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	000000000
IMEI	Identified the sending unit. 15 digit standard unique IMEI no.	358980012345678
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)	27.758963

Longitude	Longitude value in decimal degrees (not less than 6 places)	73.6277844
Checksum	Ensure no error in transmission	
End Character	*	*

Sample Data:

$LGN,000000000,3589802041471415,FIRMWAREVER1.0,AIS140,30.10145,78.28998,DDE3220E*

Response for Login Packet-

Login packet response. (sample response - $LGN26032021090946*

Field	Description	Sample Data Example
Start Character	$	$
Packet Header	LGN	LGN
Date Time	UTC (format 24 hrs)	Date value as per GPS date time per GPS time (DDMMYYYYhhmmss)
End character	*	*

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).

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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

(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 NR = Normal EA = Emergency Alert EO = Emergency Alert OFF TA/DT = Tamper Alert HP = Health Packet IN = Ignition On IF = Ignition Off BD = Vehicle Battery Disconnect BR = Vehicle Battery Reconnect BL = Internal Battery Low BC = Internal Battery Charged Again HB= Harsh Braking HA= Harsh Acceleration RT= Rash Turning OS= OverSpeed CFG/PC/OT=Over the air Update GI=Geo-fence In/Entry GO=Geo-Fence Out/Exit TILT/CO=Collision Alert (Future use, optional)	NR

5	Alert ID	Specify the Alert ID 1= Location Update 2= Location Update (history) 3= Alert – Disconnect from main battery 4= Alert – Low battery 5= Alert – Internal Battery Charged Again 6= Alert – Connect back to main battery 7= Alert – Ignition ON 8= Alert – Ignition OFF 9= Alert – GPS box opened 10= Alert – Emergency state ON* 11= Alert – emergency State OFF 12= Parameter Change Over Air 13= Harsh Braking 14= Harsh Acceleration 15= Rash Turning 16= Device Tampered 17= Geofence In 18= Geofence Out 19= Collision Alert (Future use. optional) 20 = Over Speed *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.	3589800051760000
8	Vehicle No	Mapped vehicle registration number	000000000
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)	*

Sample PVT (Position Velocity Time) Packet Data

$PVT,VNDR,FIRMWAREVER1.0,NR,1,L,358980005176023 2,000000000,1,14122022,172946,31.589618,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,70000,19,0000,0000,00,0,492894,00AC*

Response for PVT packet-

$,PVT,358980101617810,1*

$,PVT,IMEI,1#

*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	$	1 byte
Packet Header	EPB, The unique identifier for all messages from VLT	Character, 3 bytes
Packet Type	Message Types supported. Emergency Message (EMR) or Stop Message (SEM)	Character, 3 bytes
IMEI Number	Unique ID of the Vehicle (IMEI Number)	Character, 15 bytes
Packet Status	NM – Normal Packet, SP – Stored Packet	Character, 2 bytes
Date	Date and time of the location obtained from the location data in DDMMYYYY hhmmss format	Character, 14 bytes
GPS Validity	A – Valid, V – Invalid	Character, 1 byte
Latitude	Latitude in decimal degrees - dd.mmmmmm format	Double, 12 bytes
Latitude Direction	N – North, S – South	Character, 1 byte
Longitude	Longitude in decimal degrees - dd.mmmmmm format	Double, 12 bytes
Longitude Direction	E – East W – West	Float, 6 bytes
Altitude	Altitude in meters (above sea level)	Float, 6 bytes
Speed	Speed of Vehicle as Calculated by GPS module in VLT. (in km/hrs.)	Character, 1 byte

Distance	Distance calculated from previous GPS data	Character, 16 bytes
Provider	G - Fine GPS N – Coarse GPS or data from the network	0
Vehicle RegnNo	Registration Number of the Vehicle	1 byte
Reply Number	The mobile number to which Test response need to be sent. (Emergency Mobile No. as specified by MHA/MoRTH/States.)	8 bytes
Check sum	Ensure no error in transmission.	DDE3220E
End Character	*	

Sample Packet Data

$EPB,EMR,3589802012345678,NM,20012021055403,A,30.10145,N,78.28998,E,0000000142.8,0080.0,01.350,G,000000000,+91-9999999999,DDE3220E*

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,FIRMWAREVER1.0,3589802012345678,70,65,90,2,10,0011,00*

Server Response for HEL packet -

-: **$HBT***

Field	Description	Sample Data Example
Start Character start bit	$	$
Packet Header	HBT	HBT
End character	*	*

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:
-

B.

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	3589802012345678
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

C. 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	3589802012345678
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 :

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)

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	19
4	IMEI Number	Unique code for unit identification
5	Mode	0 – Command via SMS 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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