LMU-2650

Scope

This document provides an overview of CalAmp's Telematics EdgeCore platform, referred as EdgeCore hereafter, the associated products, highlights, and major features. It also serves as a training manual on 'how-to' get started with an EdgeCore device (e.g. LMU-2650). Lastly, this document serves to describe the major differences between EdgeCore and the LMU32 predecessor platforms.

LMU32 vs EdgeCore Platform Differences

LMU-2650/3640/2630 Differences

	LMU-2650	LMU-3640	LMU-2630
SIM card	Externally accessible Nano (4FF)	Internal Mini (2FF)	Internal Mini (2FF)
Pinout	24 pin	24 pin	20 pin
Battery Technology	Lithium iron phosphate	Lithium-ion	Lithium-ion
Battery Capacity			
Current Draw			
BLE	5.0	4.2	4.2
Embedded Intelligence Engine	PEG2	PEG1	PEG1
On/Off Switch			

I/O Mapping & Wake-up sources

I/O	LMU-2650 (EdgeCore)	LMU-2630 (LMU32)
Input-0	Ignition	Ignition
Input-1	In-1 sel	In-1 sel
Input-2	In-2 sel	In-2 sel
Input-3	In-3 sel	In-3 sel
Input-4	In-4 sel	In-4 sel
Input-5		Motion
Input-6		Pwr State
Input-7		Vbatt Low
Input-8	Motion	Hi Temp
Input-9		VBUS Active
Input-10	Pwr State	Batt Virt Ign
Input-11	Vbatt Low	
Input-12	1BB Detect	1BB Detect
Input-13	Batt Virt Ign	
Input-14	Pure Virt Ign	Pure Virt Ign
Input-15		
Input-16	Motion Wake	

Input-17		
Input-18	Input Power Wake	
Input-19		
Input-20		
Input-21		
Input-22		
Input-23	Radio Active Wake	
Input-24	BLE Wake	
Input-25	VBUS Wake	
Input-26		
Input-27	Crank Detect Wake	
Input-28	RTC Wake	
Input-29	GPS Active	
Input-30	Hyb Crank Detect	
Output-0	Out-0	Out-0
Output-1	Out-1	Out-1
Output-2	Out-2	Out-2/ADC-7
Output-3		
Output-4		Pwr Switch
Output-5		Chrg Disable
Output-6		
Output-7	Pwr Switch	
Output-8	Chrg Disable	
Output-9		
Output-10		
Output-11		
Output-12		
Output-13	Switched VOUT	
Output-14		
ADC-0	Vin	Vin
ADC-1	Ext-1	Ext-1
ADC-2	Ext-2	GPS Ant.
ADC-3	HWID (LMU)	uP Temp.
ADC-4		Vref
ADC-5		Battery
ADC-6		Temp Sensor
ADC-7	uP Temp	Vcc_Sys/Ext
ADC-8		Audio Sensor
ADC-9	VBATT (LMU)	
ADC-10		
ADC-11		
ADC-12		

LED-1	GPS (Green)	GPS (Green)
LED-2	Comm (Orange)	Comm (Orange)
LED-3	BT (Blue)	

Stream Settings

Debug information will be sent through the USB port (Aux3), while Aux1 will remain as a command-only stream.

Default Stream Settings (needs correction)

Stream		Port	Rate	Word
0	USER0			
1	MODEM	4 :PORTID_RADIO	921600	8/N/1
2	USER1			
3	DEBUG	10:PORTID_AUX3	115200	8/N/1
4	NMEA_OUT			
5	DUN			
6	PEG_SERIAL			
7	VBUS	1 :PORTID_AUX2	921600	8/N/1
8	GPS	5 :PORTID_GPS	921600	8/N/1
9	ALTMDM			
10	EA_0			
11	EA_1			
12	EA_2			
13	UNDEF			
14	BT	17:PORTID_VUART_BLE	921600	8/N/1
15	ATCMD_1			
16	ATCMD_2			
17	SATMDM			
18	SBB			
19	WSP			
20	DB			
21	CONSOLE			
22	PERIPHDRV			
23	PSM			
24	COPDBG			

LMU-2650 Hardware Specifications

Cellular/Network

LTE Cat M1: 2100 (B1)/1900 (B2)/1800 (B3)AWS 1700 (B4)/850 (B5/B26)/900 (B8)/700 (B12/B13/B28)/800 (B18/B19/B20)/1900 (B39/B25) MHz

GSM/GPRS: 850/900/1800/1900 MHz

Data Support

SMS, UDP Packet Data, TCP

Satellite Location (GNSS)

- **Constellation Support**: GPS/GLONASS
- **Tracking Sensitivity**: -161 dBm
- **Acquisition Sensitivity**: -16 dBm (hot start) -145 dBm (cold start)
- **Location Accuracy**: ~2.5 CEP open sky

Battery

- Battery capacity: 1100 mA
- Battery technology: Lithium iron phosphate
- Charging temperature: 0 to +45° C

Environmental

- **Temperature**:
  - -40° to +60° C (connected to primary power)
  - -20° to +60° C (operating on internal battery)
  - -20° to +25° C ≤ 6 months (long term storage with battery)
- **Humidity**: 85% RH @ 55° C non-condensing
- **Shock and Vibration**: U.S. Military Standards 202G, 810F SAEJ1455
- **ESD**: IEC 61000-4-2
- **Ingress Protection**: IP67 (CalAmp Assembled)

Physical/Design

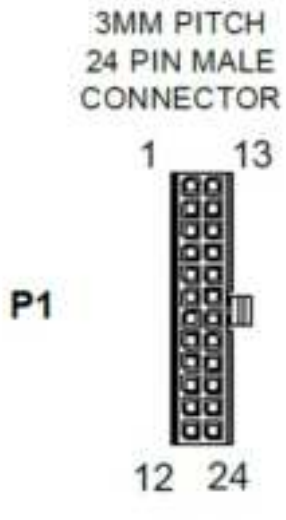
Dimensions: 4.0” x 2.2” x 0.8” (106 mm x 57 mm x 22 mm)
Weight: 3.4 oz. (97 g)

LMU-2650 Connectors

Comprehensive I/O

- Ignition Inputs: 1 fixed bias
- Digital Inputs: 4 (high/low bias selectable 0-32 VDC)
- Digital Outputs: 3 (open collector relay 150mA)
- Analog Inputs: 2 (external ADC input 0-32 VDC)
- Accelerometer: Built in, triple-axis (driver behavior, impact detection, motion sensing, tilt detection)
- Serial Interface: 2 TTL ports
- USB Interface: 1 serial port (with switch)
- DC Power Output: 3 (2 switched 3.3V & 1 switched VIN (Pin 12 on 24 pin connector)
- 1-Wire® Interface 1 (driver ID/temperature sense)
- Status LEDs: 3 (GPS, cellular, Bluetooth)

Primary Connector



Pin	Signal Name	5C360 Color
1	Input 1	Blue
2	Input 2	Blue/Orange
3	Input 3	Violet
4	Input 4	Grey
5	ADC 1	Pink
6	ADC 2	Black/Red
7	AUX1 TX	Brown/Blue
8	AUX1 RX	Brown/Green
9	GND	Black
10	GND	Black

11	GND	Black
12	VIN SW	Blue/Red
13	Input 0	White
14	VCC 3V3 AUX1	Brown/Orange
15	VCC 3V3 AUX2	Yellow/Orange
16	1BB T DATA	Green/Black
17	AUX2 RX	Yellow/Green
18	AUX2 TX	Yellow/Blue
19	OUT 0	Green
20	OUT 1	Brown
21	OUT 2	Yellow
22	GND	Black
23	VIN 1	Red
24	VIN 2	Orange

Compatible Cabling/Accessories

- DPod
- LMU-364x compatible cables (1 bit bus not supported until march)

Connectors/Antennas/SIM Access

- Power, I/O: 24 pin 3mm Pitch
- SIM Access: Externally accessible (4FF SIM)
- BLE Antenna: Internal
- Cellular Antenna: Internal
- GPS Antenna: Internal
- USB

3-Axis Accelerometer Input

The LMU-2650™ supports an internal 3 Axis Precision Accelerometer as one of its discreet inputs. When the LMU is moved in any direction, the associated input will be in the High state. If the LMU's accelerometer does not detect motion, then the input will be in the Low state. No external connections are required for this functionality to be operational.

Status LEDs

The LMU-2650™ is equipped with three Status LEDs, one for GPS, one for COMM (wireless network status), and one for Bluetooth. The LEDs use the following blink patterns to indicate service:

LED #1 (Comm LED - Orange) Definitions

Condition	LED 1
Modem Off	Off
Comm On - Searching	Slow Blinking
Network Available	Fast Blinking
Registered but no Inbound Acknowledgement	Alternates from Solid to Fast Blink every 1s
Registered and Received Inbound Acknowledgement	Solid

LED #2 (GPS LED - Green) Definitions

Condition	LED 2

GPS Off	Off
GPS On	Slow Blinking
GPS Time Sync	Fast Blinking
GPS Fix	Solid

LED #3 (BLE LED – Blue) Definitions

(will eventually insert table here)

(Script programmable)

PEG2

PEG2 is the next-generation scripting environment with enhancements that allow you to build more efficient scripts with easier maintenance and unrestricted feature growth. These benefits are made possible by features such as:

- Multiple Triggers, Conditions and Actions per line
- Expanded modifier fields
- Complex Boolean Condition logic
- Labels for Jumps and Calls (i.e., PEG line indexing will not change no matter where a line is added)
- In-line comments

PEG2 File

In next generation devices supporting PEG2, the file containing the PEG script and the configurations parameters has an updated format. The new file has the following characteristics:

- Format
    1. Header - Time/Date, Signature, ID
    2. Configuration Parameters - same format as existing Config Param file (File Type 1)
    3. PEG2 Script - ASCII Text Lines delimited with <CR><LF>
    4. End-Of-File marker
    5. CRC - Usual 2-byte CRC is appended to the file by PULS or file generation tool
- Configuration Parameter section (if present) is merged with configuration parameters on target device
- Script section (if present) overwrites script on target device.
- New File Type: 22
- File Extension: 'PG2'

Header

TAG Definition	**Example**

!TD: UTC Date and Time the file was generated or uploaded to the maintenance server (PULS) **!SIG:** File Signature is a MD-5 Hash generated from the file contents (anything after the signature). This is generated by LMU Manager and PULS during upload. **!ID:** User defined identification field. Up to 60 characters allowed. This field is displayed on PULS.	!TD:10:47:38 12-27-2018 !SIG:2a944f7d34857d99e4b39ce50069dcf0 !ID:v10.41_12_27_18_FAEPilot3040TestScript

Configuration Parameters

TAG Definition	**Example**
!CP: Following this tag, this is where all the Config Parameters start until the PEG2 script section starts or the EOF is detected. Important Notes: ▪ Config Parameters use the same format as in a PEG1 file ▪ Config Parameters are still a union of the file contents and what already resides on the target device	!CP: 256,0,00 256,1,01 256,2,00 256,3,00 257,0,15D4 259,3,00 260,0,00 260,1,00 ....

Script Section

TAG Definition	**Example**
!SCR: Script Section starts here. This section must immediately follow the Configuration Parameter (!CP) section.	!SCR: L512000;T1,0;A51,512225 L512001;T2,0;A51,512225

▪ PEG Lines are no longer parameterized. ▪ !SCR will overwrite the entire PEG2 script on the device (no longer a union of PEG lines) ▪ You can delete the PEG2 script on the target device by including the !SCR tag without any lines following. ▪ The generic line number references can be replaced with custom names or named sub-routines	L512002;T3,0;C39,7;A51,512185 L512003;T5,2;A51,512185 L512004;T11,0;C17,15;A31,15 L512005;T18,5;C17,15;A31,15 L512006;T48,0;C16,15;^C17,16;A31,16 L512007;T5,2;C8,0;^C16,16;A32,16 L512008;T12,0;A124,28 L512009;T12,0;A125,29 LCustomLabel;T5,2;!C44,0;A51,512195

End of File (EOF) and CRC

TAG Definition	Example
!EOF: End-of-file marker (this tag) must be included **!CRC:** Following EOF marker, a 2-byte binary CRC value must be appended to validate integrity of file during transit. This is needed for OTA and Serial transfers **Important Note:** If !SIG or !CRC is incorrect, PULS will re-calculate upon upload. However, this means while the file has been corrected for OTA, your original file will not be valid or usable for serial updates until fixed.	... L514014;T18,35;A112,0,0 L514015;T15,0;A112,0,0 L514250;T0,0;A0,0 !EOF: %P

PEG2 TAG Definitions

Definitions of the PEG2 Tag Characters with examples are listed below:

Tag Char	Name	Description	Example
L	Label	Defines a unique label to be used as a “virtual line”. Used as reference for Jump & Call PEG Actions	L514013
T	Trigger	Define one or more Triggers on the same line.	T18,0;T17;A8,4

		T<TrigCode>,<Mod0>,T<TrigCode>,<Mod0>	
C	Condition	Define one or more Conditions on the same line. C<CondCode>,<Mod0>, C<CondCode>,<Mod0>	T13;C16,11;^C16,10;!+!C16,12;A1,24
A	Action	Defines one or more PEG Actions. Actions executed in order of appearance. A<ActionCode>,<Mod0>,A<ActionCode>,<Mod0>	T13;C16,11;^C16,10;!+!C16,12;A1,24
:	Comment	The comment tag ':' is immediately followed by free text and is only terminated by the end-of-line delimiter (<CR>)	T18,0;T17;A8,4;:This is a comment
+	OR	Boolean operator that combines result with next Condition results using 'OR' operation	
^	AND	Boolean operator that combines result with next Condition results using 'AND' operation	
!	NOT	Boolean operator that inverts results of following Condition or previous Boolean state depending on placement.	

Multiple Modifiers

PEG2 offers the ability to use multiple modifiers for specific Triggers, Conditions or Actions. This makes it easier to use some existing PEG actions where there was a need to bit mask one modifier, or use two PEG actions to satisfy one function (like copy accumulator). See below for a few examples of how multiple modifiers can be utilized in a PEG2 script.

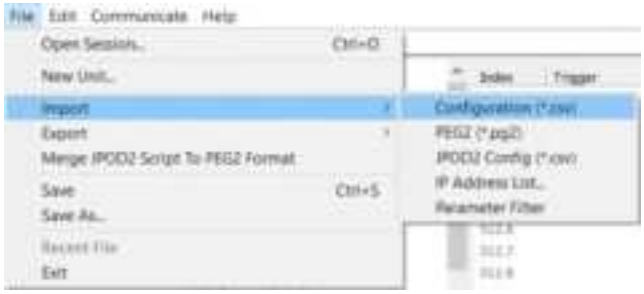
Trigger/Cond/Action	Definition	Modifier 0	Modifier 1
Update End Trigger (Code 61)	An update has completed. PEG1 single modifier mapping: Bits 0-3=File Type, bits 4-7 = Device Type	Device Type	File Type
Zone State Condition (Code 40)	True when current location is inside (0) or outside (1) the Zone identified by Zone# and the Zone is enabled. PEG1 single modifier mapping: Inside (bit7 of is 0), Outside (bit7 is 1), Zone Identifier (bits 0-6).	Current Location (inside/outside Zone)	Zone#
Copy Accumulator Action (103)	Copies value in Accum Source into Accum Destination PEG1 single modifier mapping: Upper 4 bits = Source, Lower 4 bits = Destination	Source Accum	Destination Accum

PEG1 -> PEG2 Conversion

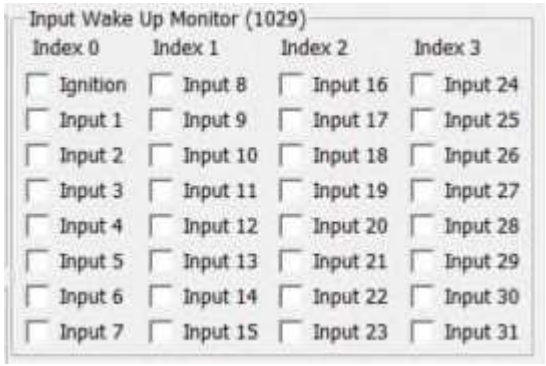
Use the latest version of LMU Manager to convert a pre-existing PEG1 script.

1. Go to **File** > **New Unit** and create a new unit using the App ID 1033.

2. Go to **File > Import > Configuration (*.csv)** to import your PEG1 file.

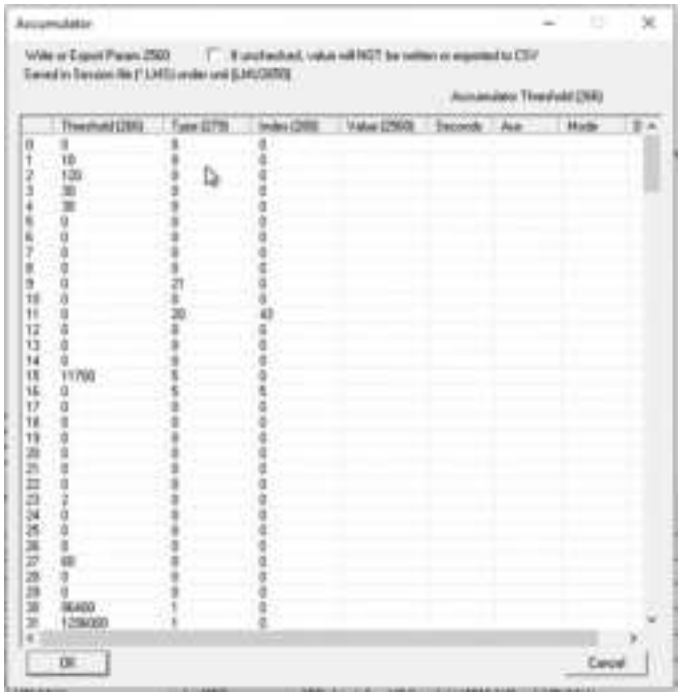


3. Update parameter 1029 by picking the appropriate wake sources. Refer to the I/O mapping and Wake Sources table.



4. Update any parts of your script that reference ADCs (A/D thresholds; PEG actions 42, 47, 59, 104, 119). Refer to the I/O mapping and Wake Sources table.

5. Update ADCs in the Index column in Accumulators if the Type column contains 5, 6, 17, 28, 29, and 34. Refer to the I/O mapping and Wake Sources table.



6. Update any parts of your script with inputs (input equates, triggers, conditions, etc.). Refer to the I/O mapping and Wake Sources table.

7. In the Stream tab, update the stream settings. Refer to default Stream Settings section.

8. To complete conversion, save the script and go to **File > PEG2 format (*.pg2)**.

Installation Instructions

The following sections cover some of the issues to consider when planning your LMU installation.

Size and Placement of LMU Unit

The LMU-2650 contains an internal battery, and thus should be oriented with the label facing upwards towards the sky. LMUs with internal antennas should be placed directly under a thick panel to maximize their performance and protect from external elements. A typical location is under the dash close to the front windshield.

Attach the LMU by mounting to the solid body (frame) of the vehicle, **not** to plastic panels or with cable/zip ties. The LMU can be placed out of sight by removing interior trim and molding to expose available space, then replacing the trim once the LMU is in place.

Access to the SIM Card

When used in a LTE or HSPA, each LMU uses a Subscriber Identity Module (SIM) card, which should be inserted before you install the LMU for the first time.

The SIM Card slot is externally accessible in the LMU-2650. There is no need to remove the device's cover.

Protection from Heat

It is best not to place the LMU unit in an unusually warm location such as directly near heater vents, near hot engine components or in direct sunlight. The maximum temperature that can be tolerated by the LMU is described in the LMU Environmental Specifications section.

Visibility of Diagnostic LEDs

Status LED lights on the front of the LMU unit can provide valuable information about the operation of the LMU. When feasible, attempt to install the LMU in such a way that these lights can be seen with reasonable ease.

You may find it useful to be able to view the LEDs periodically to make sure that the LMU is operating properly. If at any time you should encounter a problem with the LMU, you may need to read the LEDs to troubleshoot the problem. If you cannot fix the LMU yourself, you will need to provide the LED information to CalAmp customer support.

For information about how to interpret the LEDs, see the Status LED section.

Cable Length

Do not cut cables. Instead, coil any excess length, making sure not to crimp or flatten any cable.

Moisture and Weather Protection

The LMU unit must be located where it will not be exposed to moisture or water. In a typical installation inside a vehicle this is not commonly thought to be a concern; however, it might be best to avoid locating the LMU below a car's cup holders, or where rain might easily splash into the compartment when a door is opened.

Preventing Accidental or Unauthorized Modification

If you anticipate that fleet drivers or others might interfere with the LMUs once they are installed, take steps to be sure that it is not easy to remove the LMU from its power source, or disrupt internal antenna interference.

Two common methods are the use of Tamper Proof Sealant or creation of PEG Script to detect power loss or GPS antenna disconnections.

Installation Verification

In many cases it is desirable to verify that an installed LMU-2650 is working properly. That is, installers should verify that the GPS and communications functions of the LMU-2650 are working properly before departing the installation site. In more robust cases, some key configuration settings such as the Inbound Address and URL should also be verified.

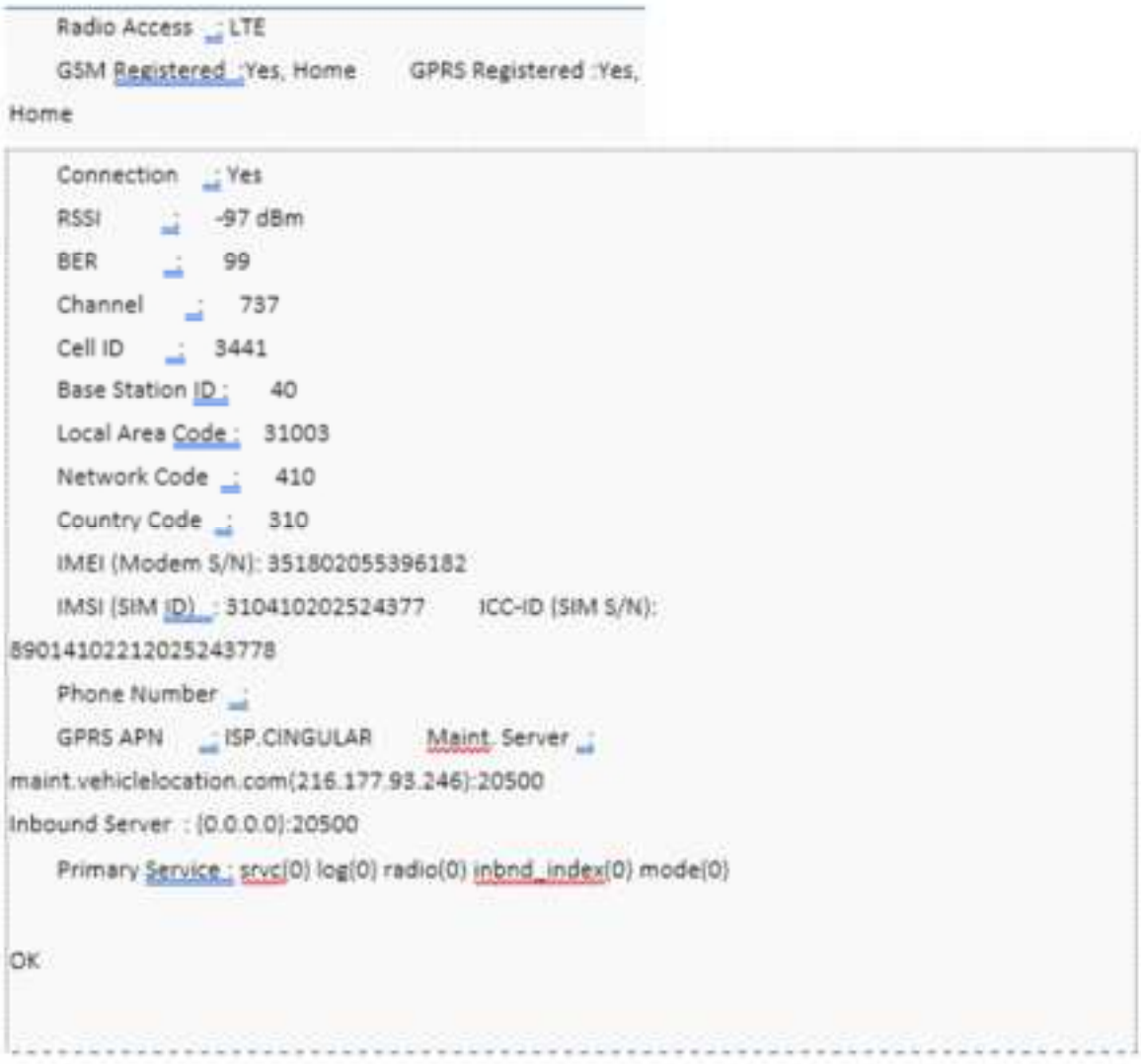
Note that these processes are all based on issuing AT Commands to the LMU-2650. It is expected that installers will have access to a serial port expansion cable and a laptop or PDA capable of a terminal connection. Alternatively, an SMS message can be sent to an LMU-2650 to obtain its current status.

Comm Verification

Installers should first verify that the LMU-2650 has been acquired and has registered to the wireless network. Comm may be verified using an AT Command:

ATIC

Depending on the wireless network being used something similar to what is shown below will be displayed. It is important to verify that 'Yes' values are displayed at the top for Data and Network registration and the correct APN is displayed.



If any of the responses return Not-Acquired or Not-Registered (and the APN is correct), the wireless network operator should be contacted for further troubleshooting.

Please note that it may take several seconds (or longer) for the LMU-2650 to communicate with the modem and acquire the wireless network.

GPS Verification

The next step is to verify that the GPS receiver is seeing enough satellites to obtain a valid GPS position. Again, installers have two choices on how to perform this verification. First, like the Comm Verification, there is a GPS status LED (i.e., the one closest to the SMA connector). If this LED is solid, then the LMU has found GPS service.

If the LED is not visible then GPS service may be verified using an AT Command:

AT$APP GPS?

The response should be similar to:

Lat=3304713, Lon=-11727730, Alt=0

Hdg=113 Spd=0 3D-RTIME HDOP=130 nSats=7

Installers are looking for the 3D-RTIME setting along with a valid Lat, Long pair (i.e. something other than 0). If the GPS receiver does not have a valid lock within 2-3 minutes, for further troubleshooting, installers should contact CalAmp Support (productsupport@CalAmp.com)

Inbound Verification

The last item to verify is that the LMU-2650 is sending data to the correct server. In general, this is a two-step process that will need the aid of an observer on the back end. That is, a technician will have to be logged in so they can monitor data coming into the backend mapping/vehicle management application.

First, verify that the LMU-2650 is using the correct Inbound IP address by using:

ATIS

The response should be similar to:

PUBLIC SERVICES 4

srvc(0) log(0:0) radio(0) mode(0:0) inb(0) ddd.ddd.ddd.ddd:<ppppp>

srvc(1) log(1:0) radio(0) mode(0:0) inb(1) 0.0.0.0:20500

srvc(2) log(2:0) radio(0) mode(0:0) inb(2) 0.0.0.0:20500

srvc(3) log(3:0) radio(0) mode(0:0) inb(3) 0.0.0.0:20500

PRIVATE SERVICES 1

srvc(0) log(0:0) radio(0) mode(0:0) inb(0) 0.0.0.0:20500

OK

The installer will need to verify with a backend technician that the IP address (ddd.ddd.ddd.ddd) and port (<ppppp>) are correct.

The second step is to verify that the LMU-2650 is sending data. The best way to do this is to force the LMU-2650 to send in an unacknowledged Event Report (i.e., its current GPS location) with the following command:

AT$APP PEG ACTION 44 255

The LMU-2650 will respond with: OK

The backend monitor must then be contacted to confirm that they received an Event Report with Event Code 255.

Assuming all three sections have passed, the installation can be considered to be complete.

Verification via SMS

The current Comm, GPS and Inbound status of a LMU can be obtained via SMS provided you have access to an SMS capable phone or PDA.

Using your handset, send the following SMS Message to the LMU:

!R0

Within a few minutes, the LMU should return a response in the following format:

APP: <App ID> <Firmware Version>

COM:<RSSI> [./d/D][./a/A][./L][IP address] [<APN>]

GPS:[Antenna <Short/Open/Off>] | [No Time Sync] | [<FixStatus> <Sat Count>]

INP:<inputs states> <vehicle voltage>

MID:<mobile ID> <mobile ID type>

INB:<inbound IP address>:<inbound port> <Inbound Protocol (LMD/LMX)>

APP: o **<App ID>:**

The Application ID value of the LMU indicating the host platform and the wireless networking technology of the LMU.

<Firmware Version>:

The current firmware version in use by the LMU

- **COM:**

<RSSI>:

This is the signal strength the wireless modem sees from the network. In general the LMU is at least scanning for the network if the RSSI is not -113.

[./d/D]:

If the character ‘D’ is present, it indicates the LMU had a data session established when it responded to the status request. For the 8-Bit product line an upper case ‘D’ indicates both the Inbound and Maintenance sockets are ready. The lower case ‘d’ indicates that only the Maintenance socket is ready. A ‘.’ indicates no sockets are ready.

[./a/A]:

This field indicates if the LMU has received an Acknowledgement from the Inbound server. This field will be empty if the LMU has never received an ACK. The lower case ‘a’ will be present if it has received an ACK since the last cold boot (i.e. power cycle) but not the last warm boot (App Restart or Sleep). The upper case ‘A’ will be present if the LMU has received an ACK since the last warm boot. A ‘.’ Indicates no acknowledgement has been received.

[./L]:

This field indicates if the LMU's log is currently active. An 'L' indicates that the log is currently in use (i.e. one or more records have been stored) where a '.' indicates the log is inactive.

[IP Address]:

This is an optional field if and is only present if the LMU has established a valid data session. This field will contain the current IP address of the LMU as assigned by the wireless network. Note that if you see a value of 192.168.0.0, this is an indication that the LMU has not been able to establish a data session.

[<APN>]

The current Access Point Name in use by a GSM LMU.

- **GPS:**

[Antenna <Short/Open/Off>]:

This field, if present, indicates a problem with the LMU's GPS antenna. A value of Short indicates that the antenna cable has likely been crushed. A value of Open indicates that the antenna cable is either cut or disconnected. A value of Off indicates that the LMU' GPS receiver is off.

[No Time Sync]:

If this field is present, it indicates that the LMU's GPS receiver has not been able to find even a single GPS satellite. This would likely been seen in conjunction with the above antenna error, or if the LMU GPS antenna is otherwise blocked.

[<FixStatus> <Sat Count>]:

If these fields are present it indicates that the LMU has, or had a valid GPS solution. The <Sat Count> field indicates how many GPS satellites are currently in use by the LMU. The <FixStatus> field indicates the type of fix.

- **INP:**

<input states>:

This field details the current state of each of the LMU's discreet inputs. This field is always 8 characters long. The left most character represents the state of input 7 where the right most represents the state of input 0 (i.e. the ignition). A value of 1 indicates the input is currently in the high state. A value of 0 indicates it is currently in the low state.

<vehicle voltage>:

This field will contain the current reading of the LMU's internal A/D. This will be the supply voltage provided to the LMU in mV.

- **MID:**

<mobile ID>:

This will be the current mobile ID in use by the LMU.

<mobile ID type>:

This will be the type of Mobile ID in use by the LMU. The available types are, Off, ESN, IMEI, IMSI, USER, MIN and IP ADDRESS.

- **INB:**

<inbound IP address>:

This is the current IP address in use by the LMU. This value should match the IP address of your LM Direct™ server.

<inbound port>:

This is the current UDP port the LMU will use to deliver its LM Direct™ data. This value should match UDP port you are using on your LM Direct™ server. It is typically 20500.

<Inbound Protocol (LMD/LMX)>:

This is the current UDP/IP messaging protocol in use by the LMU. In general, it should be LMD.

Example Response:

APP:1001 10a

COM:0

GPS:No Time Sync

INP:11100111 13.7V

MID:4141000100 ESN

INB:207.7.101.227:20500 LMD

Regulatory statement:

NOTICE:

This device complies with Part 15 of the FCC Rules [and contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS standard(s)].

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.

(3)

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

NOTICE:

Changes or modifications made to this equipment not expressly approved by (manufacturer name) may void the FCC authorization to operate this equipment.

Radiofrequency radiation exposure Information:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

NOTE:

This equipment 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.*