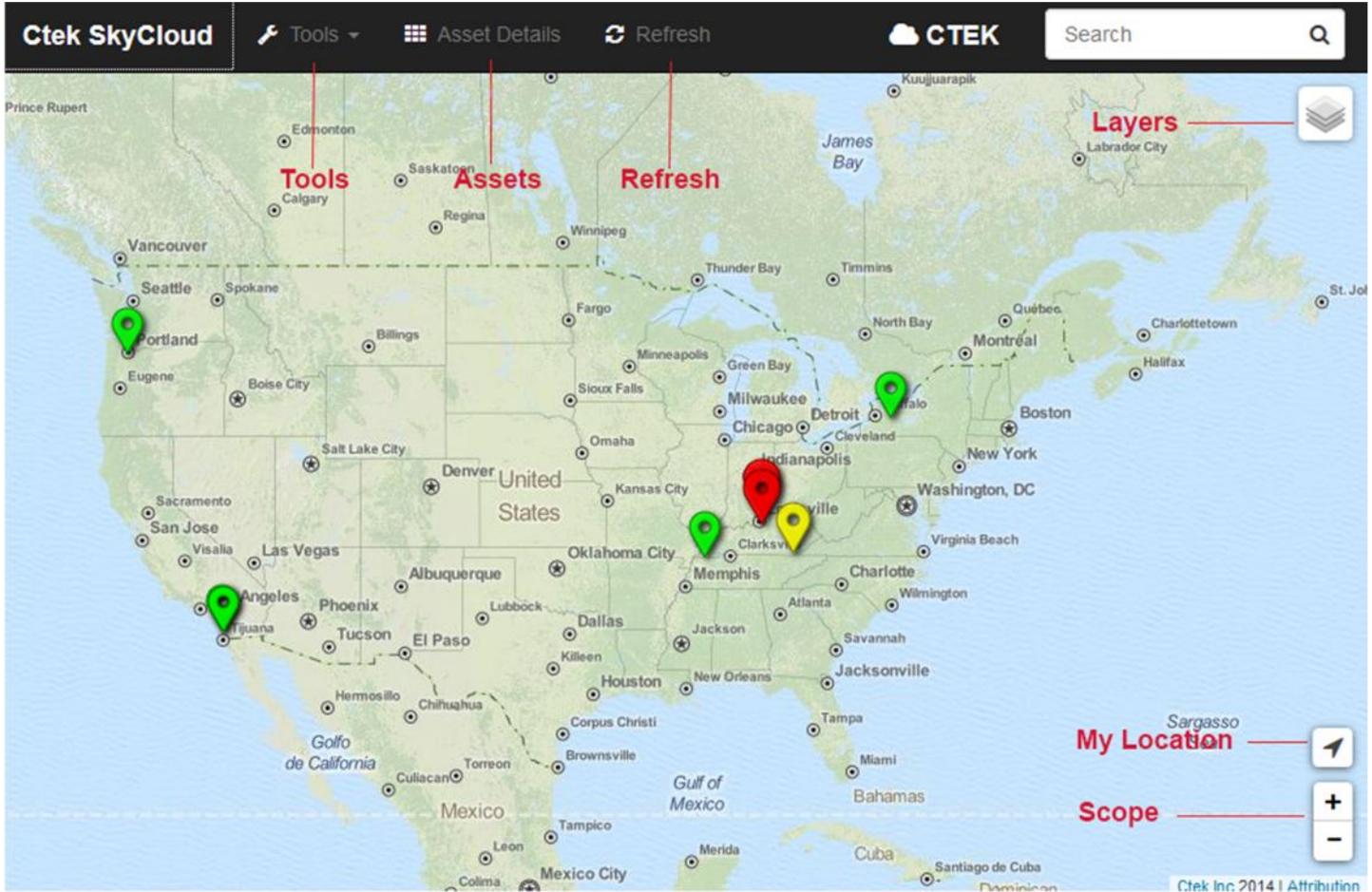


Figure 11 - Primary Interface Display Controls

5.6.1 Tools

The Tools dropdown menu provides menu items to enhance the visual display. Selecting the Tools dropdown presents the options shown in Figure 12 below:

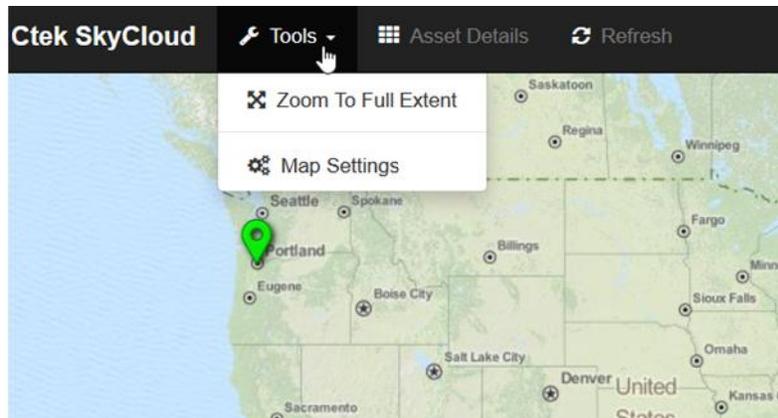


Figure 12 - Tools Drop-down

Zoom To Full Extent – Selecting this option will return the display to a visualization of the entire cloud appropriately scoped for that cloud as described in Section 5.1 (Primary Interface).

Map Settings – Selecting the Map Settings option brings up an Auto-Refresh selector screen as shown in Figure 13 below:

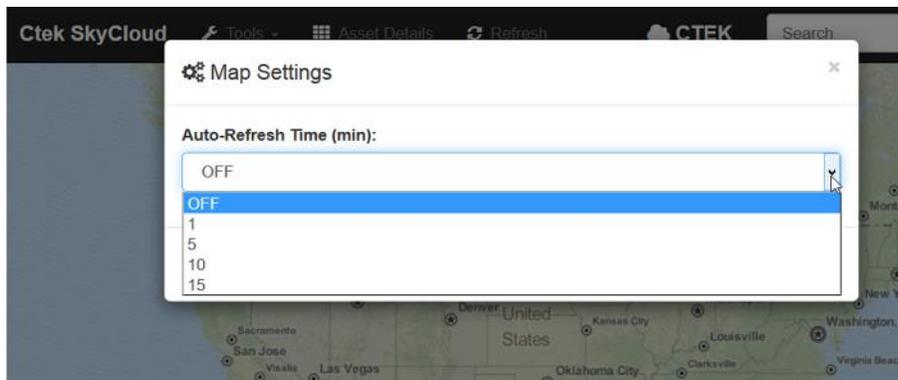


Figure 13 - Auto Refresh

Auto-Refresh allows the user to select an interval (in minutes) at which the mapping visualization will be updated or refreshed. This feature allows the user to monitor any endpoint pin color status changes (red, yellow, green) as well as any changes to application assigned attributes and to reported location.

Note: It is important to understand that the Auto-Refresh feature simply updates the visual display with whatever information has been reported by the endpoints. It **DOES NOT** interrogate the endpoint and has no bearing on the amount of cellular data used by the endpoint.

5.6.2 Assets

The Asset Details button creates a display of all assets within the cloud without regard to any layering or filtering that may have been applied to the visualization. The list of assets and the key status indicators associated with the asset is displayed as a vertical scrolling area alongside the left hand of the screen.

5.6.3 Refresh

The Refresh button issues a new POST command to the server and causes the display to be refreshed with the most current information. Refresh will return the display to the default size for the cloud being monitored. To refresh an individual pin for tracking purposes it is advisable to use the position refresh button within the individual pin's display.

5.6.4 Layers

The Layers control displays two different filtering mechanisms. The first filter allows the visualization to be viewed over a street map, or an aerial display, or both. The second filtering mechanism determines which assets are displayed, the choices being any combination of green, yellow, red, or gray (inactive) assets.

5.6.5 My Location

The My Location button will transmit to the SkyCloud server any location information available on the laptop/tablet that you are using to access SkyCloud. The server will reposition the display over the approximate area that it believes you are in and display a blue shaded area over the most likely area of your location. It is important to note that this transaction is between your laptop and the SkyCloud server over the network that is providing communications for your laptop. Typically, the location determination is made by identifying the location of the first network element that your network traffic is passing through. The actual accuracy of this can vary significantly depending on the network architecture of your serving network.

5.6.6 Scope

The Scope control adjusts the coverage area of the map presentation to focus the view on a specific area. This feature is useful to "drill down" on a cluster of assets so they can be isolated from each other.

6 SkyRouter Administration for SkyCloud

6.1 Obtaining a SkyCloud Device Activation

SkyCloud device activations are available from all authorized Ctek sales channels. To activate a license you will need to supply your Ctek representative with the 10-digit serial number of the device to be licensed and the details on which SkyCloud products you wish to enable.

6.2 Configuration- DDNS Services

On the SkyRouter's main administrative menu select the DDNS Services item from the Services column. The screen shown in Figure 12 will appear. On this screen settings are available for EW/UDP and for all SkyCloud services.



SkyCloud Configuration

DDNS Type Select DDNS Type: <input type="text" value="SkyCloud"/>
Basic Parameters For All DDNS Types Device Name: <input type="text" value="piffard01.ctekskycloud.com"/> DDNS Server 1: <input type="text" value="ns1.ctekskycloud.com"/> DDNS Server 2: <input type="text"/>
Parameters Required For SkyCloud Services Cloud Group ID: <input type="text" value="ctek"/> Cloud Button Name: <input type="text" value="Cloud Services"/>
SkyCloud Location Services <input type="text" value="Enable Location Services"/> Update Rate: <input type="text" value="12"/> <input type="text" value="Hours"/>
SkyCloud Network Management Services <input type="text" value="Enable Network Management Services"/>

Figure 14 - SkyRouter SkyCloud Configuration

6.2.1 DDNS Type

As shown in Figure 13 the DDNS pull-down menu offers the following selections:

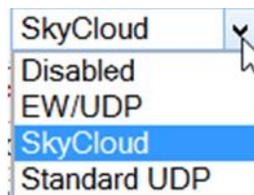


Figure 15 - DDNS Type

EW/UDP – Enables support for the legacy EW/UDP DDNS protocol supported prior to SkyRouter release 4.02.02.

SkyCloud – Enables protocol support for the SkyCloud protocol. This selection should be used for all three levels of SkyCloud service.

Standard UDP – Enables support for the RFC standard DNS protocol.

6.2.2 Device Name

Device name should be filled with the fully qualified domain name of the endpoint. For standard configurations the entry should be **your-selected-name.ctekskycloud.com**.

Note: The your-selected-name portion of the fully qualified domain name must be twenty-three (23) characters or less in length and may not contain the space or underscore (_) character.

6.2.3 DDNS Server 1 & 2

The DDNS Server fields should be filled with the fully qualified domain name or IP address of the SkyCloud Servers. For standard configurations use NS1.ctekskycloud.com. Specifying redundant (NS1 & NS2) name servers doubles the amount of data transmitted for DDNS record type

6.2.4 Cloud Group ID

The Cloud Group ID binds all endpoints having the same Cloud ID into a single cloud for management and display purposes. This field is required for all SkyCloud services.

6.2.5 Cloud Button Name:

This field should be filled with the desired name of the cloud selection button that will appear on the SkyRouter's main administrative menu.

6.2.6 Enable/Disable Location Services

When Location Services are enabled, a location message type will be sent to the SkyCloud server at the specified frequency. If Location Services are enabled the update rate must be set.

6.2.7 Update Rate

These fields are used to set the interval between location messages in hours or minutes.

Note: The frequency of location updates will impact the overall data usage of the endpoint. For stationary devices a setting of once every 12 hours is recommended. For mobile assets the user should consider the granularity of positioning required for a specific application.

6.2.8 Enable/Disable Network Management Services

When Network Management Services are enabled a Network Management record will be sent to the SkyCloud at a prescribed interval. Since network data is either static, presented as an average, or presented in terms of extremes there is no need for a rapid update of this record type. The factory default setting is once every two (2) hours. To adjust this interval contact Ctek for support.

6.3 Configuration – Location Source

On the SkyRouter's main administrative menu select the Location Source item from the Interfaces column. The screen shown in Figure 14 will appear.

Ctek **System Location Source**

Location Source: Internal GPS User Defined (below)
(Please note that LAT and LON must be entered in decimal format)

LAT:

LON:

Figure 16 - Location Source

6.3.1 Location Source

Select internal GPS for applications that need to determine actual location and may be mobile. The User defined selection allows a user to manually enter coordinates for stationary installations.

6.3.2 LAT/LON

The LAT and LON fields must be filled in for configurations specifying a user defined setting. LAT and LON must be entered in the decimal format as shown in Figure 14.