

Intel® LTE IOT Quick Deployment Sonim XPi

User Guide

September 2017



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Revision History

Date	Revision	Description
September 2017	1.0	Initial release.

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1.0 Introduction

The Sonim XPi harnesses the power of data and enables businesses to gain valuable insights by connecting and gathering information from equipment, livestock, vehicles, shipping containers, and more. Built to withstand the most brutal environments, the rugged design of the XPi opens the door for unlimited field deployment possibilities. The XPi has been pre-certified on the AT&T LTE network and can quickly deploy multiple intelligent sensors in the field. Optimized for the AT&T IoT platform and M2x service, the XPi can be up and running and collecting data in minutes with no need for specialized training or experience.

Figure 1. Sonim XPi™ IP65 Rugged Device



1.1 Features

- Ultra-rugged IP65 rated design IoT device

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- Built-in sensors with modular design to securely attach additional sensors
- Connects to AT&T's M2X Service and Flow Designer platforms
- 4G LTE CAT 1 America
- Intel® Quark™ SE Microcontroller C1000
- 1 MB SPI flash memory
- USB 1.1 connector
- 36-pin expansion connector
- Ultra-rugged IP65 design
- Embedded SIM

Table 1. Supported Features

Feature	Description
Initial Configuration	At power-up, the platform: <ul style="list-style-type: none"> • Connects to a time service to align its Real Time Clock. Note: For this release, there is no integration to the Intel® Device Management Service, so the default device configuration is used. See Section 5.1 for the settings used.
Time Management.	After power on, the platform performs an NTP sync to ensure it has the correct time.
Power Management	Sensors which are disabled through the configuration are held in the lowest possible power consumption state. Sensors which are enabled through the configuration settings are held in the lowest possible power consumption state when not active. When the GPS sensor is enabled, it is held in the Warm Start standby mode, with the "Easy" orbit predication algorithm enabled to minimize satellite acquisition time. The host processor is held in the lowest possible power state when not actively communicating with the modem or sensors.
Connectivity Management	Cellular Modem If the connection to the Cellular Network fails the connection is retried. The retry mechanism depends on whether the NTP Sync has happened or not. No NTP Sync : <ul style="list-style-type: none"> • Connection request sent every second until successful connection is made or retry duration ends. NTP Sync successful : <ul style="list-style-type: none"> • Connection is retried based on a configurable number of attempts. If no connection is made the retry mechanism restarts at the next upload interval. When a connection is established to the Cloud platform: <ul style="list-style-type: none"> • All stored sensor data is uploaded and deleted from the host processor buffer. If a Cloud connection is unsuccessful, the sensor samples are buffered until the next connection time.



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Feature	Description
	<p>Bluetooth</p> <p>When the Bluetooth feature is enabled, the advertising interval is set to 1200ms to lower the BLE module power consumption.</p> <p>The Bluetooth module provides the following read-only characteristics:</p> <ul style="list-style-type: none"> • Battery Service • Most recent cellular RSSI value • Number of cellular connection retry attempts within the last 24 hours • Time and date of the last successful cellular connection • GPS Latitude • GPS Longitude • GPS Altitude • GPS Number of satellites in view • Humidity • Temperature • Barometric Pressure • Peak Vibration • Ambient Light <p>The Bluetooth module buffers the Characteristic data internally.</p> <p>When enabled, the Bluetooth GAP server publishes a device name of LIQD-xxxx, where “xxxx” is the unique serial number of the platform.</p>
<p>Sensor Management</p>	<p>When a sensor value is recorded, a 32 bit UNIX timestamp is recorded with it. All timestamps are reported in ISO8601 UTC format, with no time zone offset applied.</p> <p>Depression of the user push button:</p> <ul style="list-style-type: none"> • Causes an immediate connection attempt to the Cloud server, initiating a configuration check and transfer of sensor data • Does not alter the timing of periodic cellular connection attempts <p>At the configured update interval:</p> <ul style="list-style-type: none"> • The device connects to the M2X platform and posts its buffered sensor data <p>Supported Sensor Streams in this release include :</p> <ul style="list-style-type: none"> • Ambient Light - ambient light • Battery Level - bat • Humidity - humidity • Location - location • Barometric Pressure - pressure • Vibration - shock • RSSI - rssi • Temperature - temp <p>The device API key created for the device to upload sensor data has POST and PUT rights only.</p>
<p>Cloud Communication</p>	<p>At the configured update interval, the device connects to the M2X platform and posts its buffered sensor data.</p>

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Feature	Description
	Uploading multiple streams using JSON Formatted messages via HTTP/HTTPS is supported. The device API key created for the device to upload sensor has POST and PUT rights only.
LED Indicators	See Section 3.8
Button Behavior	See Section 3.9
Device Modes	The device can be put into different modes to allow flexibility for different lab testing requirements. <ul style="list-style-type: none">• Standard Mode (“s” -> Normal Operational Mode)• Network Test Mode (“t” -> Network Registration Only)• Always On Mode (“a” -> Keep Cellular Modem Always On – No Sleep) See Section 3.7 for details

1.2 What’s in the Box?

Verify the components you received:

- Sonim XPi™ device
- End cap
- Info sheet

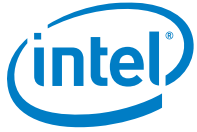
The device comes partially charged and ready to activate.

Note: The 5V/1A USB Charger and Micro USB Cable must be purchased separately.

1.3 Support

For technical support:

1. Go to: <https://marketplace.att.com/support>
2. Select Sonim XPi in the drop down menu and access:
 - Latest User Guides
 - The Groove Ticketing
 - Live Chat
 - Knowledge Base



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For product specific information, go to:

<https://marketplace.att.com/products/sonim-xpi>

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2.0 Quick Setup

Refer to the Quick Start Guide at <https://marketplace.att.com/products/sonim-xpi>.

2.1 Setup

Follow these steps to set up the Sonim XPi device:

1. Access the Device Management Service at: <https://devicemanagement.intel.com> or click this button:

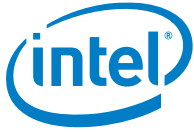


2. Click the button to log in to the AT&T IoT Platform.

**Welcome to Intel® Device Management System
(Intel® DMS)**

- You will be temporarily routed to the AT&T login Authentication screen.
- Use the AT&T IoT platform account credentials you used to purchase your order.
- Upon authentication, you will be routed back to the Intel® Device Management System (Intel® DMS) to activate your devices.
- Use the Quick Start Guide to navigate the Intel® Device Management System (Intel® DMS)).

[Log in to AT&T IoT Platform](#)



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3. Enter the AT&T IoT account credentials that were used when purchasing your devices.

Username / Email manjunath

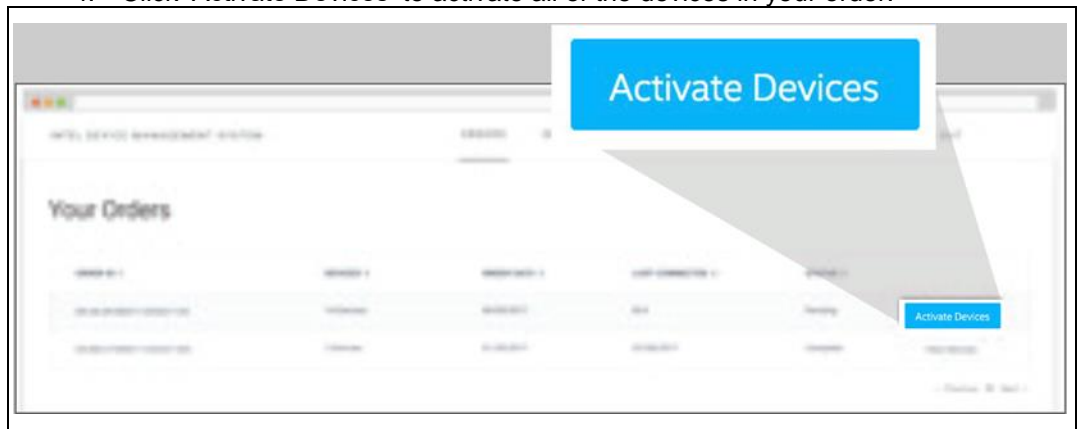
Password

Forgot your [username](#) or [password](#)? [LOGIN](#)

You are routed to Intel® DMS to activate your devices.

Note: If you do not have a username and password for the AT&T IoT account, ask your manager for the name of the person who purchased the devices for your company.

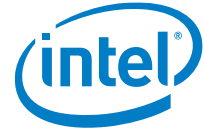
4. Click 'Activate Devices' to activate all of the devices in your order.



2.2 View Device Data

Users can view device data in two ways:

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1. Download the Intel® LIQD Mobile Application.



2. Use the [M2X website](#).

The screenshot shows the Intel Device Management System interface. At the top, there is a navigation bar with the Intel logo, 'Device Management System', and tabs for 'Orders' and 'Devices'. A 'Sign out' button is visible in the top right. Below the navigation bar, the main heading is 'Devices'. There is a search and filter section with columns for 'Device Name', 'AT&T Order ID', 'Device Serial #', and 'Device Status'. Below this is a table with one device listed. The table has columns for 'Device Name', 'Device Serial Number', 'ICCID', 'Status', 'Last Data Received', and 'Configuration'. The device listed has a status of 'Pending Sync' and 'Last Data Received' of 'N/A'. A 'View Device Data' button is highlighted in the table row.

Device Name	AT&T Order ID	Device Serial #	Device Status
Any	All	Any	Any

1 of 1 Devices [Select all 1 devices that match your filters](#) [Bulk Configure](#)

Device Name	Device Serial Number	ICCID	Status	Last Data Received	Configuration	
<input type="checkbox"/>	678901234567812345	678901234567812345	098765432109876543	Pending Sync	N/A	Order Default View Device Data



3.0 Using the Sonim XPi

Devices come partially charged and ready to be activated.

3.1 Power on the Device

Press and release the Power button to power on the device.

The 'User LED' flashes white 3 times at 100ms intervals to indicate the device is powering up.

If the 'User LED' flashes red 3 times, the device is already ON.

Tip:

- If the device is connected to a USB charger, the Power LED is green.
- If the device is running on battery, NO LED is illuminated.

Note: It may take 5-6 seconds for the 'User LED' to flash white. Do not press the power Button again.

3.2 Power off the Device

Press and hold the Power Button for 10 seconds.

The user LED flashes RED every second while the button is held.

3.3 Charge the Device

The XPi can be charged with a 5V/1A USB Charger and Micro USB Cable, purchased separately.

The Charge Status LED is RED until it is fully charged, at which time the LED turns off.

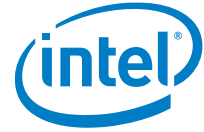
3.4 Wake Up the Device

If the device is running on battery, it goes to sleep between sensing intervals.

Press and quickly release the Power button to wake up the device. This wakes the device for 20 seconds.

3.5 Device Battery

<Add info on the battery, how long it lasts, based on use cases being tested>



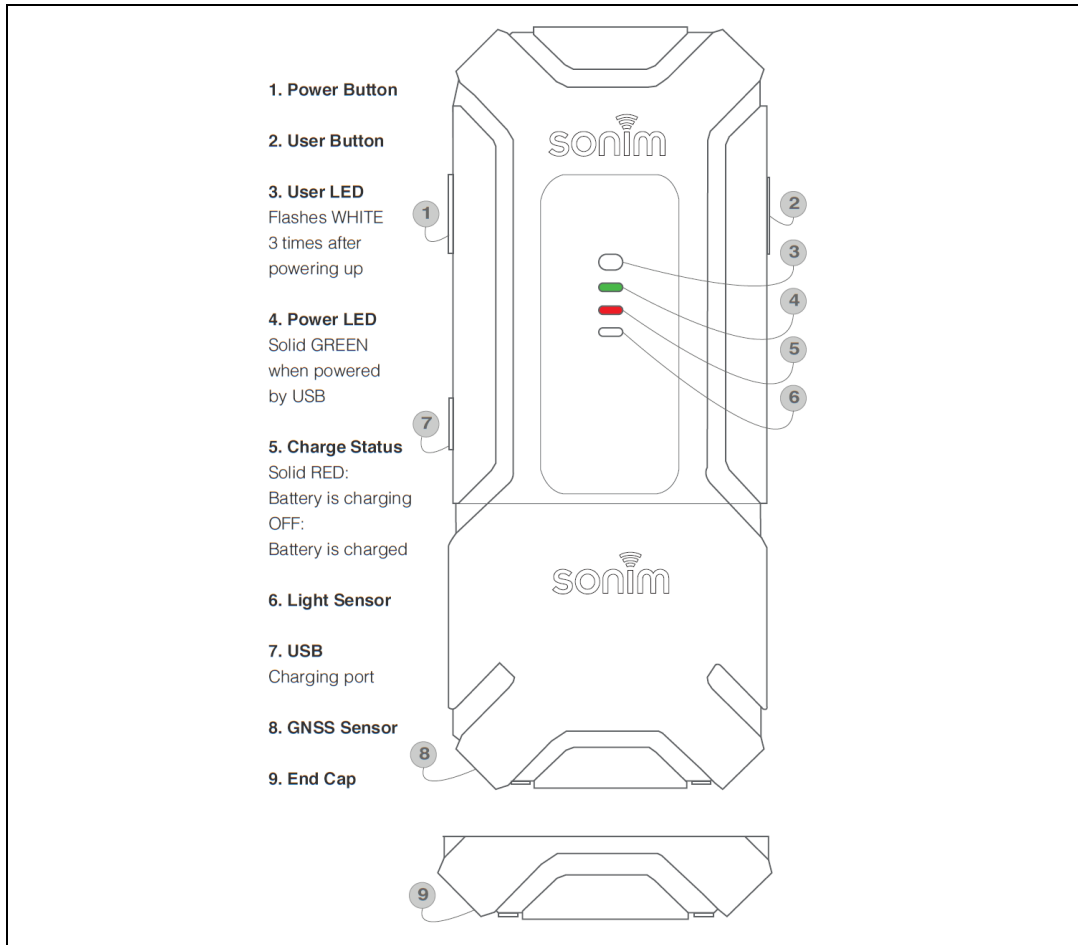
3.6 Firmware Updates

After each data upload, the device connects to the Intel® DMS to check for firmware updates. Intel will push <think of word – unobtrusive type> firmware updates as needed, to improve usability and performance of the device.

3.7 LED Indicators

Figure 2 illustrates the user interface of the device.

Figure 2. LED Indicators and Buttons



3.7.1 Charge Status LED

Table 2. Charge Status LED Indicators

Charging LED	Behavior
Solid RED	Battery is charging



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Charging LED	Behavior
OFF	Battery is charged

NOTE: This LED is controlled by hardware. Software cannot control this LED.

3.7.2 Power LED

Table 3. Power LED Indicators

Power LED	Behavior
GREEN	Board is powered by USB and turned on

3.7.3 User LED

Table 4. User LED Indicators

User LED	Behavior
Flashing WHITE quickly 3 times	Powering up
Flashing RED every second	Button held while powering down the board
GREEN for half a second	Data is successfully sent to the cloud
RED for half a second	Connection attempt to the cloud failed
BLUE for a tenth of a second	Sensors are being sampled
Flash BLUE for 100msec every 1s	BLE is discoverable
BLUE for 3s	BLE connection is made
Flashing AQUA	BLE module is initializing

3.8 Button Behavior

Each button has a distinct function and pressing the user and power buttons down together do not yield any action.

3.8.1 User Button

Before using any user button functions, press the power button to ensure the system is awake.

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Table 5. User Button Behavior

User Button	Behavior
Button is pressed and released	An immediate connection attempt to the Cloud server is made, initiating a configuration check and transfer of sensor data. Note: The user LED is solid GREEN for 500ms when data is successfully sent to the cloud. Note: On User button press, the user LED is solid WHITE for 100ms. This LED display indicates that the button press has been detected.
Button is pressed and held for 2 seconds while the device is running	The BLE module will be enabled. Note: The user LED flashes AQUA while initializing the BLE module, then flashes BLUE every 1s while advertising, and turns off the module after 60s of advertising. The user LED stays solid BLUE for 3 seconds if connection is made.

3.8.2 Power Button

Table 6. Power Button Behavior

Power Button	Behavior
Button is pressed and held for 10 seconds	Device powers down. The user LED flashes RED every second while the button is held.
Button is pressed and released	The board wakes up and does not go back to sleep for 20s.



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4.0 Using Intel® Device Management Service

The Intel® DMS provides the user interface for the end user to activate and configure their devices.

Click on the Orders tab to activate your devices.

AT&T Order ID	Devices	Order Date	Activation Date	Status	
iotauto_27f851756ebcff190854ed605968e93f699	3 Devices	09/07/2017	09/07/2017	Pending	Activate Devices
iotauto_8854cfea5317bcd47f88794ac7b91627ca8	1 Devices	09/07/2017	09/07/2017	Pending	Activate Devices
iotauto_90a0e1f6bffc94c18f7dcd88bae9edb6bf8	1 Devices	09/07/2017	09/07/2017	Pending	Activate Devices

Click on the [Activate Devices](#) button next to the device you want to activate. Once you have activated your devices, you can view their status.

Note: All devices within an order are activated at the same time. Once an order is activated, the View Devices button is available and the status is Complete.

Click on the Devices tab for information for each order.

4.1 Factory Configuration

All devices are shipped with factory default configuration settings as listed.

All sensors are enabled, as shown in Figure x

<add screenshot>

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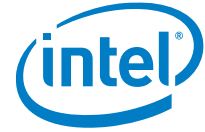


Figure 3. Default Configuration

The screenshot shows the 'Device Configuration' window in Intel Device Management. The window title is 'Device Configuration' and it includes a close button (X) in the top right corner. On the left side, there is a sidebar with the 'Devices' section, showing a search filter 'Any' and a list of devices with checkboxes. The selected device is 'iotaauto_N4579PEuHGm8Z4ZLA3VB'. The main content area shows the configuration for this device. At the top, the 'Name' field contains 'iotaauto_N4579PEuHGm8Z4ZLA3VB' with an 'Edit' button and a 'Reset to Factory Default' button. To the right, the 'Reporting Interval' is set to '1' hour. Below this, there is a table of sensors with columns for 'Sensors', 'Sensor Reading Frequency', and 'Status'. The sensors listed are Temperature, Peak Shock, Ambient Light, Humidity, Location, Atmospheric Pressure, Battery Charge Level, Battery on Charge, and RSSI. Each sensor has a frequency of 15 minutes and a status of 'On'. At the bottom of the window, there are 'Apply' and 'Cancel' buttons.

Sensors	Sensor Reading Frequency	Status
Temperature Temperature in degrees celsius.	15 Minutes	On
Peak Shock Peak intensity of motion.	15 Minutes	On
Ambient Light Ambient light level in lux.	15 Minutes	On
Humidity Relative humidity level.	15 Minutes	On
Location Track your device location.	15 Minutes	On
Atmospheric Pressure Atmospheric pressure in millibar.	15 Minutes	On
Battery Charge Level Percentage of battery charge.	15 Minutes	On
Battery on Charge Track if device is being charged via USB cable.		
RSSI Received signal strength in decibels.		



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4.2 Search Capability

A flexible search form provides several fields to enter search criteria.

Enter criteria in a field and apply search criteria by clicking the Apply Filters button to query the fields for the results. You can also use the drop down menus to select a specific AT&T Order ID or view by Device Status.

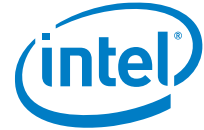
Figure 4. Search Capability

The screenshot shows the Intel Device Management Service interface. At the top, there is a navigation bar with the Intel logo, "Device Management Service", and tabs for "Orders" and "Devices". A "Sign out" button is visible in the top right. Below the navigation bar, the main heading is "Devices", with a "View Data in M2X" button to its right. A search filter section contains four input fields: "Device Name" (with a search icon), "AT&T Order ID" (with a dropdown arrow), "Device Serial #" (with a search icon), and "Device Status" (with a dropdown arrow). An "Apply Filters" button is positioned to the right of these fields. Below the filter section, it indicates "41 of 41 Devices" and a "Bulk Configure" button. A table displays the following data:

<input type="checkbox"/>	Device Name	Device Serial Number	ICCID	Status	Last Data Received	Configuration	
<input type="checkbox"/>	test_516	iotauto_mm6mUIQ77xAGG3g34Y8j5L	350d003b5c35d9f2a42e	Error Offline	09/10/2017	LIQD_01	View Device
<input type="checkbox"/>	new	iotauto_od9KhoJJJXJXQMBDKzbNB3	50cd3f8fe8afeb69a752	Pending Sync	N/A	Custom	View Device
<input type="checkbox"/>	iotauto_pxbB4s64pMmhta6xLU6gt	iotauto_pxbB4s64pMmhta6xLU6gtN	7d7ac86456f568ab22db	Pending Sync	N/A	Custom	View Device

Click the Remove Filter ⊗ button next to the field to clear all criteria, and show all records.

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4.3 Configure a Single Device

To custom configure your devices individually:

1. Log into the Intel® Device Management System (Intel® DMS) using your AT&T IoT Platform Account credentials.
2. From the Devices screen, click the **name of the device** to see data for one device.

Figure 5. Devices Menu

Device Name	AT&T User	Device Serial Number	ICCID	Status	Firmware
Sonim XPI 1	r5fnU2W9QQx8yZbk7JzIQc	19318270b312z1z32	89883037464910384635	Not activated	Up to date
Sonim XPI 2	f4fnU2W9QQx8yZbk7JzIQc	49318270b312z1z32	789883037464910384635	Healthy	Up to date
Sonim XPI 3	e3fnU2W9QQx8yZbk7JzIQc	79318270b312z1z32	589883037464910384635	Config Pending	Up to date
Sonim XPI 4	w2fnU2W9QQx8yZbk7JzIQc	99318270b312z1z32	189883037464910384635	Config Delayed	Up to date
Sonim XPI 5	y6fnU2W9QQx8yZbk7JzIQc	29318270b312z1z32	389883037464910384635	Not Activated	Up to date
Sonim XPI 6	f7fnU2W9QQx8yZbk7JzIQc	19318270b312z1z32	489883037464910384635	Healthy	Up to date
Sonim XPI 7	r5fnU2W9QQx8yZbk7JzIQc	69318270b312z1z32	289883037464910384635	Offline	Up to date
Sonim XPI 8	f4fnU2W9QQx8yZbk7JzIQc	29318270b312z1z32	389883037464910384635	Not activated	Up to date
Sonim XPI 9	e3fnU2W9QQx8yZbk7JzIQc	19318270b312z1z32	489883037464910384635	Healthy	Up to date
Sonim XPI 10	w2fnU2W9QQx8yZbk7JzIQc	69318270b312z1z32	289883037464910384635	Config Pending	Up to date



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4.4 Configure Multiple (Bulk) Devices

To configure multiple devices:

1. <After logging in – refer to logging in section to log in> Log into the Intel® Device Management System (Intel® DMS) using your AT&T IoT Platform Account credentials.
2. Select multiple check boxes next to the device name and utilize the **Bulk Configure** feature.

Figure 6. Bulk Configuration

The screenshot shows the Intel Device Management System interface. At the top, there is a navigation bar with the Intel logo, 'Device Management System', and tabs for 'Orders' and 'Devices'. A 'Sign out' button is visible in the top right. Below the navigation bar, the main heading is 'Devices'. There is a search and filter section with fields for 'Device Name', 'Order ID', 'Device Serial #', and 'Device Status'. The 'Order ID' field contains 'xZpRSQG9xjqaveWpG682'. Below this, it says '3 of 3 Devices' and 'Select all 3 devices that match your filters'. A 'Bulk Configure' button is present. The main content is a table with columns: Device Name, Device Serial Number, ICCID, Status, Last Data Received, and Configuration. Three devices are listed, each with a checked checkbox in the first column. The first device is 'iotauto_mMggFyQpf22CHsfDzQKThE', the second is 'iotauto_zSKFUGK4VXeZrDNQUHYufb', and the third is 'iotauto_eqKeq6mGQoDoo6NpnXGhMX'. Each device row has a 'View Device Data' link. At the bottom, there are links for 'DATA STORAGE M2X' and 'CARRIER AT&T'.

<input type="checkbox"/>	Device Name	Device Serial Number	ICCID	Status	Last Data Received	Configuration	
<input checked="" type="checkbox"/>	iotauto_mMggFyQpf22CHsfDzQKThE	iotauto_mMggFyQpf22CHsfDzQKThE	67728ffdd95bb016763c	Not Activated	N/A	Custom	View Device Data
<input checked="" type="checkbox"/>	iotauto_zSKFUGK4VXeZrDNQUHYufb	iotauto_zSKFUGK4VXeZrDNQUHYufb	19844a23a09e071ab1d7	Not Activated	N/A	Custom	View Device Data
<input type="checkbox"/>	iotauto_eqKeq6mGQoDoo6NpnXGhMX	iotauto_eqKeq6mGQoDoo6NpnXGhMX	72fa38e4d2054d9e9324	Not Activated	N/A	Custom	View Device Data

3. Set sensor reading frequency and turn sensors on, or off.

4.5 Configuration Considerations

- Minimum Sensor Reading Frequency – 5 minutes

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- Minimum Reporting Interval – 5 minutes

Note: If the Sensor Reading Frequency is set too low relative to the Reporting Interval you may lose data as older readings will be overwritten by new ones.

Warning: You will receive a warning if the settings entered will likely lead to data loss. However it should be noted that the calculation used does not account for M2X upload failures or network connection failures.

- Battery Charge Level / Battery Charge Indicator. The Battery Charge Indicator is not directly configurable and will take its configuration setting from the Battery Charge Level i.e. if you disable the Battery Charge Level on DMS you will not see any values reported to the 'Charging' stream on M2X.
- Possible Values for the Battery Charge Indicator are ON (1) or OFF (0)
- Reporting Interval offset.
- The 'com_offset' parameter is sent by the DMS to the device as part the configuration. It is used by the device to offset the upload time of the **first** data upload after power-on or after a configuration change.
- The 'com-offset' is a random value between 0 and the Reporting Interval – 1 second. The intention of the parameter is to avoid multiple devices with the same configuration that are powered in simultaneously to connect to M2X at the same time.
- Subsequent uploads should happen as per the configured reporting interval.

4.6 User Interface

4.6.1 Accessing Intel® DMS End Interface

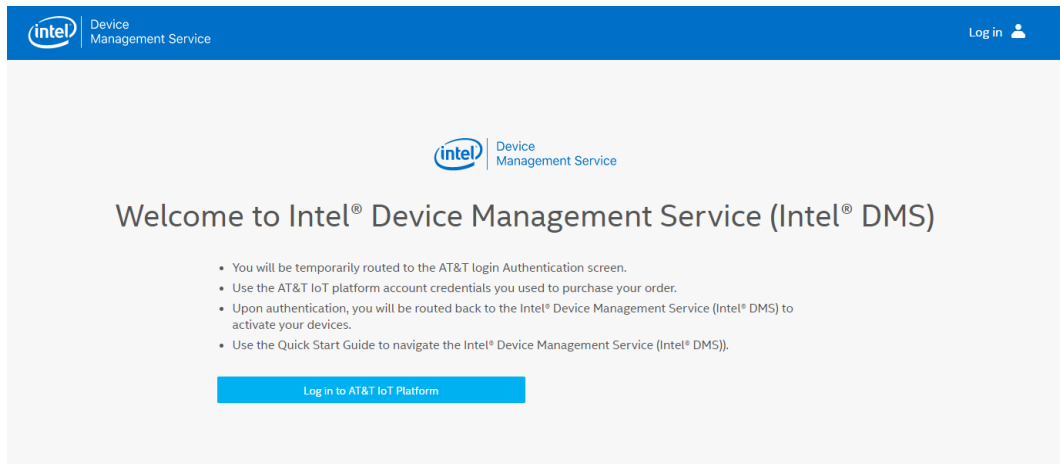
The Intel® Device Management Service User Interface can be accessed at <https://devicemanagment.intel.com/>

To login select the 'Log in' button on the top right of the screen or the 'Login to AT&T IoT Platform' button.



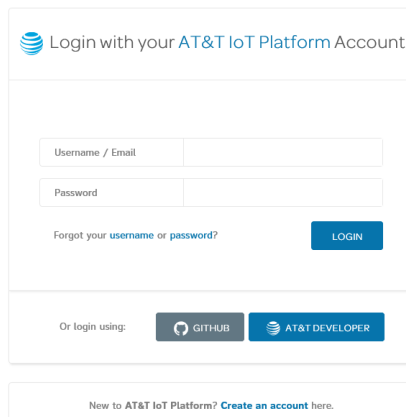
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Figure 7. Intel® DMS login screen



You are temporarily routed to the AT&T IoT Platform. Enter the credentials for your M2X account. These credentials are provided during the device order process.

Figure 8. AT&T IoT Platform Login Screen



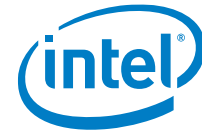
After entering valid M2X credentials, you are routed back to the Intel® DMS main interface.

4.6.2 Orders

From the Orders tab, an end user can:

- View status of their orders. Possible order states are:
 - Completed
 - In Progress
 - Pending

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- Complete order activation for Pending orders
- View the Devices on the Order

4.6.2.1 Order Fields

Figure 9. Order Fields

A AT&T Order ID	B Devices	C Order Date	D Activation Date	E Status	
bcamp_b23e2fc23b0ca6dd407204c6e7ec37ac2ae	1 Devices	09/14/2017	09/14/2017	Completed	View Devices
bcamp_e79ac6af6089d50919a13b98dcd7a5f344c	1 Devices	09/11/2017	09/11/2017	Completed	View Devices
bcamp_56ce82ffc336aefe88e8b74e41e233714fa	1 Devices	08/29/2017	08/29/2017	Completed	View Devices
iotauto_3539290e9fdcb0d710efa6668e573af43a4	1 Devices	07/27/2017	07/27/2017	Completed	View Devices

- A. **AT&T Order ID** The AT&T Order Number assigned when the order was made
- B. **Devices** The number of devices included on the order
- C. **Order Date** The date the order was made
- D. **Activation Date** The date the devices on the order were activated
- E. **Status** The current status of the order

4.6.2.2 Activate an Order

To activate all the devices associated with a specific AT&T Order ID, select the Order ID in the 'Orders' tab and click 'Activate'.

4.6.2.3 View the Devices on an Order

To view all the devices associated with a specific AT&T Order ID, select the Order ID in the 'Orders' tab and click 'View Devices'. You are routed to the 'Devices' tab where all the devices for that order are listed.



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Figure 10. View Devices

Device Name	AT&T Order ID	Device Serial #	Device Status
Any	All	Any	Any

Device Name	Device Serial Number	ICCID	Status	Last Data Received	Configuration
108	108	89011702272001378493	Error Offline	07/31/2017	Order Default
355464070326748	355464070326748	89011702272001378493	Pending Sync	09/15/2017	Custom
17072600529	17072600529	89011702272001378113	Error Offline	09/14/2017	Order Default
XPIN17072600529	XPIN17072600529	89011702272001378113	Healthy	09/15/2017	Custom

4.6.3 Devices

From the Devices tab, an end user can:

- View the list of current devices
- View the configuration for any device
- Update the configuration for a device
- Update the configuration for a range of devices
- Click through to M2X to view device data

4.6.3.1 Device Search Fields

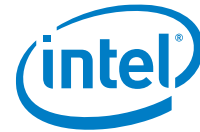
Figure 11. Device Search Fields

A Device Name	B AT&T Order ID	C Device Serial #	D Device Status
Any	All	Any	Any

Enter the search term and click 'Apply filters' to search.

- A. **Device Name** This is the Name assigned to the Device. By default this is the Serial Number. Users can edit this field to adopt a more user-friendly name.

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- B. **AT&T Order ID** The AT&T Order Number assigned to the Order
- C. **Device Serial #** Serial Number of the device. The Serial Number is printed on the back of the device.
- D. **Device Status** Current Status of the device

4.6.3.2 Device Fields

Figure 12. Device Fields

The screenshot shows the Intel Device Management Service interface. At the top, there is a navigation bar with the Intel logo, 'Device Management Service', and tabs for 'Orders' and 'Devices'. A 'Sign out' button is also present. Below the navigation bar, the main content area is titled 'Devices' and includes a 'View Data in M2X' button. A search and filter section allows users to search for devices by name, AT&T Order ID, Device Serial #, and Device Status. Below this, a table displays a list of devices. The table has columns for Device Name, Device Serial Number, ICCID, Status, Last Data Received, and Configuration. A red box highlights the first row of the table, which is labeled with letters A through F corresponding to the column headers. The first row shows a device with ID 108, which is currently 'Error Offline'.

A	B	C	D	E	F	
Device Name	Device Serial Number	ICCID	Status	Last Data Received	Configuration	
108	108	89011702272001378493	Error Offline	07/31/2017	Order Default	View Device Data
355464070326748	355464070326748	89011702272001378493	Healthy	09/15/2017	Custom	View Device Data

- A. **Device Name** This is the Name assigned to the Device. By default this is the Device Serial Number but it can be edited to a more user-friendly name
- B. **Device Serial Number** Serial Number of the device. The Serial Number is printed on the back of the device.
- C. **ICCID** The ICCID associated with the e-sim on the device
- D. **Status** Current Status of the device. The possible states are:
 - **Not Activated** The Device has not been activated or device activation failed
 - **Healthy** The Device is communicating with the Intel® DMS
 - **Pending Sync** The most recent configuration change has not been synced to the device
 - **Sync Error** The most recent configuration change failed to sync to the device
 - **Error Offline** The device is not communicating with the Intel® DMS



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- **Offline**

E. Last Data Received The date of the most recent successful communication

Note: A Device Status of **Healthy** only indicates that the Device is Online and communicating successfully with the Intel® DMS. It is not an indication that the device is successfully collecting and uploading sensor data to M2X.

with the device.

F. Configuration There are 2 possible values for the Configuration setting:

- **Order Default** Indicates that the device is using the factory default settings.
- **Custom** Indicates that device configuration has been updated from the factory defaults.

4.6.3.3 **Configure Device(s)**

Click the 'Device Name' on the 'Devices' tab to view the current device configuration.

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4.6.3.3.1 Default Configuration

Figure 13. Default Device Configuration

Device Configuration

A Name: XPIN17072600529 [Edit](#) **G** [Reset to Factory Default](#) **D** Reporting Interval ⓘ: 1 Hours
How often do you want to send the data?

Sensors	E Sensor Reading Frequency ⓘ	F Status
Temperature Temperature in degrees celsius.	15 Minutes	OFF ON
Peak Shock Peak intensity of motion.	15 Minutes	OFF ON
Ambient Light Ambient light level in lux.	15 Minutes	OFF ON
Humidity Relative humidity level.	15 Minutes	OFF ON
Location Track your device location.	15 Minutes	OFF ON
Atmospheric Pressure Atmospheric pressure in millibar.	15 Minutes	OFF ON
Battery Charge Level Percentage of battery charge.	15 Minutes	OFF ON
C Battery on Charge Track if device is being charged via USB cable.		
B RSSI Received signal strength in decibels.		

[Apply](#) [Cancel](#)

- A. The default value of the 'Name' field is the device Serial Number. This can be edited to a more user-friendly name.
- B. RSSI is enabled by default and cannot be disabled.
- C. Battery On Charge Indicator is not directly configurable using the Intel® DMS UI and takes its configuration from the Battery Charge Level. If the Battery Charge Level on Intel® DMS is disabled, no values are reported to the 'Charging' stream on M2X. Possible Values for the Battery Charge Indicator are ON (1) or OFF (0).
- D. The default reporting Interval is 1 hour.
- E. The default Sensor Reading Frequency is 15 minutes.
- F. All sensors are enabled by default (ON).
- G. The 'Reset to Factory Default' button resets your device sensor and upload interval settings to the default settings.



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Note: 'Reset to Factory Default' button has no effect on the device name setting.

4.6.3.3.2 Configure a Single Device

Select the Device to be configured by clicking the 'Device Name' on the 'Devices' tab.

The configurable fields are:

- **Name** To change the device name click 'Edit' enter your new device name and click 'Save' to save the change.
- **Sensor Status** Slide the Sensor Status button to the desired position (ON/OFF) to enable/disable a sensor.
- **Reporting Interval** To change the Reporting interval enter the desired value in the dialog box and select Minutes/Hours/Days from the dropdown. Minimum Reporting Interval is 5 minutes.
- **Sensor Reading Frequency** To change the Sensor Reading Frequency enter the desired value in the dialog box and select Minutes/Hours/Days from the dropdown. Minimum Sensor Reading Frequency is 5 minutes.

Once the required changes have been made, click 'Apply' to save the new configuration.

Note: If the Sensor Reading Frequency is set too low relative to the Reporting Interval, you may lose data as older readings are overwritten by new ones.

Choosing settings that can likely lead to data loss generate a warning to users. However the calculation used does not account for M2X upload failures or network connection failures.

 Reporting interval is too long and/or sensor reading values are too short. Please adjust to prevent data loss.

4.6.3.3.3 Bulk Configure Devices

You can also select multiple devices and select 'Bulk Configure' to apply the same configuration to the selected devices.

To Bulk Configure ALL devices on a page, check the box beside the 'Device Name' (A) field at the top of the page and select 'Bulk Configure' (B).

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Figure 14. Bulk Configure Devices

The screenshot shows the Intel Device Management Service interface. At the top, there's a navigation bar with 'Orders' and 'Devices' tabs, and a 'Sign out' button. Below the navigation bar, the main heading is 'Devices'. There's a search and filter section with fields for 'Device Name', 'AT&T Order ID', 'Device Serial #', and 'Device Status'. An 'Apply Filters' button is present. Below this, there's a table of devices. The first row of the table has a 'Select All' checkbox highlighted with a red box labeled 'A'. The table has columns: Device Name, Device Serial Number, ICCID, Status, Last Data Received, and Configuration. There are four rows of device data. A 'Bulk Configure' button is highlighted with a red box labeled 'B'.

<input checked="" type="checkbox"/>	Device Name	Device Serial Number	ICCID	Status	Last Data Received	Configuration
<input checked="" type="checkbox"/>	108	108	89011702272001378493	Error Offline	07/31/2017	Order Default View Device Data
<input checked="" type="checkbox"/>	355464070326748	355464070326748	89011702272001378493	Healthy	09/15/2017	Custom View Device Data
<input checked="" type="checkbox"/>	17072600529	17072600529	89011702272001378113	Error Offline	09/14/2017	Order Default View Device Data
<input checked="" type="checkbox"/>	XPIN17072600529	XPIN17072600529	89011702272001378113	Healthy	09/15/2017	Custom View Device Data

Note: If you click the select all box at the top of the page (A) and your devices span more than one page, you need to configure each page separately.

4.6.3.4 View Device Data in M2X

When a device is powered on, it connects to Intel® DMS to download its configuration, which includes the M2X Credentials. If the device has successfully connected to the Intel® DMS, it shows a 'Healthy' status.

The Device then takes an initial reading from all enabled sensors and uploads the readings to M2X. To verify that the sensor data has been successfully uploaded, select the device from the 'Devices' tab and click 'View Device Data'.



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Figure 15. View Device Data in M2X

The screenshot shows the Intel Device Management Service interface. At the top, there's a navigation bar with 'Orders' and 'Devices' tabs, and a 'Sign out' button. Below this is a 'Devices' section with a search and filter area. The filter area includes fields for 'Device Name' (set to 'Any'), 'AT&T Order ID' (set to 'All'), 'Device Serial #' (set to 'XPIN17072600529'), and 'Device Status' (set to 'Any'). An 'Apply Filters' button is to the right. Below the filters, it says '1 of 1 Devices' and a 'Bulk Configure' button. A table lists the device details:

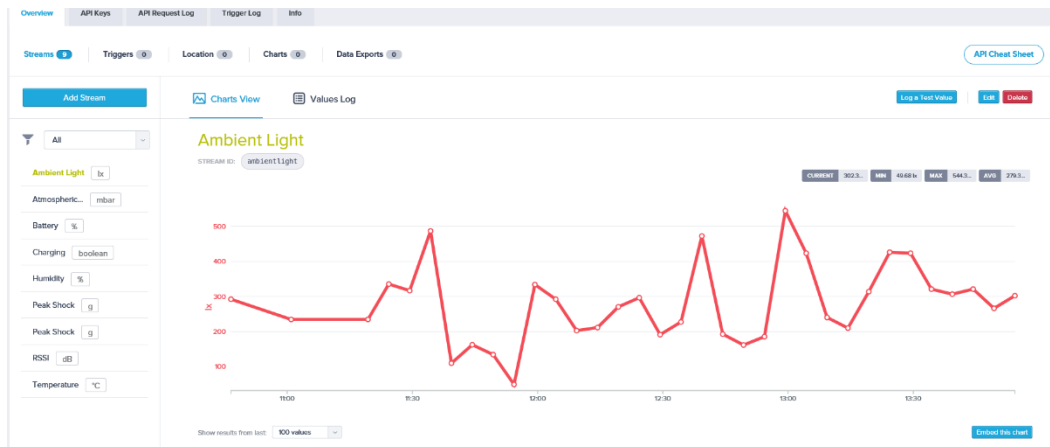
<input type="checkbox"/>	Device Name	Device Serial Number	ICCID	Status	Last Data Received	Configuration	
<input type="checkbox"/>	XPIN17072600529	XPIN17072600529	89011702272001378113	Healthy	09/15/2017	Custom	View Device Data

Clicking 'View Device Data' transfers you to the M2X page for that specific device (https://m2x.att.com/devices/<device_id>).

Clicking 'View Data in M2X' transfers you to the M2X page listing all your devices.

Data successfully uploaded appears graphed on the page.

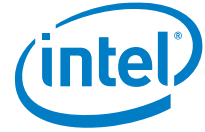
Figure 16. M2X Stream Data



Note: On the default Factory Configuration, ALL sensors are enabled.

Note: The Device can be identified via the Serial Number printed on the back.

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5.0 Using Intel® LTE IOT Display Mobile App

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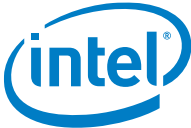


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Appendix AFAQ

Question	Answer
Why isn't the device charging?	
Why isn't the power LED green?	
When the device is in battery mode no LED at all and how would you know if device is powered on?	
When do I get charged for data? ? is it right when I turn it on? can i turn off data completely and not get charged from AT&T?	– You are being charged by At&T when you purchase your data plan whether the device is activated or not.
How does it attach to assets? Does it need to be in a certain position relative to cell towers, etc?	
How much data can the device store?	
How will the battery life be reflected in DMS based on current battery level and sensor settings?	
Represent the connectivity coverage limitations and breadth?	
Can it be placed inside a container?	
When will there be probes available? (sealed food and medical condition monitoring)	
how do you charge it?	
how do you know when its fully charged?	The DMS displays charging status and light on XPi™ changes when fully charged
What do the LEDs communicate?	
Where is the power button? how do you know when its on?	Power buttons color described in UG and QSG
Does it have to be fully charged before you can activate it?	They come fully charged
Can I put it on the asset/tank/etc before I activate it?	Yes, but it is recommended that you power cycle it on and off to test it and configure the device so you know which one it is and the ID
When users turn off all sensors, they may expect it to affect their data plan but it doesn't (they are charged regardless)?	
It should be made clear that the data plan begins as soon as customers purchase the service	

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Question	Answer
The way and amount the data is spread across devices in a plan needs to be made clear in marketing and guide materials as well as the levels of the plan (developer, professional, enterprise)	
We need to clarify that this solution is a set of services as well as a device they are purchasing	

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Appendix B Terminology

The following acronyms and terms are used in this document, and arranged in alphabetic order:

Table7. Terminology

Term	Description
API	Application Programming Interface
DMS	Data Management Service
FCC	Federal Communications Commission
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Intel® LIQD	Intel® Lte Iot Quick Deployment
IoT	Internet Of Things
LTE	Long Term Evolution
M2X	AT&T Data Storage Service For Internet Connected Machine-To-Machine Devices
RSSI	Received Signal Strength Indication
SSO	Single Sign On



Appendix C Security

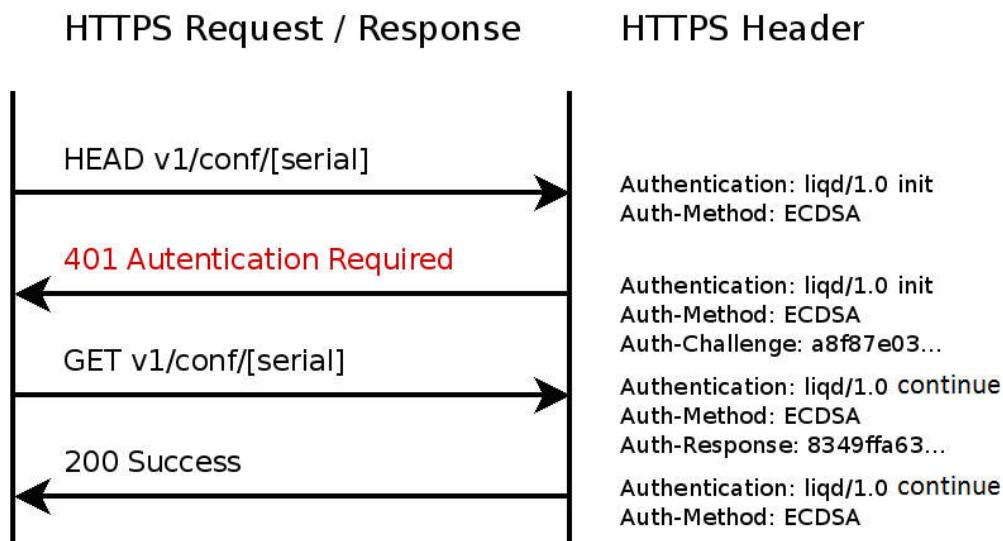
The Intel® LIQD device security is provided by five mechanisms:

1. Connection to the Cloud based components via HTTPS, with the servers public certificates held on the Intel® LIQD device.
2. Authentication of the device by the Device Management Service, with the unique and individual private key held within a cryptographic co-processor on the Intel® LIQD device, which is never exposed.
3. Individual M2X API keys, created and managed by M2X providing write access to that device's M2X data streams only.
4. Intel® QMSI secure bootloader within the Quark SE microcontroller C1000 with the update key are owned and managed by Intel. For full details on the Intel® QMSI Bootloader Security features refer to the Intel® Quark™ Microcontroller Software Interface – Bootloader Security Features Programmer's Guide.

Intel® Quark™ Microcontroller Software Interface – Bootloader Security Features Programmer's Guide	http://www.intel.com/content/dam/www/public/us/en/documents/guides/bootloader-security-features-programmers-guide.pdf
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5. Whitelisting of the domains to which the Intel® LIQD APN can connect – M2X, Device Management Service and NTP servers only.

The device periodically reports its configuration hash (encryption), firmware versions and certificate bundle version to the DMS. A report is sent each time a device is powered up, or when the configuration, certificate, or firmware has changed.





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The operation of OAuth 2.0 authentication with M2X is detailed here:
<https://m2x.att.com/developer/documentation/v2/oauth>



Appendix D Safety and Regulatory Requirements



Warning: Failure to follow instructions could increase risk to safety and noncompliance with regional laws and regulations.

Warning: DO NOT SHORT CIRCUIT, DISASSEMBLE, CRUSH, PENETRATE OR INCINERATE. BATTERY MAY LEAK OR EXPLODE IF HEATED ABOVE 100 °C (212 °F).

Warning: HAZARDOUS AREA WARNING: This instrument has not been designed to be intrinsically safe for use in areas classified as hazardous locations. For your safety, **DO NOT** use it in hazardous (classified) locations.

Caution: In the case of an emergency, degraded performance will occur if wireless reception is inhibited.

Note: The device is supported for temp range -20 to 85 degrees Celsius, -4 to 185 degrees Fahrenheit.

Note: Rating is 3.7V/0.5A.

- Note:**
- a) Do not disassemble or open crush, bend or deform, puncture or shred
 - b) Do not modify or remanufacture, attempt to insert foreign objects into the battery, immerse or expose to water or other liquids, expose to fire, explosion or other hazard.
 - c) Only use the battery for the system for which it is specified
 - d) Only use the battery with a charging system that has been qualified with the system per CTIA Certification Requirements for Battery System Compliance to IEEE 1725. Use of an unqualified battery or charger may present a risk of fire, explosion, leakage, or other hazard.
 - e) Do not short circuit a battery or allow metallic conductive objects to contact battery terminals.
 - f) Replace the battery only with another battery that has been qualified with the system per this standard, IEEE-Std-1725. Use of an unqualified battery may present a risk of fire, explosion, leakage or other hazard. Only authorized service providers shall replace battery. (If the battery is non-user replaceable).
 - g) Promptly dispose of used batteries in accordance with local regulations
 - h) Battery usage by children should be supervised.
 - j) Avoid dropping the phone or battery. If the phone or battery is dropped, especially on a hard surface, and the user suspects damage, take it to a service center for inspection.
 - k) Improper battery use may result in a fire, explosion or other hazard.

CAUTION
RISK OF EXPLOSION IF BATTERY IS REPLACED
BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING
TO THE INSTRUCTIONS



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Federal Communication Commission Interference Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution:

- Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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- The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

▶ **RF Exposure Information (SAR)**

This device meets the government's requirements for exposure to radio waves.

This device is designed and manufactured not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission of the U.S. Government.

The exposure standard for wireless device employs a unit of measurement known as the Specific Absorption Rate, or SAR. The SAR limit set by the FCC is 1.6W/kg. Tests for SAR are conducted using standard operating positions accepted by the FCC with the device transmitting at its highest certified power level in all tested frequency bands. Although the SAR is determined at the highest certified power level, the actual SAR level of the device while operating can be well below the maximum value. This is because the device is designed to operate at multiple power levels so as to use only the power required to reach the network. In general, the closer you are to a wireless base station antenna, the lower the power output.

The highest SAR value for the model device as reported to the FCC when worn on the body, as described in this user guide, is 1.1W/kg (Body-worn measurements differ among device models, depending upon available accessories and FCC requirements.)

While there may be differences between the SAR levels of various devices and at various positions, they all meet the government requirement.

The FCC has granted an Equipment Authorization for this model device with all reported SAR levels evaluated as in compliance with the FCC RF exposure guidelines. SAR information on this model device is on file with the FCC and can be found under the



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Display Grant section of www.fcc.gov/oet/ea/fccid after searching on FCC ID:
WYPEU0312.

For body worn operation, this device has been tested and meets the FCC RF exposure guidelines for use with an accessory that contains no metal and be positioned a minimum of **1cm** from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.