

# MultiTech Conduit<sup>®</sup> IP67 Base Station

16-channel v2.1 Geolocation  
US915 for North America



**MultiTech Conduit<sup>®</sup> IP67 Base Station** is a ruggedized IoT gateway solution, specifically designed for outdoor LoRa<sup>®</sup> public or private network deployments. The product can operate in two modes: standard and geolocation. The standard product operates as a 16-channel, full duplex gateway, supporting both packet-forwarder and built-in network server modes. The geolocation product is based on the Semtech v2.1 reference design, which uses the LoRaWAN<sup>®</sup> protocol to perform Time Difference of Arrival (TDoA) calculations to deliver end-node location information in conjunction with a v2.1 LoRa Network Server. This technology provides asset location information that enables a variety of use cases, services and business models that GPS limitations cannot support. The FPGA on the LoRa processor allows customers to deploy in standard operation today for existing LoRaWAN network needs and remotely upgrade to geolocation operation as business needs change. There is no need to send a technician to the site to change mode of operation. The Conduit IP67 can support thousands of LoRaWAN certified end nodes natively, including the MultiTech mDot<sup>™</sup>\* and xDot<sup>™</sup>\*, without the need for additional hardware or software upgrades to the end nodes.

\*Represents ideal network configuration and equipment set up. Results vary depending on payload amount, transmission frequency, spreading factor used, as well as terrain, RF interference and obstruction type (e.g., metal, cement, etc.)

## BENEFITS

- Full duplex communication reduces time and costs of operational management of LoRa end devices
- Increased timing accuracy and Enhanced Security - all geolocation packets are fine timestamped and AES encrypted
- Existing LoRaWAN compliant end nodes can utilize geolocation without extra hardware or software costs
- GPS-free geolocation reduces complexity of locating LoRaWAN end devices

## FEATURES

- Semtech v2.1 design is Geolocation enabled by partnering with a v2.1 LoRa Network Server
- Operates as a 16-channel gateway in standard or geolocation operation
- Certified for North American 915 MHz ISM bands
- Standard operation supports 1PPS packet timestamp; geolocation operation supports finer packet timestamp

# IP67 BASE STATION HIGHLIGHTS

## Geolocation Applications

There are many IoT use cases that require information on the location of a physical asset, but traditionally have been hampered by technology that either requires additional hardware (e.g., GPS module) and/or has limited capability (e.g., cannot work indoors in wide area applications). With Semtech's v2.1 geolocation solution, new business cases and services in key verticals such as agriculture, health care, logistics, and construction can benefit from location services previously too expensive or impossible to meet utilizing GPS. Whether one wants to locate animals, assets or provide new services cost efficiently, LoRaWAN geolocation is positioned to enable a myriad of use cases that benefit society.

## CONNECTING THE "THINGS"

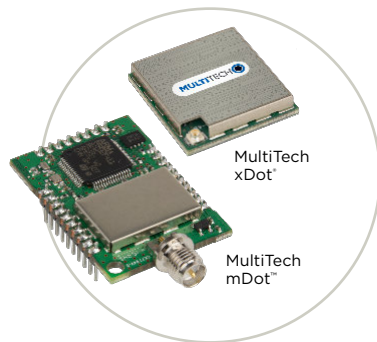
### MultiTech mDot™ & xDot™

MultiTech mDot and xDot are secure, regulatory-certified, Arm® Mbed™ programmable, low-power RF modules, providing long-range, low bit rate IoT data connectivity to sensors and actuators.

The mDot and xDot are LoRaWAN compliant, providing bi-directional data communication up to 10 miles line-of-sight and 2-3 miles in buildings, using the global sub-GHz ISM radio bands in North America, Europe, and the APAC regions.

The mDot was the first Arm Mbed platform listed on mbed.org that was deployment ready. The mDot supports applications written and compiled in the mbed online environment using developer friendly libraries. Decision making and control can be done at the edge, reducing the need to optimize RF performance and implement complex IoT middleware.

mDots and xDots bring intelligence, reduced complexity and a lower overall bill of material to the edge of the network while supporting a variety of interfaces to connect just about any battery-powered "thing".



## Geolocation with v2.1 LoRa Network Servers

The MultiTech IP67 Conduit v2.1 base station requires a LoRa Network Server that is capable of processing v2.1 packets. v2.1 packets are not backwards compatible with v1.5 or earlier LoRa Network Servers. Therefore, in order to use geolocation with this product, a customer must have access to a v2.1 capable LoRa Network Server. Check with your public LoRa operator of choice to see if they have an agreement with Semtech, as MultiTech is compatible with most operators around the world.

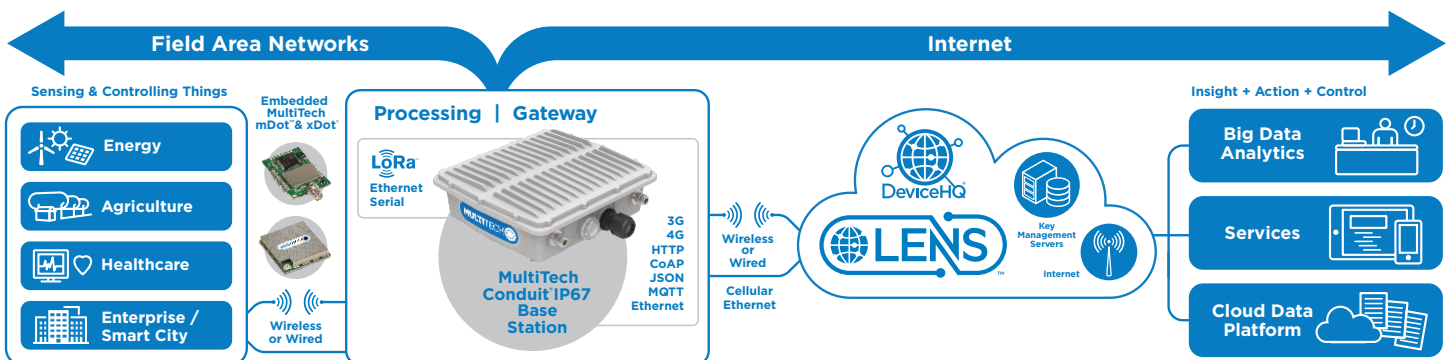
## mLinux Software

mLinux is an open source embedded Linux distribution. It's built using the open source Yocto Project which uses the OpenEmbedded-Core build framework. A pre-built Linux image ships with each Conduit Base Station as well as the source code and build system for creating your own custom image.

- Open source embedded Linux distribution based on Yocto project - 2.2
- Linux version (Linux 4.9), including access to over 500 resolved Common Vulnerabilities and Exposures (CVE)
- Hardware support for cellular, LoRaWAN, WiFi/BT, and GNSS/GPS
- LoRa packet forwarder
- Tool chain for creating custom images
- WAN connection via Ethernet or cellular
- Cellular PPP, DHCP client and server
- Firewall configuration via iptables
- Full root console access via SSH and serial debug port
- Language support: Python, C, C++, Javascript
- Package upgrade support: Java, Perl, Ruby, Mono C#
- opkg package manager with limited package feed
- Basic router functionality with built-in Linux
- Software configurable USB device port
- Lighttpd web server

Detailed information about getting started and using mLinux can be found at:

<http://www.multitech.net/developer/software/mlinux/>



## SPECIFICATIONS

Models	MTCDTIP-L4N1	MTCDTIP-LAT1	MTCDTIP-LVW2
Mobile Network Operator	AT&T & Verizon	AT&T	Verizon
Cellular Performance	4G-LTE Category 4	4G - LTE Category 3	
Cellular Fallback	3G - HSPA+ (AT&T only)	3G - HSPA+	No Fallback
Frequency Band (MHz)	<b>AT&amp;T: 4G:</b> B2(1900), B4(AWS1700), B5(850), B12 (700a), B14(700 FirstNet), B66(AWS-3 1700) <b>3G:</b> B2(1900), B4(AWS1700), B5(850) <b>Verizon: 4G:</b> B4(AWS1700), B13(700c) <b>Other Bands Supported:</b> B71 (600)	<b>4G:</b> B2(1900), B4(AWS1700), B5(850), B17(700) <b>3G:</b> B2(1900), B5(850)	<b>4G:</b> B4(AWS1700), B13(700)
Packet Data (LTE FDD)	Up to 150 Mbps peak downlink Up to 50 Mbps peak uplink	Up to 100 Mbps peak downlink Up to 50 Mbps peak uplink	
Input Voltage	Ethernet Input Power: 37 - 57 VDC. Provided by PSE injector with power rating of 60W or greater		
Processor & Memory	ARM9 processor with 32-Bit ARM & 16-Bit Thumb instruction sets • 400 MHz • 16K Data Cache • 16K Instruction Cache • 128X16 MB DDR RAM • 256 MB Flash Memory		
Wi-Fi / Bluetooth (-275 models)	WiFi: 802.11abng (2.4 & 5 Ghz) Bluetooth: Classic 4.1 and BLE		
GPS/GNSS	GNSS for LoRa Packet Time Stamping Concurrent GNSS connections: 3 GNSS Systems Supported: (default: concurrent GPS/QZSS/SBAS and GLONASS)		
LEDs (*)	PR (Power), ST (Status, user-programmable), L1 (user-defined), L2: (user-defined)		
<b>LoRa Specifications</b>			
LoRa Frequency Band	915 MHz		
LoRa Channel Plan	US915		
Channel Capacity	16-channels (full-duplex)		
LoRa Power Output	27 dBm maximum output power before antenna		
<b>Connectors</b>			
Ethernet	RJ45 Ethernet jack (10/100 port) (POE)		
USB HOST (*)	USB 2.0 Type A connector		
SIM (*)	3FF Micro SIM		
Antennas	Cellular, GPS, LoRa: female SMA / LoRa: reverse polarity female SMA		
<b>Physical Description</b>			
Dimensions (LxWxH)	262 mm x 91 mm x 257 mm		
Physical Weight	2.75 kg		
Chassis Type	IP67-rated, Aluminum		
<b>Environmental</b>			
Operating Temperature	-30° to +75° C		
Storage Temperature	-40° to +85° C		
<b>Certifications</b>			
EMC Compliance	US: FCC Part 15 Class B Canada: ICES-003 Class B		
Radio Compliance	US: FCC Part 22, 24, 27 Canada: ISED		
Safety	UL/cUL 60950-1   UL/cUL 62368-1		
Mobile Network Operator Approvals	PTCRB, AT&T, Verizon Pending: Rogers, Bell, Telus, T-Mobile	PTCRB, AT&T Pending: Rogers, Bell, Telus, T-Mobile	Verizon
Quality	MIL-STD-810G: High Temp, Low Temp, Random Vibration. SAE J1455: Transit Drop & Handling Drop, Random Vibration, Swept-Sine Vibration. IEC68-2-1: Cold Temp. IEC68-2-2: Dry Heat		
Warranty	2-Years - <a href="http://www.multitech.com/legal/warranty">www.multitech.com/legal/warranty</a>		

(\*) SIM, LEDs, and USB port accessible under IP67-rated bottom cap cover