ATLANTA
Innovative IOT Solutions

O-300
PROTOCOL

CAN Protocol

GSM

Battery

GNSS

ATLANTA SYSTEMS PVT. LTD.

Firmware Version	O-300 V2.1 ATL_STD
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1.Introduction

This document details the protocol used in O-300 device to communicate with server. The device would send data in ASCII format with coma separated values. Following are the packets from O-300 to server.

1	LOGIN PACKET
2	GPS Location
3	OBD data packets with PIDs and responses
4	DTC Packet
5	Bluetooth Data Packet
6	Alerts Packets
7	GPRS command response

Also the server will send two types of packets to O-300

1	LOGIN ACK Packet
2	GPRS command Packets

1.LOGIN PACKET

Format : Live,Signature,IMEI,messageType,sequenceNumber,checksum

Sample Data : L,ATL,862631034245448,01,1235,*CS

EXPECTED RESPONSE:

Expected RESPONSE for connection message:

Format : @IMEI,messageType,sequenceNumber,*checksum

Example: @862631034245448,00,1235,*CS

(If connection message with sequence no 1235 is sent from OBD, server application will send response or same sequence number)

2.GPS Location & Health Packet

LIVE/MEMORY, SIGNATURE, IMEI,MESSAGE TYPE,SEQUENCE NUMBER,TIME (GMT), DATE , VALID/INVALID, LATITUDE;NORTH/SOUTH, LONGITUDE;EAST/WEST, SPEED KNOT, ANGLE OF MOTION, ODOMETER, BATTERY , SIGNAL STRENGTH, MOBILE COUNTRY CODE, MOBILE NETWORK CODE, LOCATION AREA CODE, CELL ID, #IGNITION(0/1) ADDITIONAL STATE(0/1) HARSH BRAKING / ACCELERATION/EVENT/NON(0/2/1/3) MAIN POWER STATUS (0/1),OVER SPEEDING(0/1),END OF RESPONSE,*CHECKSUM

Example :-

- **Live data**

  L,ATL,866795030478513,02,0983,054748,230318,A,28.633486;N,77.222595;E,0,154,1.14,4.2,18,404, 4,88,ad7b,#1031,0,ATL,*B

- **History data**

  H,ATL,866795030478513,02,0981,054448,230318,A,28.633486;N,77.222595;E,0,154,1.14,4.2,18,404, 4,88,ad7b,#1031,0,ATL,*B

Signature	Description
L/H	Live/Memory
ATL	Signature
862631034226166	IMEI
02	Message type
1234	Sequence no
063736	Time
080717	Date
A/V	valid/invalid
28.633486	Latitude
N/S	North/South
77.222595	Longitude
E/W	East/West
0	Speed in knots
17	Angle of motion
351.16	Odometer in KM
4.2	Internal Battery level in volts
16	Signal Strength
404	Mobile country code
4	Mobile Network code
88	Location area code
4ca5	Cell id
#0010	#Ignition(0/1), RESERVED , Harsh Braking / Acceleration//Non(0/2/3) Main power status(0/1)
1	Over speeding
ATL	Signature
B	CHECKSUM

3.OBD DATA PACKET with PIDs and responses

LIVE/MEMORY, SIGNATURE, IMEI,MESSAGE TYPE,SEQUENCE NUMBER,TIME (GMT), DATE, OBD PROTOCOL, COMMAND1:RESPONSE FIELD1,........, COMMANDn:RESPONSE FIELDn, END OF RESPONSE,*CHECKSUM

PROTOCOL EXAMPLE
CAN PROTOCOL with DTC

- **Live data**

  L,ATLOBD,862631034231208,03,0031,114035,170218,CAN,0101:33445566,0103:3344,0104:33,0105:AA,010A:33, 0105:AA,010C:0000,010D:AA,010E:33,010F:33,0110:AAAA,0111:33,011C:33,011F:3344,0121:3344,0122:3344,012F:33, 012F:33,0132:3344,0133:33,0143:3344,0145:33,0146:33,0147:33,0148:33,0149:33,014A:33,014B:33, 014C:33,0151:33,,,,,,,,,,,,,,,,,,,$ATLOBD,*B

- **History data**

  H,ATLOBD,862631034231208,03,0008,111838,170218,CAN,0101:33445566,0103:3344,0104:33,0105:AA,010A:33, 0105:AA,010C:0000,010D:AA,010E:33,010F:33,0110:AAAA,0111:33,011C:33,011F:3344,0121:3344,0122:3344,012F:33, 012F:33,0132:3344,0133:33,0143:3344,0145:33,0146:33,0147:33,0148:33,0149:33,014A:33,014B:33,014C:33, 0151:33,,,,,,,,,,,,,,,,,,$ATLOBD,*

NOTE:-ALL OBD RESPONSES RECEIVING FROM THE OBD-II DEVICE IS IN HEX FORMAT.

Signature	Description
L/H	LIVE/MEMORY
ATLOBD	SIGNATURE
862631034226166	IMEI
03	MESSAGE TYPE
1589	SEQUENCE NUMBER
055404	TIME(GMT)
220317	DATE
J1939/CAN	OBD PROTOCOL
0101:33445566	BEFORE COLON COMMAND AFTER COLON RESPONSE (PLEASE REFER PID TABLE FOR INTEGRATION)
$ATLOBD	END OF RESPONSE
B	CHECKSUM

PIDS AND RESPONSE DETAILS

PID (Hex)	Data Bytes Returned	Description	Min Value	Max Value	Units	Formula
0101	4	Monitor status since DTCs cleared. (Includes malfunction indicator lamp (MIL) status and number of DTCs.)				Bit encoded. REFER APX 1
0102	2	Freeze DTC				
0103	2	Fuel system status				Bit encoded. REFER APX 2
0104	1	Calculated engine load	0	100	%	(A/255)*100
0105	1	Engine coolant temperature	-40	215	°C	A-40
0106	1	Short term fuel trim—Bank 1	-100	99.2	%	
0107	1	Long term fuel trim—Bank 1	(Reduce	(Add Fuel:		
0108	1	Short term fuel trim—Bank 2	Fuel:	Too Lean)		
0109	1	Long term fuel trim—Bank 2	Too Rich)			
010A	1	Fuel pressure (gauge pressure)	0	765	kPa	3*A
010B	1	Intake manifold absolute pressure	0	255	kPa	A
010C	2	Engine RPM		16,383.75	rpm	(256*A)+B)/4
010D	1	Vehicle speed	0		km/h	A
010E	1	Timing advance	0 / -64	255 / 63.5	° before TDC	(A/2)-64
010F	1	Intake air temperature	-40	215	°C	A-40
0110	2	MAF air flow rate	0	655.35	grams/sec	(256A+B)/100
0111	1	Throttle position	0	100	%	(100/255)*A
0112	1	Commanded secondary air status				Bit encoded. REFER APX 3
0113	1	Oxygen sensors present (in 2 banks)				[A0..A3] == Bank1, Sensors 1-4. [A4..A7] == Bank2.
0114	2	Oxygen Sensor 1, A: Voltage B: Short term fuel trim				
0115	2	Oxygen Sensor 2, A: Voltage B: Short term fuel trim				
0116	2	Oxygen Sensor 3, A: Voltage B: Short term fuel trim	0	1.275	volts	(if B==$FF, sensor is not used in trim calculation)
0117	2	Oxygen Sensor 4, A: Voltage B: Short term fuel trim	-100	99.2	%	
0118	2	Oxygen Sensor 5, A: Voltage B: Short term fuel trim				
0119	2	Oxygen Sensor 6, A: Voltage B: Short term fuel trim				

011A	2	OxygenSensor 7 A: Voltage B: Short term fuel trim				
011B	2	OxygenSensor 8 A: Voltage B: Short term fuel trim				
011C	1	OBD standards this vehicle conforms to				Bit encoded. REFER APX 4
011D	1	Oxygen sensors present (in 4 banks)				Similar to PID 13, but [A0..A7]== [B1S1, B1S2, B2S1, B2S2, B3S1, B3S2, B4S1, B4S2]
011E	1	Auxiliary input status				A0 == Power Take Off (PTO) status (1 == active) [A1..A7] not used
011F	2	Run time since engine start	0	65,535	seconds	256A+B
0121	2	Distance traveled with malfunction indicator lamp (MIL) on	0	65,535	km	256A+B
0122	2	Fuel Rail Pressure (relative to manifold vacuum)	0	5177.265	kPa	0.079(256A+B)
0123	2	Fuel Rail Gauge Pressure (diesel, or gasoline direct injection)	0	655,350	kPa	10(256A+B)
0124	4	OxygenSensor 1 AB: Fuel–Air Equivalence Ratio CD: Voltage				
0125	4	OxygenSensor 2 AB: Fuel–Air Equivalence Ratio CD: Voltage				
0126	4	OxygenSensor 3 AB: Fuel–Air Equivalence Ratio CD: Voltage				
0127	4	OxygenSensor 4 AB: Fuel–Air Equivalence RatioCD: Voltage	0 0	< 2 < 8	ratio V	
0128	4	OxygenSensor 5 AB: Fuel–Air Equivalence Ratio CD: Voltage				
0129	4	OxygenSensor 6 AB: Fuel–Air Equivalence Ratio CD: Voltage				
012A	4	OxygenSensor 7 AB: Fuel–Air Equivalence Ratio CD: Voltage				
012B	4	OxygenSensor 8 AB: Fuel–Air Equivalence Ratio CD: Voltage				
012C	1	Commanded EGR	0	100	%	
012D	1	EGR Error	-100	99.2	%	
012E	1	Commanded evaporative purge	0	100	%	

PID	Bytes	Description	Min	Max	Units	Formula
012F	1	Fuel Tank Level Input	0	100	%	(100/255)A
0130	1	Warm-ups since codes cleared	0	255	count	
0131	2	Distance traveled since codes cleared	0	65,535	km	
0132	2	Evap. System Vapor Pressure	-8,192	8191.75	Pa	(256A+B)/4 (AB is two's complement signed)
0133	1	Absolute Barometric Pressure	0	255	kPa	A
0134	4	OxygenSensor 1 AB:Fuel–Air Equivalence Ratio CD: Current				
0135	4	OxygenSensor 2 AB:Fuel–Air EquivalenceRatio CD: Current				
0136	4	OxygenSensor 3 AB:Fuel–Air EquivalenceRatio CD: Current				
0137	4	OxygenSensor 4AB:Fuel–Air Equivalence Ratio CD: Current	0 -128	< 2 <128	ratio mA	
0138	4	OxygenSensor 5 AB:Fuel–Air Equivalence Ratio CD: Current				
0139	4	OxygenSensor 6 AB:Fuel–Air Equivalence Ratio CD: Current				
013A	4	OxygenSensor 7 AB:Fuel–Air Equivalence Ratio CD: Current				
013B	4	OxygenSensor 8 AB: Fuel–Air Equivalence Ratio CD: Current				
013C	2	Catalyst Temperature: Bank 1, Sensor 1				
013D	2	Catalyst Temperature: Bank 2, Sensor 1	-40	6,513.5	°C	
013E	2	Catalyst Temperature: Bank 1, Sensor 2				
013F	2	Catalyst Temperature: Bank 2, Sensor 2				
0141	4	Monitor status this drive cycle				Bit encoded.
0142	2	Control module voltage	0	65.535	V	
0143	2	Absolute load value	0	25,700	%	(100/255) (256A+B)
0144	2	Fuel–Air commanded equivalence ratio	0	< 2	ratio	
0145	1	Relative throttle position	0	100	%	(100/255)A
0146	1	Ambient air temperature	-40	215	°C	A-40
0147	1	Absolute throttle position B				
0148	1	Absolute throttle position C				
0149	1	Accelerator pedal position D	0	100	%	(100/255)A
014A	1	Accelerator pedal position E				
014B	1	Accelerator pedal position F				
014C	1	Commanded throttle actuator				

PID	Bytes	Description	Min	Max	Units	Formula
014D	2	Time run with MIL on				
014E	2	Time since trouble codes cleared	0	65,535	minutes	
014F	4	Maximum value for Fuel–Air equivalence ratio, oxygen sensor voltage, oxygen sensor current, and intake manifold absolute pressure	0, 0, 0, 0	255, 255, 255, 2550	ratio, V, mA, kPa	A, B, C, D*10
0150	4	Maximum value for air flow rate from mass air flow senso	0	2550	g/s	A*10, B, C, and D are reserved for future use
0151	1	Fuel Type				From fuel type table REFER APX 5
0152	1	Ethanol fuel %	0	100	%	
0153	2	Absolute Evap system Vapor Pressure	0	327.675	kPa	
0154	2	Evap system vapor pressure	-32,767	32,768	Pa	((A*256)+B)-32767
0155	2	Short term secondary oxygen sensor trim, A: bank 1, B: bank 3	-100	99.2	%	
0156	2	Long term secondary oxygen sensor trim, A: bank 1, B: bank 3				
0157	2	Short term secondary oxygen sensor trim, A: bank 2, B: bank 4				
0158	2	Long term secondary oxygen sensor trim, A: bank 2, B: bank 4				
0159	2	Fuel rail absolute pressure	0	655,350	kPa	
015A	1	Relative accelerator pedal position	0	100	%	(100/255)A
015B	1	Hybrid battery pack remaining life	0	100	%	(100/255)A
015C	1	Engine oil temperature	-40	210	°C	A-40
015D	2	Fuel injection timing	-210.00	301.992	°	
015E	2	Engine fuel rate	0	3276.75	L/h	
015F	1	Emission requirements to which vehicle is designed				Bit Encoded
0161	1	Driver's demand engine - percent torque	-125	125	%	A-125
0162	1	Actual engine - percent torque	-125	125	%	A-125
0163	2	Engine reference torque	0	65,535	Nm	(256A+B)
0164	5	Engine percent torque data	-125	125	%	A-125 Idle B-125 Engine point 1 C-125 Engine point 2 D-125 Engine point 3 E-125 Engine point 4
0165	2	Auxiliary input / output supported				Bit Encoded

APX 1

A request for this PID returns 4 bytes of data, labeled A B C and D.

The first byte(A) contains two pieces of information. Bit A7 (MSB of byte A, the first byte) indicates whether or not the MIL (check engine light) is illuminated. Bits A6 through A0 represent the number of diagnostic trouble codes currently flagged in the ECU.

The second, third, and fourth bytes(B, C and D) give information about the availability and completeness of certain on-board tests. Note that test availability is indicated by set (1) bit and completeness is indicated by reset (0) bit.

Name	Definition
MIL Off	Off or On, indicates if the CEL/MIL is on (or should be on)
A0 DTC_CNT	Number of confirmed emissions-related DTCs available for display.
RESERVED	Reserved (should be 0)
NO NAME	0 = Spark ignition monitors supported (e.g. Otto or Wankel engines)
	1 = Compression ignition monitors supported (e.g. Diesel engines)

Here are the common bit B definitions, they are test based.

The third and fourth bytes are to be interpreted differently depending on if the engine is spark ignition (e.g. Otto or Wankel engines) or compression ignition.In the second (B) byte, bit 3 indicates how to interpret the C and D bytes, with 0 being spark (Otto or Wankel) and 1 (set) being compression (Diesel). The bytes C and D for spark ignition monitors (e.g. Otto or Wankel engines):

	Test available	Test incomplete
EGR System	C7	D7
Oxygen Sensor Heater	C6	D6
Oxygen Sensor	C5	D5
A/C Refrigerant	C4	D4
Secondary Air System	C3	D3
Evaporative System	C2	D2
Heated Catalyst	C1	D1
Catalyst	C0	D0

And the bytes C and D for compression ignition monitors (Diesel engines):

	Test available	Test incomplete
EGR and/or VVT System	C7	D7
EGR and/or VVT System	C6	D6
Exhaust Gas Sensor	C5	D5
Boost Pressure	C3	D3
NOx/SCR Monitor	C2	D2
NMHC Catalyst	C0	D0

APX 2

Value	Description
1	Open loop due to insufficient engine temperature
2	Closed loop, using oxygen sensor feedback to determine fuel mix
4	Open loop due to engine load OR fuel cut due to deceleration
8	Open loop due to system failure
16	Closed loop, using at least one oxygen sensor but there is a fault in the feedback system

Any other value is an invalid response. There can only be one bit set at most.

The second byte describes fuel system #2 (if it exists) and is encoded identically to the first byte.

APX 3

A request for this PID returns a single byte of data which describes the secondary air status.

Value	Description
1	Upstream
2	Downstream of catalytic converter
4	From the outside atmosphere or off
8	Pump commanded on for diagnostics

APX 3

The fuel type is returned as a single byte, and the value is given by the following table:

Value	Description
0	Not available
1	Gasoline
2	Methanol
3	Ethanol
4	Diesel
5	LPG
6	CNG
7	Propane
8	Electric
9	Bifuel running Gasoline
10	Bifuel running Methanol
11	Bifuel running Ethanol
12	Bifuel running LPG
13	Bifuel running CNG
14	Bifuel running Propane
15	Bifuel running Electricity
16	Bifuel running electric and combustion engine
17	Hybrid gasoline
18	Hybrid Ethanol
19	Hybrid Diesel
20	Hybrid Electric
21	Hybrid running electric and combustion engine
22	Hybrid Regenerative
23	Bifuel running diese

4. DTC PACKET FORMAT

LIVE, ATLDTC, IMEI,MESSAGE TYPE,SEQUENCE NUMBER, TIME, DATE, PROTOCOL, DTC_CODE, ATLDTC,*CHECKSUM

*DTC_CODE – Every DTC code will have 2 Bytes of data. Refer the Example

Example:-

L,ATLDTC,862631034247006,04,2365,093334,270917,CAN,0171,ATLDTC,*B

- One DTC

L,ATLDTC,862631034247006,04,2369,093334,270917,CAN,0171:0121,ATLDTC,*B

- Two DTC

*Use the following method to find out which Error code occurs.

Signature	Description
ATLDTC	STARTING SIGNATURE
L	LIVE DATA
862631034247006	IMEI
093334	TIME
270917	DATE
CAN	PROTOCOL
0171:0121	DTC(2 data) SEPARATED BY (:)
ATLDTC	ENDING SIGNATURE
B	CHECKSUM

A request for this mode returns a list of the DTCs that have been set. The list is encapsulated using the ISO 15765-2 protocol.

If there are two or fewer DTCs (4 bytes) they are returned in an ISO-TP Single Frame (SF).
hree or more DTCs in the list are reported in multiple frames, with the exact count of frames dependent on the communication type and addressing details.

EXAMPLE(0171)

```
                        01
                      A
```

Each trouble code requires 2 bytes to describe. The text description of a trouble code may be decoded as follows. The first character in the trouble code is determined by the first two bits in the first byte:

A7-A6	First DTC character
00	00 P – Power train
01	01 C – Chassis
10	10 B – Body
11	U - Network
A5-A4	Second DTC character
00	0
01	1
10	2
11	3

The two following digits are encoded as 2 bits. The second character in the DTC is a number defined by the following table: The third character in the DTC is a number defined by

A3-A0	Third DTC character	1001	9
0000	0	001010	A
0001	1	1011	B
0010	2	1100	C
0011	3	1101	D
0100	4	1110	E
0101	5	01111	F
0110	6	1001	9
0111	7	1010	A
1000	8	1011	B

The fourth and fifth characters are defined in the same way as the third, but using bits B7-B4 and B3-B0. The resulting five-character code should look something like "P0058" and can be looked up in a table of OBD-II DTCs. Hexadecimal characters (0-9, A-F), while relatively rare, are allowed in the last 3 positions of the code itself.

5.BLUETOOTH DATA PACKET FORMAT

LIVE,ATLBLE,IMEI,MESSAGE TYPE,SEQUENCE NUMBER, TIME, DATE, DEVICE:DATA, ATLBLE,*CHECKSUM

EXAMPLE

L,ATLBLE,862631034247006,05,2365,093334,270917,DEVICE1:DATA,DEVICE2:DATA,DEVICE3:DATA,DEVICE 4:DATA,DEVICE 5:DATA ,ATLBLE,*B

6.EVENT/ALERTS PACKET

LIVE/MEMORY, SIGNATURE, IMEI,MESSAGE TYPE,SEQUENCE NUMBER,TIME (GMT), DATE, VALID/INVALID, LATITUDE;NORTH/SOUTH,LONGITUDE;EAST/WEST, SPEED KNOT, ANGLE OF MOTION, ODOMETER, BATTERY, SIGNAL STRENGTH, MOBILE COUNTRY CODE, MOBILE NETWORK CODE, LOCATION AREA CODE, CELL ID, #IGNITION(0/1) ADDITIONAL STATE(0/1) HARSH BRAKING / ACCELERATION/EVENT/NON(0/2/1/3) MAIN POWER STATUS(0/1),OVER SPEEDING(0/1),END OF RESPONSE,*CHECKSUM

EXAMPLE

L,ATL,862631034245448,06,1234,073950,090817,A, 28.633478;N,77.222565;E,0,143,3.14,4.0,21,404,4 88,ad7b,#0010,1,ATL,*B

HISTORY DATA
H,ATL,862631034245448,06,1234,073950,090817,A, 28.633478;N,77.222565;E,0,143,3.14,4.0,21,404,4 88,ad7b,#0010,1,ATL,*B

MESSAGE TYPE

MESSAGE TYPE	DESCRIPTION
00	LOGIN RESPONSE FROM SERVER
01	LOG IN PACKET
02	TRACKING PACKET
03	OBD PACKET
04	DTC PACKET
05	BLUETOOTH PACKET
06	ALART PACKET

PACKET AVALABILITY

PACKET	LIVE/HISTORY
LOG IN	LIVE
TRACKING	LIVE & HISTORY
OBD	LIVE & HISTORY
DTC	LIVE & HISTORY
BLUETOOTH	LIVE
ALART	LIVE & HISTORY