

X Protocol Reference

Version 1

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radshid

1. DATA PROTOCOL

1.1 AVL data array

Header	Data
6 Byte	...

1.2 Header

Packet Tag	Device Serial Number	Number Of Data Element
1 Byte	4 Byte	1 Byte

Packet Tag - Unique at device side, used to distinguish packets from each other
 Number Of Data Element - Max 10 Event, Min 1 in case of other message

1.3 Data

AVL Data	...	AVL Data
----------	-----	----------

1.4 AVL Data

Event	...	Event
-------	-----	-------

1.5 Event

<i>1 Byte</i>	Event Version
<i>1 Byte</i>	Event Code
<i>5 Byte</i>	Driver Id
<i>2 Byte</i>	Total Driving Time (minute)
<i>4 Byte</i>	Data Time (Unix Timestamp Second)
<i>14 Byte</i>	Speed and Distance Element
<i>1 Byte</i>	I/O Status
<i>1 Byte</i>	GPS Status
<i>14 Byte</i>	GPS Element
<i>1 Byte</i>	Extra Data Length (Max 255)
<i>:</i>	Extra Data

Event Version - Constant value (0x01)

Driver Id - Identification number of driver that has been read from the driver license

Total Driving Time - Total driving time (in minutes) of the current driver ID

Data Time - GTM date and time

Extra Data Length (Max 255) - The length of extra data (0x00 if not exists)

1.6 Event Code

Normal point	0xE0
Starting of stop state	0xE1
Main power disconnected	0xE2
Main power connected	0xE3
No GPS signal	0xE4
Strong impulse (G-Sensor)	0xE5
Direction changed	0xE6
Driving more than the allowed time (hours)	0xE7
Begin driving before break time ends	0xE8
Driving without driver liecense	0xE9
Driving using illegal driver license	0xEA
Device disconnected	0xEB
Device connected	0xEC
The vehicle started	0xED
Driving at an illegal speed	0xEE
Driving at a hazardous speed	0xEF
Battery is low	0xF0
No GPS signal	0xF1
GPS antenna is short-circuited	0xF2
No camera	0xF3
Absence of DSRC module	0xF4
Passing the Police station	0xF5
Unusual speed difference between GPS and vehicle sensor (more that 15Km/h)	0xF6
Non-stop driving more than the acceptable time	0xF7
Changing the driver's license during driving	0xF8
GPS signal jamming	0xF9

Card reader disconnected	0xFA
Dummy Packet	0xFB
Reserved codes for the third-party automotive hardware manufacturers	0xFC
	0xFD
	0xFE
	0xFF

1.7 Speed and Distance Element

GPS Speed	Vehicle Sensor Speed	Max Speed (GPS)	Max Speed (Vehicle Sensor)	Engine RPM	Total Traveled Distance (GPS)	Total Traveled Distance (Vehicle Sensor)
1 Byte	1 Byte	1 Byte	1 Byte	2 Byte	4 Byte	4 Byte

GPS Speed - GPS speed in Killo-meter per hour (Km/h) based on GPS data

Vehicle Sensor Speed - Automobile speed based on car sensor (CAN or Odometer)

Max Speed(GPS) - Maximum speed (Km/h) measured by GPS from the last point until now

Max Speed (Vehicle Sensor) - Maximum speed (Km/h) measured by vehicle sensor from the last point until now

Engine RPM - RPM (round per minute) of the vehicle's engine

TOTAL Traveled Distance (GPS) - Total travel distance of the car based on GPS data

TOTAL Traveled Distance (Vehicle Sensor) - Total travel distance of the car based on vehicle sensor data

1.8 I/O Status

8-Bit number to determine the state of the digital I/O ports:

Power	Ignition	Tamper Sensor	DSRC Module	Input 1	Input 2	Input 3	Input 4
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

1.9 GPS Status

0x00	3D Fix
0x01	Not Fix
0x02	2D Fix

1.10 GPS Element

Latitud e	Longitud e	Altitud e	Bearin g	Number Of Satellites	PDOP
4 Byte	4 Byte	2 Byte	2 Byte	1 Byte	1 Byte

Latitude - Latitude coordinate in decimal degrees format multiplied by 10^7 (to eliminate the decimal numbers)

Longitude - Longitude coordinate in decimal degrees format multiplied by 10^7 (to eliminate the decimal numbers)

Altitude - Above sea level

Bearing - Angle of the point

Number Of Satellites - Total number of available satellites

PDOP - Multiplied by 10^7 (to eliminate the decimal numbers)

1.11 Extra Data

All data in the extra data section are in the little-endian format.

1 Byte	Version
2 Byte	DeviceVersion
4 Byte	Point_Conter
4 Byte	System_LiveTime
2 Byte	Reset_Number
2 Byte	Flash_StorPoint
2 Byte	Sim_Charge
2 Byte	Pause_Time
2 Byte	Off_Time
1 Byte	CSQ
1 Byte	Device_Status
1 Byte	External_Power
1 Byte	Internal_Battry
1 Byte	SavePicture
1 Byte	ResetSource
4 Byte	Temperature
4 Byte	Humidity
1 Byte	BootloaderVersion

Version – Constant value (0x07)

DeviceVersion – Device firmware version

Point_Conter – The counter of the points

System_LiveTime – Total working-time of the device

Reset_Number – Total number of the resets

Flash_StorPoint – Total number of the stored points in flash memory storage

Sim_Charge – The charge of the Sim card (two signed bytes)

Pause_Time – Duration of the pause state

Off_Time – Duration of the off state

CSQ – The quality of the GSM signal

External_Power – External power supply voltage multiplied by 10 (to eliminate the decimal numbers)

Internal_Battry – Battery level in percentage

SavePicture – Total number of saved pictures

ResetSource – The source of the reset event

Temperature – The temperature in celsius degree

Humidity – Humidity percentage

BootloaderVersion – The version of the device bootloader

1.12 Device_Status

An 8-bit number to present the device status.

Lisense_IS_Sy nc	Flash_Poi nt	GPSAN T	Net3 G	Net2 G	Camer a	Flash 2	Flash1
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

0x00 – Unknown

0x01 – Flash1 is connected

0x02 – Flash2 is connected

0x04 – Camera is connected

0x08 – 2G network is available

0x10 – 3G network is available

0x20 – GPS antenna is connected

0x40 – Sending point data from memory

0x80 – Driver license is synchronized with server

2. SENDING DATA OVER TCP/IP

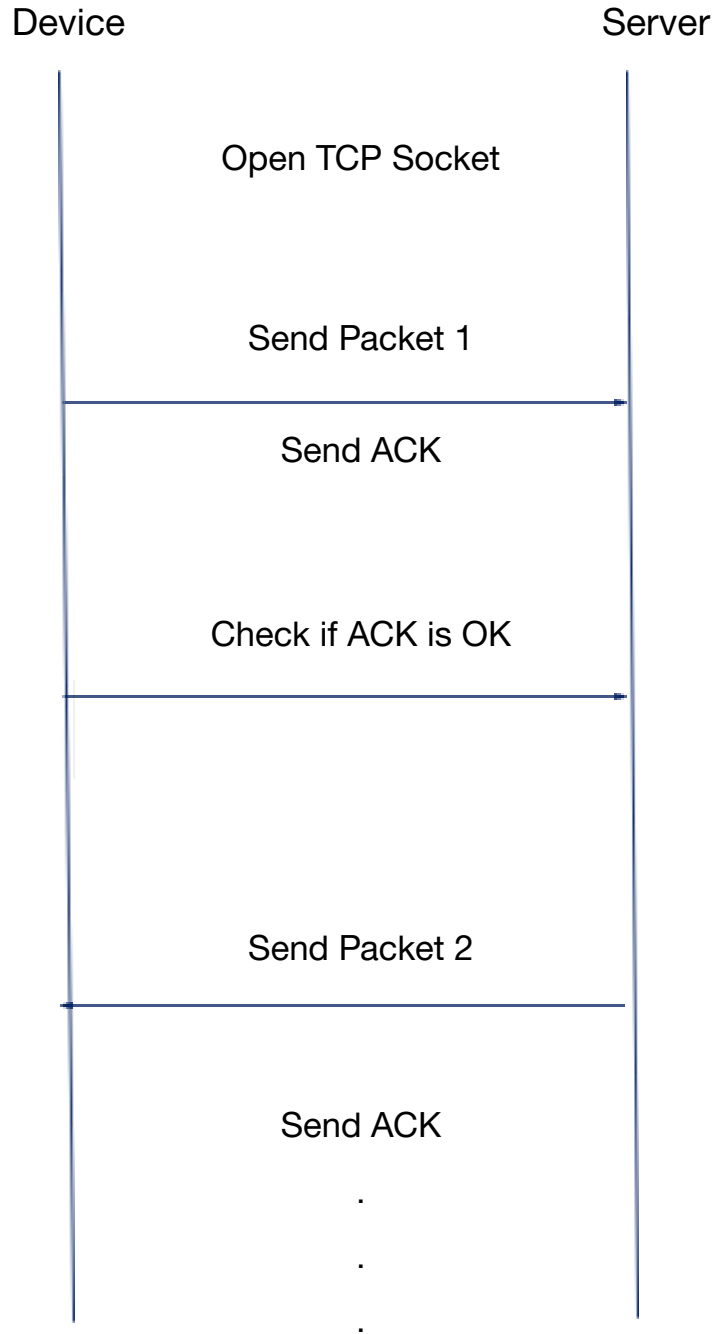
2.1 AVL data packet

The device sends the data packet to the server using the following structure:

Length	AVL data array	CRC
Byte 4	...	Byte 2

Length Length of AVL data array + Length of CRC – 32-bit Integer (**Little-endian**)
CRC CRC 16 CCITT, Polynomial=0xA001 – Header and Data used for
calculating CRC

2.2 Communication with server



2.3 Response of Server

The received packet from the server is based on the following format:

0x82	Packet Tag	Received Data Length	CRC Status
Byte 1	Byte 1	Byte 4	Byte 1

Received Data Length - Server return back the length of received data - 32 bit Integer
(Little-endian)

2.4 CRC Status

0x00	Error
0x01	Ok

2.5 Example

Event Pack:

```
600000000114FCFB160201E0000000000000005777AB640000000000000000000000000000A00
0137EE8441ECB3F96063B00000A010001F3000000000000005777AB6400000000000000000000
00000000A000137EE8441ECB3F96063B0000 0A0100657A
```

// Length

60000000 – 96 Byte

// Header

01 – Packet Tag

14FCFB16 – Device Serial Number = 352123670

02 – Number of Data Element = 2

// First Event

01 – Event Version

E0 – Event Code = نقطه عادی

000000000 – Driver Id = 0

0000 – Total Driving Time = 0

5777AB64 – Date Time – Timestamp = 1467460452 - Sat Jul 02 2016 11:54:12 GMT

00 – GPS Speed = 0

00 – Vehicle Sensor Speed = 0

00 – Max Speed (GPS) = 0

00 – Max Speed (Vehicle Sensor) = 0

0000 – Engine RPM = 0

00000000 – Total Traveled Distance (GPS) = 0

00000000 – Total Traveled Distance (Vehicle Sensor) = 0

A0 – I/O Status - Power = 1, Tamper Sensor = 1

00 – GPS Status = 3D Fix

137EE844 – Latitude = 32.7084100

1ECB3F96 – Longitude = 51.6636566
063B – Altitude = 1595
0000 – Bearing = 0
0A – Number Of Satellites =10
01 – PDOP = 0.1
00 – Extra Data Length = 0

//Second Event

01F300000000000005777AB6400A000137EE8441ECB3F96063
B00000 A0100

//CRC

657A

Event + Extra Data Pack:

A800000001001F60CA0201FC0000000000000063959BB80000000000008000000000000000800
0150C37A81C0427AEFF9A00000D0924076000040000007802000014000000CA0100007702432
277640000400600002C0100003401FC000000000000063959BBD000000000000800000000000
00008000150C37A81C0427AEFF9A00000C0A24076000050000007902000014000000CA010000
0000432277640000400600002C010000682E6E

// Length

A8000000

// Header

01001F60CA02

// First Event

01FC0000000000000063959BB80000000000008000000000000008000150C37A81C0427AEFF
9A00000D0924

// Extra Data

07 - Version = 7

6000 - DeviceVersion = 96

04000000 - Point_Conter = 4

78020000 - System_LiveTime = 632

1400 - Reset_Number = 20

0000 - Flash_StorPoint = 0

CA01 - Sim_Charge = 458

0000 - Pause_Time = 0

7702 - Off_Time = 631

43 - CSQ = 67

22 - Device_Status = Flash2, GPSAnt is connected.

77 - External_Power = 11.9 V

64 - Internal_Battry = 100%

00 - SavePicture = 0

00 - ResetSource = 0

40060000 - Temperature

2C010000 - Humidity

34 - bootloaderVersion = 52

//Second Event

01FC000000000000000063959BBD000000000000800000000000008000150C37A81C0427AEFF
9A00000C0A24

// Extra Data

076000050000007902000014000000CA0100000000432277640000400600002C01000068

//CRC

2E6E