## Login Packet

The Login Packet is the first packet which is sent from the device on every server connection. A login packet is sent to the server whenever there is a new TCP connection made by device to server. Device must transmit the Login message whenever it establishes (re-establishes after disconnection) its connectivity with Server with the specified fields. Login Message will carry following information:

- $DeviceName –Vehicle number on which the device is installed.
- $IMEI –15 Digit IMEI number.
- $Firmware – Version of the firmware used in the hardware.
- $Protocol -Version of the frame format protocol.
- $LastValidLocation – Last location info saved at the device.

Device must send the Login data packets in the same format & serialized as mentioned in Table below :

| Message Format | | |
|---|---|---|
| **Field** | **Description** | **Sample Data** |
| **Start Character** | $ | $ |
| **Header** | The header of the packet/ identifier | **LGN** (Fix By Transport Department) |
| **Device Name/ Vehicle Reg. No** | Mapped vehicle registration number | XX00AB0000 |
| **IMEI** | Identified the sending unit. 15 digit standard unique IMEI no. | 866772012345678 |
| **Firmware Version** | Version of the firmware used in the hardware | FIRMWAREVER1.0 |
| **Protocol Version** | Device protocol version | AIS140 |

| | | |
|---|---|---|
| **Latitude** | Latitude value in decimal degrees (not less than 6 places) | 28.758963 |
| **Longitude** | Longitude value in decimal degrees (not less than 6 places) | 77.6277844 |
| **Checksum** | Ensure no error in transmission | DDE3220E |
| **End Character** | * | * |

## Sample Data:

$LGN,XX00AB1234,866772041471415,FIRMWAREVER1.0,AIS140,30.10145,78.28998,DDE3220E*

## PVT Packet

Device shall be capable of transmitting Position, Velocity and Time (PVT data) along with heading (direction of travel) to a Backend Control Server (Government authorized server).

.

Table below (Table 1A) contains the listing of fields that the vehicle tracking devices would be required to send to the Backend Control Center. All the fields are required to be present in the location data sent by the devices to the backend, but can be in fixed sequence and with comma (,) separator between fields. The data value can be in American Standard Code for Information Interchange (ASCII) format.

The fixed frequency shall be user configurable and can be updated on a time to time basis as decided by STA.

Device must send the PVT data packets in the same format & serialized as mentioned in and alerts once per instance

(Table 4A)

| Sno | Field | Description | Sample Data |
|---|---|---|---|
| 1 | $Packet Header | Start character and header of the packet/ identifier | $PVT |

| | | | |
|---|---|---|---|
| 2 | Vendor ID | Vendor identification header | VendorID |
| 3 | Firmware Version | Version details of the Firmware | FIRMWAREVER1.0 |
| 4 | Packet Type | Specify the packet type<br>NR = Normal<br>EA = Emergency Alert<br>EO = Emergency Alert OFF<br>TA/DT = Tamper Alert<br>HP = Health Packet<br>IN = Ignition On<br>IF = Ignition Off<br>BD = Vehicle Battery Disconnect<br>BR = Vehicle Battery Reconnect<br>BL = Internal Battery Low<br>BC = Internal Battery Charged Again<br>HB= Harsh Braking<br>HA= Harsh Acceleration<br>RT= Rash Turning<br>OS= OverSpeed<br>CFG/PC/OT=Over the air Update<br>GI=Geo-fence In/Entry<br>GO=Geo-Fence Out/Exit<br>TILT/CO=Collision Alert (Future use, optional) | NR |

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| | | | |
|---|---|---|---|
| 5 | Alert ID | Specify the Alert ID<br>1= Location Update<br>2= Location Update (history)<br>3= Alert – Disconnect from main battery<br>4= Alert – Low battery<br>5= Alert – Internal Battery Charged Again<br>6= Alert – Connect back to main battery<br>7= Alert – Ignition ON<br>8= Alert – Ignition OFF<br>9= Alert – GPS box opened<br>10= Alert – Emergency state ON*<br>11= Alert – emergency State OFF<br>12= Parameter Change Over Air<br>13= Harsh Braking<br>14= Harsh Acceleration<br>15= Rash Turning<br>16= Device Tampered<br>17= Geofence In<br>18= Geofence Out<br>19= Collision Alert (Future use. optional)<br>20 = Over Speed<br>*Please Refer Table 6E of AIS 140 Document* | 2 |
| 6 | Packet status | L=Live or H= History | H |
| 7 | IMEI Number | Identified the sending unit. 15 digit standard unique IMEI no. | 860260051760000 |
| 8 | Vehicle No | Mapped vehicle registration number | XX01CV3424 |
| 9 | GPS Fix | 1 = GPS fix OR 0 = GPS invalid | 1 |
| 10 | Current Date | Date value as per GPS date time per GPS date time (DDMMYYYY) | 14122022 |
| 11 | Current Time | Time value as per GPS date time in UTC format (hhmmss) | 172946 |
| 12 | Latitude | Latitude value in decimal degrees (not less than 6 places) | 31.589618 |
| 13 | Latitude Direction | Latitude Direction. Example N=North, S= South | N |
| 14 | Longitude | Longitude value in decimal degrees (not less than 6 places). | 75.875231 |
| 15 | Longitude Direction | Longitude Direction. E=East, W= West | E |

| | | | |
|---|---|---|---|
| 16 | Speed | Speed of Vehicle as Calculated by GPS module in VLT. (in km/hrs.) (Upto One Decimal Value) | 0 |
| 17 | Head Degree | Course over ground in degrees | 117.58 |
| 18 | Number of Satellites | Number of satellites available for fix | 39 |
| 19 | Altitude | Altitude of the device in meters | 286.7 |
| 20 | PDOP | Positional dilution of precision | 0.42 |
| 21 | HDOP | Horizontal dilution of precision | 0.43 |
| 22 | Network Operator | Name of Network | BHARAT |
| 23 | Ignition Status | 1= Ignition On , 0 = Ignition Off | 0 |
| 24 | Mains Power Status | 0 = Vehicle Battery disconnected 1= Vehicle Battery reconnected | 1 |
| 25 | Mains Input Voltage | Indicator showing source voltage in Volts.(Upto One Decimal Value) | 12.2 |
| 26 | Internal Battery Voltage | Indicator for level of battery charge remaining. (Upto One Decimal Value) | 4.1 |
| 27 | SOS status | 1= On , 0 = Off | 0 |
| 28 | Tamper Alert | C = Cover Closed, O = Cover Open | C |
| 29 | GSM Signal | Value Ranging from 0 – 31 | 12 |
| 30 | MCC | Mobile Country Code | 404 |
| 31 | MNC | Mobile Network Code | 53 |
| 32 | LAC | Location Area Code | 16C7 |
| 33 | Cell ID | GSM Cell ID | E4C2 |
| 34 | NMR-1 | Cell ID 1st Neighbour | 2138 |
| 35 | NMR-2 | LAC 1st Neighbour | 700000 |
| 36 | NMR-3 | GSM Signal Strength 1st Neighbour | 29 |
| 37 | NMR-4 | Cell ID 2nd Neighbour | 2137 |
| 38 | NMR-5 | LAC 2nd Neighbour | 700000 |
| 39 | NMR-6 | GSM Signal Strength 2nd Neighbour | 21 |
| 40 | NMR-7 | Cell ID 3rd Neighbour | 2136 |
| 41 | NMR-8 | LAC 3rd Neighbour | 700000 |
| 42 | NMR-9 | GSM Signal Strength 3rd Neighbour | 21 |
| 43 | NMR-10 | Cell ID 4th Neighbour | 968A |

| | | | |
|---|---|---|---|
| 44 | NMR-11 | LAC 4th Neighbour | 70000 |
| 45 | NMR-12 | GSM Signal Strength 4th Neighbour | 19 |
| 46 | Digital Inputs | 4 external digital input status (Status of Input 1 to Input 3 (0=Off; 1=On)) | 0000 |
| 47 | Digital Output | 2 external digital output status (0=Off; 1=On) | 00 |
| 48 | AnalogInput1 | Analog value optional | 00 |
| 48 | Frame No | Sequence Number of the messages (000001 to 999999) | 492894 |
| 49 | checksum and End | Insures No error in transmission (optimal) | 00AC* |

**Sample PVT (Position Velocity Time) Packet Data**

$PVT,VNDR,FIRMWAREVER1.0,NR,1,L,860260051760232,XX01BV2345,1,14122022,172946,31.589618,N,75.875231,E,0,117.58,39,286.7,0.42,0.43,BHARAT,0,1,12.2,4.1,0,C,12,404,53,16C7,E4C2,2138,700000,29,2137,700000,21,2136,700000,21,968A,70000,19,0000,00,00,492894,00AC*

*Note : All fields must contain value or either 0, no field is allowed empty. Each packet in the batch is separated by a newline character.

## Emergency Packet

Device will start sending the emergency packets when it is in an emergency state. This packet will be continued to send until emergency mode is disabled from the emergency server.

In case of emergency alert, the alert message shall be sent to 2 different IP addresses hence the device shall support minimum 2 IP addresses (1 IP address for regulatory purpose (PVT data) and 1 IP address for Emergency response system other than the IP's required for Operational purpose. The PVT data will send the emergency alert to the system. Only Primary alert data will go to the emergency response Backend Control Centre (NERS/ MHA)

In case of emergency state, (i.e. on pressing of Alert button), the device will shift to the SMS mode in case Cellular connectivity is not available. In such case, the device will send the Alert message and tracking data through SMS mode. Since SMS has the limitation of sending only 160

characters, so the tracking data to be sent in one SMS will have fields - IMEI, Latitude, Direction, Longitude, Direction, location fix, speed, Cell ID, LAC (Location Area Code), Date and Time as per emergency alert .

Device must send the data packets in the same format & serialized as mentioned in Table 6F

| **Table 6F: Message Format** | | |
|---|---|---|
| **Field** | **Description** | **Size** |
| **Start Character** | $ | $ |
| **Packet Header** | EPB, The unique identifier for all messages from VLT | EPB |
| **Packet Type** | Message Types supported. Emergency Message (EMR) or Stop Message (SEM) | EMR |
| **IMEI Number** | Unique ID of the Vehicle (IMEI Number) | 866477089677428 |
| **Packet Status** | NM – Normal Packet, SP – Stored Packet | NM |
| **Date** | Date and time of the location obtained from the location data in DDMMYYYY hhmmss format | 28032022092408 |
| **GPS Validity** | A – Valid, V – Invalid | A |
| **Latitude** | Latitude in decimal degrees - dd.mmmmmm format | 19.3151474 |
| **Latitude Direction** | N – North, S – South | N |
| **Longitude** | Longitude in decimal degrees - dd.mmmmmm format | 84.7938843 |
| **Longitude Direction** | E – East W – West | E |
| **Altitude** | Altitude in meters (above sea level) | 34.952 |

| | | |
|---|---|---|
| **Speed** | Speed of Vehicle as Calculated by GPS module in VLT. (in km/hrs.) | 40 |
| **Distance** | Distance calculated from previous GPS data | 000.0 |
| **Provider** | G - Fine GPS N – Coarse GPS or data from the network | G |
| **Vehicle RegnNo** | Registration Number of the Vehicle | XX01BE4184 |
| **Reply Number** | The mobile number to which Test response need to be sent. (Emergency Mobile No. as specified by MHA/MoRTH/States.) | 9999999999 |
| **Check sum** | Ensure no error in transmission. | 7C0 |
| **End Character** | * | * |

**Sample Packet Data**

$EPB,EMR,866477089677428,NM,28032022092408,A,19.3151474,N,84.7938843,E,34.952,40,000.0,G,XX01BE4184,+91-9999999999,7C0*

## Health Monitoring Parameter

This packet defines status or health of device. Regular health check of the device(s) fitted on the vehicle as per the parameters and frequency defined in below Table 3B.
Device must send the data packets in the same format & serialized as mentioned in Table 3B

| **Table 3B: Health Monitoring Parameter** | |
|---|---|
| **Field** | **Description** |
| **Start Character** | $ |
| **Header** | The header of the packet/ identifier |
| **Vendor ID** | Vendor identification header |

| | |
|---|---|
| **Firmware Version** | Version details of the Firmware used in EX.1.0.0 |
| **IMEI** | Identified of the sending unit. 15 digit standard unique IMEI no. |
| **Battery percentage** | Indicates the internal battery charge percentage |
| **Low battery threshold value** | Indicates value on which low battery alert generated in percentage |
| **Memory percentage** | Indicates flash memory percentage used |
| **Data update rate when ignition ON** | Indicates Packet frequency on ignition ON |
| **Data update rate when ignition OFF** | Indicates Packet frequency on ignition OFF |
| **Digital I/o status** | Inputs connected to the device. First left 2 values for Input and Last 2 values of Output |
| **Analog I/o status** | Analog input status |
| **End character** | * |

**Sample Data**

$HEL,VENDORID,FIRMWAREVER1.0,866772012345678,70,65,90,2,10,0011,00*

## Activation message and Health Check Message Protocol

The protocols for activation message and health check message are given below. Device shall send the activation and health check messages on request as specified below directly to the backend system (i.e. backend Command and Control Centre set up/ authorized by State/UT or a Common Layer system providing interface to VLT device manufacturers' backend applications).

### A. Activation SMS Format from Backend System to Device

For completion of the installation process, the VLT device shall undergo Activation process as per below:

- Activation Message Request Format from the Backend System to the Device (Through SMS): ACTV, Random Code, Reply SMS Gateway no.
- Activation Message Reply Format from Device to the Backend System(Through SMS) as per Table 1 Above:

| Table-1: Activation Check Response SMS Format from Device to Backend System | | |
|---|---|---|
| **Field Name** | **Characters** | **Activation Example** |
| **Header** | 5 | ACTVR |
| **Separator** | 1 | , |
| **Random code** | 6 | 343434 |
| **Separator** | 1 | , |
| **Vendor ID** | 4 | vendorID |
| **Separator** | 1 | , |
| **Firmware version** | 6 | V1.6.1 |
| **Separator** | 1 | , |
| **IMEI** | 15 | 866772012345678 |
| **Separator** | 1 | , |
| **Alert ID** | 2 | 1 |
| **Separator** | 1 | , |
| **Latitude** | 12 | 14.034533 |
| **Separator** | 1 | , |
| **direction** | 1 | N |
| **Separator** | 1 | , |
| **Longitude** | 12 | 79.32045 |
| **Separator** | 1 | , |
| **Direction** | 1 | E |
| **Separator** | 1 | , |

| | | |
|---|---|---|
| **GPS fix** | 1 | 1 |
| **Separator** | 1 | , |
| **Date and Time** | 15 | 16112018 120317 |
| **Separator** | 1 | , |
| **Heading** | 6 | 263.19 |
| **Separator** | 1 | , |
| **Speed** | 4 | 25.4 |
| **Separator** | 1 | , |
| **GSM Strength** | 2 | 23 |
| **Separator** | 1 | , |
| **Country Code (MCC)** | 3 | 404 |
| **Separator** | 1 | , |
| **Network Code (MNC)** | 4 | 10 |
| **Separator** | 1 | , |
| **LAC** | 4 | d6d6 |
| **Separator** | 1 | , |
| **Main Power** | 1 | 1 |
| **Separator** | 1 | , |
| **IGN Status** | 1 | 1 |
| **Separator** | 1 | , |
| **Battery Voltage** | 4 | 24.6 |
| **Separator** | 1 | , |
| **Frame Number** | 6 | 100000 |

| | | |
|---|---|---|
| **Separator** | 1 | , |
| **Vehicle mode** | 2 | ID |
| **Total Characters** | 139 | |

**Sample :**

ACTVR,422101,vendorID,FRMV1.9,358250330555555,01,030.73869440,N,076.78578660,E,1,14122022 054604,086.23,00.0,16,404,0002,080F,1,0,11.4,000009,ID

## B. Health Check Random Messages from Backend System to Device

Frequency: Twice Daily (Recommended),
Health Check Message Request Format from the Backend System to the Device (Through SMS): HCHK, Random Generated ID, Reply SMS Gateway no. Health Check Message Reply Format from Device to Backend System (Through SMS): As per Table below

**Table-1:**
**Health Check Response SMS Format from Device to Backend System**

| Field Name | Characters | Health Check Example |
|---|---|---|
| **Header** | 5 | HCHKR |
| **Separator** | 1 | , |
| **Random code** | 6 | 474747 |
| **Separator** | 1 | , |
| **Vendor ID** | 4 | VENDOR |
| **Separator** | 1 | , |
| **Firmware version** | 6 | V1.6.1 |
| **Separator** | 1 | , |
| **IMEI** | 15 | 866772012345678 |

| | | |
|---|---|---|
| **Separator** | 1 | , |
| **Alert ID** | 2 | 1 |
| **Separator** | 1 | , |
| **Latitude** | 12 | 14.034533 |
| **Separator** | 1 | , |
| **direction** | 1 | N |
| **Separator** | 1 | , |
| **Longitude** | 12 | 79.32045 |
| **Separator** | 1 | , |
| **Direction** | 1 | E |
| **Separator** | 1 | , |
| **GPS fix** | 1 | 1 |
| **Separator** | 1 | , |
| **Date and Time** | 15 | 16112018 120317 |
| **Separator** | 1 | , |
| **Heading** | 6 | 263.19 |
| **Separator** | 1 | , |
| **Speed** | 4 | 25.4 |
| **Separator** | 1 | , |
| **GSM Strength** | 2 | 23 |
| **Separator** | 1 | , |
| **Country Code (MCC)** | 3 | 404 |
| **Separator** | 1 | , |

| | | |
|---|---|---|
| **Network Code (MNC)** | 4 | 10 |
| **Separator** | 1 | , |
| **LAC** | 4 | d6d6 |
| **Separator** | 1 | , |
| **Main Power** | 1 | 1 |
| **Separator** | 1 | , |
| **IGN Status** | 1 | 1 |
| **Separator** | 1 | , |
| **Battery Voltage** | 4 | 24.6 |
| **Separator** | 1 | , |
| **Frame Number** | 6 | 100000 |
| **Separator** | 1 | , |
| **Vehicle mode** | 2 | ID |
| **Total Characters** | 139 | |

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**Sample :**

HCHKR,148294,vendorID,FRMV1.9,358250330555555,01,030.36214256,N,076.35855103,E,1,04012023 063912,263.00,00.5,16,404,0002,08b5,1,1,11.0,000000,ID

## Messages & Alerts from Devices

Table below (Table 4B) contains the listing of alerts that need to come from the tracking devices. These alerts are applicable for both live packets as well as the history packets. In 6th parameter (Alert ID) of table 4A mention page no(2-3)

| **Table 4B: Messages & Alerts Supported** | | |
|---|---|---|
| **Alert ID** | **Message & Alerts** | **Remarks** |

| | | |
|---|---|---|
| **1.** | Location Update | Default message coming from each device |
| **2.** | Location Update (history) | Would be sent, if GPRS is not available at the time of sending the message in protocol format Zero, BLANK, NIL, etc. |
| **3.** | Alert – Disconnect from main battery | If device is disconnected from vehicle battery and running on its internal battery |
| **4.** | Alert – Low battery | If device internal battery has fallen below a defined threshold |
| **5.** | Alert – Low battery removed | Indicates that device internal battery is charged again |
| **6.** | Alert – Connect back to main battery | Indicates that device is connected back to main battery |
| **7.** | Alert – Ignition ON | Indicates that Vehicle's Ignition is switched ON |
| **8.** | Alert – Ignition OFF | Indicates that Vehicle's Ignition is switched OFF |
| **9.** | Alert – GPS box opened (Optional) | Optional message would be generated indicating GPS box opened |
| **10.** | Alert – Emergency state ON* | When any of the emergency button is pressed |
| **11.** | Alert – emergency State OFF | When emergency state of vehicle is removed |
| **12.** | Alert Over the air parameter change | When any parameter is changed over the air. Shall include the name of parameter changed and source of command |
| **13.** | Harsh Braking | Alert indicating harsh braking. |
| **14.** | Harsh Acceleration | Alert indicating harsh acceleration. |
| **15.** | Rash Turning | Alert indicating Rash turning. |
| **16.** | Device Tempered | Alert Indicating Emergency button wire disconnect/ wire cut etc. |

| | | |
|---|---|---|
| **17** | Alert –Geofence In | Alert indicating entering into a geofence. |
| **18** | Alert –Geofence Out | Alert Indicating Exit from Geofence |
| **19** | Alert –Collision or Tilt (Future use. optional) | Alert indicating accident situation where vehicle either tilted or collide from front direction |
| **20** | Alert –Overspeed | Indicating that the vehicle moves above the defined threshold speed limit. |

**OVER THE AIR PARAMETER CHANGE ALERT DATA STRING (optional format)**

When any command is sent to the device either by SMS or by Server stream, the device should respond with the below packet.

| Sno. | Field | Description |
|---|---|---|
| 1 | $ | Starting Character of String |
| 2 | Packet Type | PC = Parameter Change |
| 3 | Alert ID | 12 |
| 4 | IMEI Number | Unique code for unit identification |
| 5 | Mode | 0 – Command via SMS<br>1 – Command via Server |
| 6 | Mobile no / IP | mobile no/ IP of control center sending commands |
| 7 | Current Date | From GPS RMC packet |
| 8 | Current Time | GMT Time |
| 9 | Parameter Change | string specify which parameter has changed. |
| 10 | End character | Denotes end of message |
| 11 | Delimiter | All fields are delimited by a comma |

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