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1 INTRODUCTION

1.1 Purpose of this Specification

1.1.1 This Specification serves to describe the functional and technical requirements of a telematics In-Vehicle Unit (IVU) which can be referenced for land-based transport applications.

1.1.2 While IVUs can be used to perform any number of functions and services – including the ability to interface with vehicle management systems and Co-operative Intelligent Transport Systems (C-ITS) – this Specification sets out the core requirements to ensure reliability, integrity and security. These requirements are especially critical if the information collected from IVUs is to be used and relied upon by third parties – such as in a contractual relationship or a regulatory setting.

1.1.3 This Specification describes the requirements:

a) for telematics IVU type-approval: these are the requirements that shall be met by the Applicant intending to provide an IVU to TCA to obtain type-approval. TCA is the organisation that will grant IVU type-approval; and

a) for end-users to consider when investigating and/or acquiring a telematics IVU.

1.1.4 This Specification has been informed through engagement with stakeholders; be it in administration of regulatory telematics services, certified commercial telematics services, or investigation of general telematics to produce a type-approved telematics IVU specification for land-based transport applications.

1.1.5 This Specification contains the ‘core’ requirements necessary for a type-approved IVU.

1.2 Specification Overview

1.2.1 The philosophy guiding the creation of this Specification has been to focus on required outcomes, that is, performance based without being overly solution oriented. Applicants are encouraged to consider innovative ways of meeting the various requirements of this Specification.

1.2.2 This Specification commences with the Introduction (Section 1), followed by the Background concerning the telematics IVU and links to telematics services that are certified by TCA (Section 2).

1.2.3 Section 3 details the broad uses of this Specification.

1.2.4 Section 4 details the Nomenclature and Section 5 includes References.

1.2.5 Section 6 contains the requirements for the type-approval of a telematics IVU for land-based transport applications and is sub-divided as follows:

- Physical characteristics;
- Environmental characteristics;
- Data collection;
- Record generation;
- Data storage;
• Data security;
• Data transfer; and
• Provision of IVU and documentation for type-approval.

1.2.6 This Specification includes the following appendices:
• Appendix A: Acronyms and definitions; and
• Appendix B: Requirements for the provision of IVUs to TCA.

2 BACKGROUND

2.1 Telematics In-Vehicle Unit

2.1.1 Telematics IVUs can be used to perform any number of functions and services.

2.1.2 Typically the telematics IVU is supported via an external power supply (envisaged to be the vehicle’s power supply) and will collect data from a number of sources and sensors, generate and store records and transmit the records.

2.1.3 This Specification contains the ‘core’ requirements necessary for a type-approved IVU. It does not contain the (additional) ‘application’ or ‘use case’ requirements; these are not within scope of this Specification. The format and frequency of the transmission of IVU Data Records is dependent on the application(s) of the IVU and as such are also not within scope of this Specification.

2.1.4 The telematics IVU ‘core’ comprises:
   a) a GPS receiver and antenna;
   b) a data storage capability;
   c) a communications device and antenna;
   d) an internal power supply;
   e) a connection to the external power supply;
   f) a connection to the vehicle ignition; and
   g) a movement sensor (independent of GPS), or a connection to one.

2.1.5 The IVU may contain other components and functions to deliver ‘application’ specific requirements.

2.1.6 The IVU may interface with telematics and intelligent technologies such as vehicle management systems and C-ITS to deliver ‘application’ specific requirements.

2.1.7 The IVU shall meet environmental conditions suitable for its installation and operation in which can be referenced for land-based transport applications.
2.1.8 The IVU shall collect the following ‘core’ data (generic outputs from a good quality GPS receiver and antenna):
   a) GPS quality;
   b) date and time;
   c) vehicle position;
   d) vehicle direction of travel; and
   e) vehicle speed.

2.1.9 The IVU shall also collect data identifying malfunctions, attempts at tampering and/or tampering.

2.1.10 The IVU shall process its collected ‘core’ data to produce IVU Data Records which are stored for transmission. The IVU should be able to produce IVU Data Records as follows:
   a) IVU Position Records;
   b) IVU Speed Records; and
   c) IVU Alarm Records.

2.1.11 Additional ‘application’ specific data can be appended to the IVU Data Records produced, or be reported as separate records.

2.1.12 Applicants are encouraged to consider innovative ways of meeting the various requirements of this Specification. This will enable the type-approved IVU to draw upon the best available technology, and encourage re-development, rather than restricting the IVU to the technology that was available at a particular time. A non-exhaustive list of performance innovations include:
   a) the telematics IVU may be a standalone device or it may be distributed within the vehicle in an in-situ environment, that usually occurs if it is built with the vehicle;
   b) the telematics IVU may be provided by the original equipment manufacturer (OEM) or it may be an after-market product;
   c) the telematics IVU may have only one antenna (providing for both GPS and other communications);
   d) the movement sensor may be integrated into the IVU, or may be a connection to a sensor(s) in or around the vehicle;
   e) the GPS antenna may be integrated into the IVU enclosure without a connecting cable per se;
   f) innovative ways of determining a connection to the external power supply and/or vehicle ignition;
   g) a multitude of communications technologies can be supported; and
   h) the telematics IVU may be able to collect data to identify malfunctions, attempts at tampering and/or tampering that meet application requirements but in a different and innovative means.
2.2 Link to Telematics Services that are Certified by TCA

2.2.1 There are telematics services that utilise type-approved IVUs that are certified by TCA for both regulatory and commercial services. Examples of regulatory and commercial services include the Intelligent Access Program (IAP) and telematics services certified under Certified Telematics Service (CTS) respectively.

2.2.2 This Specification contains the core requirements necessary for a type-approved IVU. It does not contain the application requirements necessary for different telematics services that are certified by TCA.

2.2.3 TCA will publish details of type-approved IVUs including, as applicable, applications for which they are endorsed. TCA can not make any representation regarding type-approval and/or application endorsements of any IVU apart from what is published by TCA.

3 USE OF THIS SPECIFICATION

3.1 General

3.1.1 This Specification may be used for the following broad purposes:

a) for Applicants investigating and/or intending to provide an IVU to TCA to obtain type-approval, and

b) for end-users investigating and comparing different telematics IVUs against this Specification.

3.1.2 TCA believes this publication to be correct at time of printing and does not accept responsibility for any consequences arising from the use of information herein. Readers should rely on their own skills and judgment to apply information to particular issues.

3.1.3 TCA accepts no responsibility and provides no assurance whatsoever for private use or reference to this Specification (ie not in conjunction with TCA) including to manufacturers or developers using or referring to this Specification to manufacture or develop in-vehicle units (IVUs) or to end users or purchasers of IVUs manufactured or developed using or referring to this Specification. For assurance that an IVU meets the requirements of this Specification, the owner of the IVU may apply to TCA for type approval of the IVU.

3.2 Use of this Specification by Applicant

3.2.1 The requirements contained in this Specification shall apply to all IVUs presented to TCA for type-approval assessment.

3.3 Use of this Specification by End-User

3.3.1 The use of telematics across land-based transport, including the bus, taxi, mining, insurance, emergency services and automotive sectors (for both light and heavy vehicles) has grown significantly in recent times. So much so, that telematics IVUs are now commonly used for tracking, navigation, fleet management, safety and the management of regulatory requirements. In most part the purchasers and users of telematics have been left to investigate and acquire suitable telematics IVUs and support systems. Typically, the end-user is engaged via a contract or service level agreement with the IVU supplier (or vendor). Successful implementation of these systems has been
reliant on the knowledge and experience of the end-user and suppliers alike in matching the solution to the application(s) business requirements or user needs.

3.3.2 Government programs have provided end-users and industry with an insight to appropriate minimum requirements for a telematics IVU.

3.3.3 This Specification can be used by end-users to:

a) investigate and compare different telematics IVUs against this Specification; to become an informed end-user.

b) acquire/purchase IVUs already type-approved by TCA:
   i) These IVUs will be published by TCA. TCA will update as more IVUs are type–approved.
   ii) TCA will also publish as applicable details the specific certified application services the IVUs are endorsed to deliver.
   iii) IVU acquisition/purchase takes place directly with the telematics IVU supplier (vendor) who provides a TCA Certificate for each unit purchased.

c) acquire/purchase IVUs that are not type-approved by TCA:
   i) IVU acquisition/purchase takes place directly with the telematics IVU supplier (vendor) by requesting an IVU that meets this Specification.
   ii) It is solely the responsibility of the end-user to satisfy itself whether the IVU of the telematics IVU supplier (vendor) meets this Specification and as applicable, any application(s) requirements.
   iii) TCA can not and does not make any representation regarding the type-approval and/or application endorsements of any telematics IVU.

4 NOMENCLATURE

4.1 In this Specification:

a) all references to Global Positioning System (GPS) extend to include all TCA endorsed Global Navigation Satellite Systems (GNSS);

b) all references to software include software in any form or medium, including firmware, unless otherwise qualified; and

c) where the context so requires it, references to the Authorised Person shall, before the IVU has been type-approved by TCA, be a reference to that party as an Applicant for IVU type-approval.

4.2 Requirements clauses within this Specification that are denoted by:

a) ‘shall’ are requirements that must be met;

b) ‘should’ are requirements that should desirably be met; and

c) ‘will’ are obligations that will be met by other parties.

4.3 Notes are included by way of clarification and apply to the immediately preceding requirement.
5 REFERENCES

5.1 Documents referenced in this Specification are listed below:


b) Degrees of protection provided by enclosures (IP code), AS 60529-2004, Standards Australia;

c) Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement, AS/NZS CISPR22:2006, Standards Australia;

d) Radiocommunications (Communication with Space Object) Class Licence 1998, Australian Communications and Media Authority;

e) Security seals – Classification, AS/NZS 4255.1:1994, Standards Australia; and

6 REQUIREMENTS FOR TELEMATICS IVU TYPE-APPROVAL

PHYSICAL CHARACTERISTICS

A.1 In-Vehicle Unit (IVU)
A.1.1 An IVU shall be inclusive of:

a) a GPS receiver connected to a GPS antenna via an antenna cable;
b) a communications device connected to a communications antenna via a communications cable;
c) an internal backup battery or alternate;
d) an internal memory storage;
e) all cabling, connections and fixings leading up to, but not including:
   i) external power supply;
   ii) ignition (refer A.13.3); and
   iii) other independent movement sensor (refer A.13.3).

Note: The use of an internal backup battery or alternate is dependent on the Application. For example, in Government Applications an internal backup battery may be required for the monitoring of external IVU connections (refer A.20).

A.1.2 GPS is one form of Global Navigation Satellite System (GNSS). Other forms of GNSS can be proposed and adopted subject to the approval of TCA.

A.1.3 An IVU shall be capable of being robustly connected to the respective vehicle.

A.2 IVU identifier
A.2.1 Each IVU shall have a unique identifier (IVU ID) that will be used to identify:

a) the particular IVU; and
b) data from that IVU.

A.2.2 The IVU ID shall be stored in the read-only memory of the IVU.

A.2.3 The IVU ID shall not be able to be set or altered by any person other than the Applicant or otherwise tampered with.

A.3 Security seals
A.3.1 The IVU shall be protected by security seal(s) to ensure detection of any unauthorised removal or opening of the IVU.

A.3.2 The security seals shall comply with AS/NZS 4255.1.1994 Security Category 10 Grade A.

A.3.3 Removal or opening of the IVU shall be possible only by breaking the security seal(s).

A.3.4 The security seal(s) shall be such that if broken they cannot be reinstated.

A.3.5 The IVU shall be installed in a position that facilitates inspection of the integrity of the security seal(s).
A.3.6 The security seal(s) shall clearly display signs of any unauthorised access, either visually and/or physically.

ENVIRONMENTAL CHARACTERISTICS

A.4 Suitability for use in vehicles

A.4.1 The Applicant shall provide to TCA, evidence of compliance from an appropriate body, with the following, or equivalent(s) as approved by TCA:

a) IVU complies with all of the performance requirements in this Specification when subjected to the vibration specified in AS/NZS 4601:1999 Type 1 paragraph 3.3.4;

b) IVU complies with all of the performance requirements in this Specification when subjected to the impact specified in AS/NZS 4601:1999 paragraph 3.3.5;

c) IVU complies with all of the performance requirements in this Specification when subjected to the temperature and humidity specified in AS/NZS 4601:1999 paragraphs 2.2.5.2 and 3.3.2;

d) IVU complies with the electromagnetic compatibility conditions specified in AS/NZS 4601:1999 paragraph 3.3.7 Clauses (a) to (c);

e) IVU components exposed to the elements comply with the dust and water ingress protection requirements of IP66, Table 7, Item 6 and Clause 13.4 and Table 8, Item 6 and Clause 14.2.6 as defined in AS 60529-2004 (IEC 60529 Ed 2.1:2001);

f) IVU components mounted in the cabin shall comply with the dust and water ingress protection requirements of IP44, Table 7 Item 4 Clause 13.4 and Table 8, Item 4 and Clause 14.2.4 as defined in AS 60529-2004 (IEC 60529 Ed 2.1:2001);

g) IVU is tolerant to radio frequency and electrical interference as defined in 2004/104/EC, sections 6.7 and 6.8 with functional status ‘A’, Table 1;

h) electromagnetic emissions from the IVU shall not exceed the limits in 2004/104/EC, sections 6.9 using the pulse amplitude levels for either 12 or 24 volt systems as appropriate, Table 2; and

i) electromagnetic emissions from the IVU shall not exceed the limits in AS/NZS CISPR22:2006 (CISPR 22:2006), Class B, Table 6.

A.4.2 Security seals (refer A.3) shall remain intact when exposed to the vibration and impact as specified in A.4.1a and A.4.1b.

A.5 IVU GPS capability

A.5.1 The IVU GPS receiver and GPS antenna shall comply with the Radiocommunications (Communication with Space Object) Class Licence 1998 – Australian Communications Authority (the Class Licence).

A.5.2 The IVU GPS antenna shall be capable of being mounted in a position that meets the manufacturer’s specification for the vehicle combination.

A.5.3 The IVU GPS antenna shall be capable of being mounted in a position that meets the needs of the Application.
Note: For A.5.3 in Government Applications this requires optimising signal strength from the GPS satellites. This will require the GPS antenna to be installed external to the vehicle.

A.6 Non-Type-Approved functionality in IVU

A.6.1 It shall be permissible for non-type-approved functionality to be accommodated within the IVU.

A.6.2 The type-approved functionality shall be isolated from any non-type-approved functionality that may be provided by the IVU such that the performance of the IVU for type approved purposes is not hindered or degraded below the requirements in this Specification, and such that the type-approved functionality is not compromised.

Note: The IVU may contain components and functions and may interface with telematics and intelligent technologies to deliver ‘Application’ specific requirements.

DATA COLLECTION

A.7 Data

A.7.1 The IVU shall collect the following data:

a) GPS quality data (refer A.8);

b) date and time data (refer A.9);

c) vehicle position data (refer A.10);

d) vehicle direction of travel data (refer A.11);

e) vehicle speed data (refer A.12); and

f) alarm status data (refer A.13).

A.8 GPS quality data

A.8.1 GPS quality shall be measured by the number of satellites used and the horizontal dilution of precision (HDOP).

Note: ‘used’ means the number of satellites whose signal is received and taken into account by the IVU in the determination of data.

A.8.2 TCA will use a Reference System for GPS quality comparison purposes, for IVU type-approval testing.

A.8.3 The IVU GPS receiver shall demonstrate GPS quality to the level exhibited by the Reference System, or better. Specifically:

a) The HDOP shall be no worse than plus 0.1 (+0.1) from that of the Reference System for at least 95% of the observations when using:

   i) at least four satellites; and

   ii) the same number of satellites as the Reference System; and

b) the number of satellites used by the IVU’s GPS receiver shall be minus one (-1) or better than the total number used by the Reference System for at least 95% of observations, at a mask angle of 15 degrees.
Note: The GPS quality comparison testing location and duration will be defined by TCA.

A.8.4 The HDOP from the IVU GPS receiver shall be measured and stored to a resolution of 0.1 or better.

A.9 Date and time data

A.9.1 The IVU shall collect and store UTC date and time data.
A.9.2 The date and time shall be stored with a resolution of 1 second.
A.9.3 The IVU shall have an internal clock that operates independently of the supporting external power supply.
A.9.4 In the event the external power supply fails or shuts down, the IVU internal clock shall operate for a period of at least 28 days.
A.9.5 The accuracy of the IVU internal clock shall be such that in any 28 day period it does not deviate from the UTC date and time by more than:
   a) 1 second, when using GPS signals;
   b) 10 seconds per day, when not using GPS signals; and
   c) 20 seconds per day, when not using GPS signals and the IVU has no connection to the external power supply.

A.10 Vehicle position data

A.10.1 The IVU GPS receiver shall determine latitude/longitude position of the vehicle.
A.10.2 The latitude/longitude position calculated by the IVU GPS receiver shall not deviate by more than 13 metres from the absolute horizontal position Australia-wide average for at least 95% of the observations when using at least four satellites and a HDOP of < 4.
A.10.3 The resolution of the stored latitude/longitude position calculated by the IVU GPS receiver shall be to 0.00001 degrees or better.
A.10.4 In the event of interruption to and subsequent reacquisition of GPS satellite signals, the IVU GPS receiver shall on the reacquisition of GPS satellite signals, commence to collect and store vehicle position:
   a) if the interruption is for a period of less than seven days, within 60 seconds of reacquisition of GPS satellite signals; and
   b) if the interruption is for a period of seven days or more, within five minutes of reacquisition of GPS satellite signals.
A.10.5 Vehicle position (latitude/longitude) shall be reported as blank/void if the IVU used zero satellites, or was unable to determine vehicle position.

A.11 Vehicle direction of travel data

A.11.1 The IVU GPS receiver shall determine direction of travel of the vehicle.
A.11.2 The direction of travel determined by the IVU GPS receiver shall not deviate from the actual direction of travel by more than 4 degrees for at least 95% of the observations when using at least four satellites and a HDOP of < 4.
A.11.3 The resolution of direction of travel determined by the IVU GPS receiver and recorded by the IVU shall be to 0.1 degrees or better.

A.11.4 The assessment of direction of travel of the IVU GPS receiver will only be made when travelling speeds in excess of 30km/h.

A.12 Vehicle speed data

A.12.1 Vehicle speed shall be measured by a GPS Doppler derived method.

A.12.2 The GPS reported vehicle speed, shall be accurate to within 3.0 km/h for at least 99.9% of observations when using at least four satellites and a HDOP of < 4.

Note: The desired speed measurement performance is possible where the IVU GPS receiver is configured to only use line of sight satellites. An IVU should have the capability of being similarly configured.

A.12.3 The assessment of speed of the IVU GPS receiver will only be made when travelling speeds in excess of 60km/h.

A.12.4 The resolution of the vehicle speed data recorded by the IVU shall be to 0.1 km/h or better.

A.13 Alarm status data

A.13.1 The connection of the IVU to the external power supply shall be monitored and reported upon in accordance with A.17.1a and A.17.1b.

A.13.2 Movement of the vehicle shall be detected and reported upon in accordance with A.17.1c and A.17.1d, using two different features independent from the GPS signal.

Note: The purpose of the independent movement features is to be able to facilitate the detection of movement of the vehicle independently of the GPS satellite signal.

A.13.3 One independent feature to facilitate the indication of vehicle movement shall be the ignition status. The other independent movement feature to facilitate the detection of vehicle movement shall, subject to the approval of TCA, be one of the following sensors:

a) the Engine Control Module (ECM);
b) a secure odometer;
c) an internal component of the IVU system; or
d) some other such independent movement sensor.

A.13.4 The Applicant shall document its chosen method of independent movement detection and connection.

A.13.5 The connection of the independent movement features to the IVU shall be monitored and reported upon in accordance with A.17.1e through A.17.1h.

Note: The connection of the independent movement features to the IVU is monitored so as to detect any attempts to tamper, e.g. an attempt to disconnect and/or remove the IVU.

A.13.6 Access to the data in the IVU shall be monitored and reported upon in accordance with A.17.1i.

A.13.7 Access to IVU software shall be monitored and reported upon in accordance with A.17.1j.
A.13.8 The connection of the GPS antenna shall be monitored and reported upon in accordance with A.17.1k and A.17.1l.

RECORD GENERATION

A.14 IVU Data Records
A.14.1 The IVU shall process the collected data to produce the following IVU Data Records which are stored for later transmission:
   a) IVU Position Records (refer A.15);
   b) IVU Speed Records (refer A.16); and
   c) IVU Alarm Records (refer A.17).

   Note: The format and production of IVU Data Records is dependent on the number and type of Applications or uses of the IVU.

A.15 IVU Position Records
A.15.1 The IVU shall generate IVU Position Records from the data collected by the IVU that details the position data for the vehicle being monitored.
A.15.2 IVU Position Records shall be continuously generated and stored at time intervals set by the specific Application when the vehicle is in operation.
A.15.3 A vehicle shall be considered to be in operation when the IVU’s supporting external power supply is connected to the IVU and the ignition status is ON.
A.15.4 IVU Position Records shall be numbered and include vehicle position data, UTC date / time of generation, and any other data as specified by the Application.

A.16 IVU Speed Records
A.16.1 The IVU shall generate IVU Speed Records from the data collected by the IVU that details the speed data for the vehicle being monitored.
A.16.2 The IVU shall, while the vehicle is in operation, generate IVU Speed Records, set by the specific Application.
A.16.3 IVU Speed Records shall be numbered and include vehicle speed and position data, UTC date / time of generation, and any other data as specified by the Application.

A.17 IVU Alarm Records
A.17.1 The IVU shall generate and store IVU Alarm Records for each of the following events:
   a) the external power supply is disconnected from the IVU;
   b) the external power supply is reconnected to the IVU;
   c) movement is indicated by the ignition while the external power supply is disconnected from the IVU;
   d) movement is detected by the other independent movement sensor while the external power supply is disconnected from the IVU;
e) the ignition is disconnected from the IVU (with and without external power being connected);
f) the ignition is reconnected to the IVU (with and without external power being connected);
g) the other independent movement sensor is disconnected from the IVU (with and without external power being connected);
h) the other independent movement sensor is reconnected to the IVU (with and without external power being connected);
i) unauthorised access to data in the IVU is detected;
j) unauthorised access to IVU software is detected;
k) the GPS antenna is disconnected from the IVU; and
l) the GPS antenna is reconnected to the IVU.

A.17.2 IVU Alarm Records shall be numbered and include the event that triggered the generation of the IVU Alarm Record, UTC date/time of generation, and any other data as specified by the Application.

A.18 Record numbering

A.18.1 IVU Position and IVU Alarm Records shall be assigned record numbers from the one record numbering sequence, with consecutive and increasing record numbers assigned to successive IVU Data Records in order of generation.

A.18.2 IVU Speed Records shall be assigned record numbers from a separate numbering sequence, with consecutive and increasing record numbers assigned to successive IVU Speed Records in order of generation.

A.18.3 The separate numbering sequences used for IVU Data Records shall:
   a) be different, such that record numbers never clash; and
   b) each rotates through a large enough cycle to ensure that the same record number shall not be issued more than once every twelve months.

DATA STORAGE

A.19 IVU Data Record storage capability

A.19.1 The IVU shall be capable of storing sufficient IVU Position, IVU Speed and IVU Alarm Records to address the needs of any one specific Application, noting that there may be more than one such Application associated with the IVU.

A.19.2 As a minimum, the IVU shall be capable of storing:
   a) at least 20,000 IVU Position and IVU Alarm Records (combined); and
   b) at least 6,000 IVU Speed Records.

Note:

   i. For IVU Position and IVU Alarm Records, these record storage requirements are based on approximately 14 days of 12 hour operation, adopting a 30s sampling frequency for IVU Position Records.
ii. For IVU Speed Records, the record storage requirements are based on approximately five hours of IVU Speed Record data at 3 second intervals.

iii. The record storage is dependent on the number and type of Applications or uses of the IVU.

A.19.3 If the volume of data collected and generated prior to transfer from the IVU exceeds the data storage capacity of the IVU, new data shall not overwrite stored data.

A.20 IVU external power supply failure/shut down

A.20.1 In the event that the external power supply supporting the IVU fails or shuts down, the IVU shall be capable of retaining stored data for at least 28 days; and monitoring the status of the ignition and other independent movement sensor for at least seven days.

Note: The primary purpose of continuing to monitor after the external power supply fails or shuts down is to facilitate the detection of any disconnection of the IVU and/or movement of the vehicle independently of the GPS signal.

DATA SECURITY

A.21 Data security and confidentiality measures

A.21.1 It shall not be possible for collected or stored data or software memory within the IVU to be accessible or capable of being manipulated by any person, device or system (including anything attached or used to enter data into the IVU) other than that authorised by the Applicant. Security and confidentiality of data stored in the IVU shall be maintained at all times.

A.22 IVU communications capability

A.22.1 The IVU shall be capable of communicating remotely.

A.22.2 The channel for the transmission of IVU Data Records shall be secure and guarantee standards for privacy and data integrity and minimise the risk of interception by third parties, at a level consistent with services provided by Australian licensed telecommunications carriers.

DATA TRANSFER

A.23 Transfer of data from IVU

A.23.1 The transfer of stored data from the IVU shall be performed to the frequency specified by the Application, provided that the IVU is in the communication coverage area and the vehicle is in operation.

Note: The transfer of stored data is dependent on the number and type of Applications or uses of the IVU.

A.23.2 If the vehicle is out of communication coverage or not in operation at the time of the scheduled data transfer, then data transfer shall commence within 5 minutes of when the communication network becomes available and the vehicle is in operation.

A.23.3 IVU Data Records stored in the IVU shall only be deleted after such data is transferred from the IVU and successful receipt is confirmed by the Applicant.
A.24 IVU Data Records and Data Blocks

A.24.1 IVU Data Records shall be transferred from the IVU in Data Blocks.

A.24.2 Each transmission shall contain one or more complete Data Block(s).

A.24.3 If the transmitted Data Block(s) are compressed for transmission this shall be lossless compression – it shall be possible to decompress the Data Block(s) without loss of any data, with all records remaining complete.

A.24.4 Every Data Block shall include the following framing data:
   a) Data Block number;
   b) IVU ID;
   c) IVU hardware and software version(s) including version(s) of all relevant components as type-approved; and
   d) any values or data necessary to decode or decompress data within the Data Block.

A.25 Integrity and origin of Data Blocks and IVU Data Records

A.25.1 The Data Block numbering shall be sequential.

A.25.2 Data Block numbers shall cycle through a large enough number range such that Data Block number clashes associated with the particular IVU could not occur within a twelve-month timeframe.

A.25.3 Each Data Block shall contain error detection and error correction coding.

A.25.4 Each Data Block shall support a form of data authentication (i.e. some form of message authentication only known and accessible by the Applicant), subject to the approval of TCA, that can prove the origin and integrity of the IVU Data Records.

A.25.5 The Applicant shall document, to the satisfaction of TCA, the Data Block authentication mechanism.

A.25.6 The Applicant shall document, to the satisfaction of TCA, the data transfer arrangements from the IVU, including:
   a) error detection and error correction procedures;
   b) management of the integrity of data transfer and data deletion in the IVU following transfer; and
   c) authentication features that guarantee origin of data.

Note: A cryptographic hash algorithm will be used to check the integrity of data being transferred. Information concerning hash algorithms may be obtained from TCA.

PROVISION OF IVU AND DOCUMENTATION FOR TYPE-APPROVAL

A.26 IVUs for type-approval

A.26.1 To facilitate IVU type-approval testing, two IVUs shall be provided to TCA. The Applicant shall adhere to the requirements in Appendix B detailing the supply of these IVUs.

A.27 Supporting documentation

A.27.1 The Applicant shall document, to the satisfaction of TCA, the IVU and all its components, cabling and their interfaces.
## Appendix A  Acronyms and Definitions

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicant</td>
<td>A party which has applied for IVU type-approval.</td>
</tr>
<tr>
<td>Framing data</td>
<td>Identifying data attached to each Data Block transmitted from the IVU.</td>
</tr>
<tr>
<td>Functional &amp; Technical Specification</td>
<td>The specification defining the functional and technical requirements for IVU type-approval.</td>
</tr>
<tr>
<td>Global Navigation Satellite System (GNSS)</td>
<td>The Global Navigation Satellite System comprises several networks of satellites that transmit high-frequency radio signals containing time and distance data that can be picked up by a receiver, allowing the user to identify the location of the receiver anywhere around the globe.</td>
</tr>
<tr>
<td>Global Positioning System (GPS)</td>
<td>A form of GNSS controlled by the US Department of Defence.</td>
</tr>
<tr>
<td>GPS Doppler derived method</td>
<td>A method to calculate vehicle speed based on the change in the frequency or timing of signals caused by movement of the different GPS satellites relative to the GPS receiver.</td>
</tr>
<tr>
<td>GPS receiver</td>
<td>A GPS unit functioning within the IVU.</td>
</tr>
<tr>
<td>GPS Satellite Signal or GPS Signal</td>
<td>GPS satellites transmit two low power radio signals, designated L1 and L2.</td>
</tr>
<tr>
<td>Horizontal Dilution of Precision (HDOP)</td>
<td>Horizontal Dilution of Precision is a measure quantifying the quality of the determination of horizontal position (latitude &amp; longitude) based on the number and geometric distribution of the satellites used in the determination.</td>
</tr>
<tr>
<td>Independent Movement Sensor</td>
<td>A sensor which detects movement of a vehicle independent of GPS signal.</td>
</tr>
<tr>
<td>In-Vehicle Unit (IVU)</td>
<td>The telematics unit which monitors parameters.</td>
</tr>
<tr>
<td>IVU Data</td>
<td>The raw data collected by the IVU.</td>
</tr>
<tr>
<td>IVU Data Records</td>
<td>Position, Speed and Alarm Vehicle Records generated by the IVU.</td>
</tr>
<tr>
<td>IVU Identifier (IVU ID)</td>
<td>A unique identifier assigned to an IVU which identifies the IVU and the data from that IVU.</td>
</tr>
<tr>
<td>Message Authentication Code</td>
<td>A code known only to the IAP-SP to ensure the authenticity of the IVU, and SDID communication origin.</td>
</tr>
<tr>
<td>Prime mover/rigid truck</td>
<td>That part of a vehicle which contains the power unit to which the IVU is affixed.</td>
</tr>
<tr>
<td>Reference System</td>
<td>The reference system used by TCA for GPS quality testing of IVUs.</td>
</tr>
<tr>
<td>Tamper</td>
<td>Conduct towards the IVU which is intended to...</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>--------------------------</td>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>Type-approved IVU</td>
<td>An IVU which is of a type which has been approved by TCA.</td>
</tr>
<tr>
<td>Vehicle</td>
<td>A vehicle installed with a type-approved IVU.</td>
</tr>
<tr>
<td>IVU Alarm Record</td>
<td>A record generated and stored in the IVU as a result of testing IVU data against pre-defined criteria.</td>
</tr>
<tr>
<td>Vehicle position</td>
<td>The latitude and longitude position of a vehicle, to 0.00001 decimal degrees using the Geodetic Datum of Australia 1994 (GDA94) coordinate system.</td>
</tr>
<tr>
<td>IVU Position Record</td>
<td>A record generated and stored in the IVU when the vehicle is in operation, containing positional and other data for the vehicle being monitored.</td>
</tr>
<tr>
<td>IVU Speed Record</td>
<td>A record generated in the IVU containing vehicle speed and other data for the vehicle being monitored.</td>
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Appendix B  Requirements for the Provision of IVUs to TCA

B.1  General

B.1.1  The requirements contained in this appendix shall apply to all IVUs presented to TCA for type-approval testing.

B.1.2  TCA will, if requested, complete and return to the Applicant a signed confidentiality agreement in reasonable terms for the protection of the Applicant’s intellectual property in the devices under test.

B.1.3  The Applicant shall be responsible, at its cost, for the installation, operation and maintenance of all IVUs provided to TCA.

B.1.4  The Applicant shall provide to TCA all services reasonably required to enable TCA to carry out type-approval testing.

B.2  TCA Access to Data

B.2.1  For the type-approval testing the Applicant shall provide to TCA:

a) all IVU Data Records at daily intervals;

b) all applicable Data Blocks at no greater than weekly intervals; and

c) support, procedural guidance, user login account(s) and access to appropriate software tools or utilities to allow the decoding, decryption, decompression, extraction, etc. of data held in any proprietary or custom format, to permit further viewing or analysis of the transmitted data by TCA.

B.2.2  The data referred to in B.2.1a and B.2.1b shall be backed up by the Applicant for the duration of the type-approval process.