

M2MD Locator Software Features

Location on Demand: Find the device in real-time

Location on demand eliminates the need for typical tracker breadcrumb technology. We leverage QuickConnect, a proprietary M2MD technology which allows us to reach and connect to a remote device without using SMS messaging. The QuickConnect feature leverages 3GPP communications standards to trigger a data session with a mobile device in a secure and efficient manner. The feature is enabled by proprietary modifications to the software embedded in the cellular modem application stack and allows a mobile device to remain in a lower power state for an indefinite period of time yet remain reachable by the mobile network. The result is a faster connection for the user, significantly less network traffic that reduces overall operating costs, and an extended battery life for mobile devices.

Security

M2MD patented security features integrate the established standard TLS 1.3 cryptographic protocol with the security aspects of a SIM module. The secret cryptographic material used for generating the security credentials is stored securely in both the M2MD back office and the SIM module and is never transmitted or exchanged between a device and the back office. Both the Applet on the SIM module in the device and the back office are able to independently generate the security credentials that are then utilized to secure data communications between the device and the back office IoT platform. The process leverages unique data for each device so there are no “public” keys and the security credentials can be updated individually over the air. This security solution avoids the pitfalls of public key infrastructure and certificate operations which has been a common vulnerability exploited in security breaches. The advantage of this solution is the TLS handshakes are 1/20 the size of traditional TLS handshakes making this security solution perfect for LTE CAT M1 and NB-IoT wireless solutions where data consumption and battery power are critical.

Advanced Location Technology Feature Set

Our software based, power-efficient approach uses Wi-Fi, GPS/GNSS, and cellular signals to track locations. We use PoLTE and Google to resolve location based upon received signal information. The table below illustrates characteristics of each search technology.

Search technology	Accuracy of location	Length of search time	Example use case	Power utilized
-------------------	----------------------	-----------------------	------------------	----------------

GPS	Best	Long (up to 1 minute)	Open skies	High
Wi-Fi	Better	Short (<= 5 seconds)	Inside buildings	Low
PoLTE	Good	Short (<= 5 seconds)	Anywhere	Low

- We support two GPS vendors: Sony and UBlox.
- Downloadable GPS ephemerous files allow enhanced GPS signal acquisition including fast acquisition time and improved location services for weak signal areas.
- PoLTE [Position over LTE] is ideal for superfast location using minimal power. PoLTE delivers positioning information in places where GPS may not work and Wi-Fi is not available such as indoors or in a cargo truck under other packages.

Sensor Features

Our Rapid Port technology minimizes time required to add new supported sensors. All available sensors can be enabled for low and high ranges; triggering events; and, alerting for out of bound range readings. For example, we can trigger location updates based on a device starting and/or stopping movement. We can configure the frequency of alerting. We currently support temperature, accelerometer and humidity sensors.

LED

Optional LEDs can be configured to indicate the state of the locator. We support a push button switch which enables the user to change the operating mode. Our common states are: Connected; Disconnected; Going into or out of airplane mode; Reboot; Searching for connection; Transmitting data.

Wi-Fi Geofence

This feature provides notification when a locator leaves proximity of configured Wi-Fi hotspots. Examples where this is useful are Alzheimer patients leaving their healthcare facility or pets leaving their home.

Power Saving Features

Our QuickConnect and Security technologies inherently optimize power consumption. Together they minimize data communications between the device and the back office saving significant power. Additionally, we manage power through selective use of eDRX and in the future, PSM, to minimize idle power consumption. The net result is extremely long battery life for a given size battery.

Low Operational Costs

Our QuickConnect and Security technologies inherently minimize data consumption. By elimination of traditional breadcrumbs needed for competing trackers, we greatly reduce data consumption. We do not use SMS messaging which reduces

cellular data costs. We provide efficient, standard APIs to our back office for easy integration.

Miscellaneous

- Over-the-air software upgradeable for CAT M1 devices.
- All software developed in the US, and controlled by M2MD, a US company.

Features Currently in Development:

1. Localized BLE Range Finder. This feature allows a locator to be found in areas where our location technology does not provide high enough accuracy to easily find the locator. Examples are large parking decks or warehouses. We also reference this as 'Geiger Counter Mode'.
2. Breadcrumb Technology. For those applications which require historical location and are not concerned about long-term battery life, we are adding the ability to capture location at pre-determined intervals. The options for this solution include the ability to cache multiple locations over time and transmit to our back office once.