

TCS 069 - 2019

Specification for

The Supply and Installation of Bluetooth Data Stations

June 2019
Rev C

TCS 069 – 2019

Foreword

This specification has been developed by VicRoads. It is one of a number of technical specifications, and associated standard drawings, which set out the requirements for roadside ITS devices, traffic signal equipment and other electrical equipment and associated devices and control systems.

This specification is intended for use in all relevant works undertaken by or on behalf of VicRoads.

VicRoads Standard Drawings, Specifications and Guidelines are available for downloading from VicRoads website at the following,

<https://www.vicroads.vic.gov.au/business-and-industry/technical-publications/electrical-and-intelligent-transport-systems>

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Specification updates. VicRoads specifications and associated standard drawings are subject to periodic review. To keep the specifications up to date, amendments or new editions are issued as necessary. It is therefore important for users of VicRoads specifications to ensure that they have the latest version and associated amendments.

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PREFACE

A. TELECOMMUNICATIONS EQUIPMENT

- A.1 All telecommunications equipment shall comply with relevant requirements of the Australian Communications and Media Authority (ACMA). Such equipment shall be labelled with a Regulatory Compliance Mark.

B. CHANGES TO THIS SPECIFICATION

- B.1 The main changes to this specification from the previous version are listed below:
- Changes to installation requirements;

Revision History

Version	Revision	Date	Author	Description
2018	A	May 2018	SJS	First Release
2019	B	May 2019	ITS	Changes to installation requirements
2019	C	June 2019	ITS	Minor changes to installation section

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

- 1.1.1 This document covers the requirements for the supply and installation of Bluetooth Data Stations (BDS) for use on VicRoads network.

1.2 GENERAL

- 1.2.1 Bluetooth Data Stations (BDS) are used to gather real time Classic Bluetooth (CB) and/or Bluetooth Low Energy (BLE) MAC address data used for various analytical, statistical and advisory applications.
- 1.2.2 VicRoads uses Bluetooth data analytics system Addinsight developed by South Australia's Department of Planning, Transport and Infrastructure (DPTI). (Refer to <http://www.addinsight.com.au/>).
- 1.2.3 Any Bluetooth solution shall be fully compliant with DPTI Bluetooth data analytics Addinsight software.
- 1.2.4 The BDS shall read all Bluetooth MAC addresses in its detection zone and package them in accordance with the software requirements.
- 1.2.5 BDS for use on VicRoads projects shall be listed in TCG 018, Register of ITS Approved products.
- 1.2.6 All Bluetooth devices shall comply with the relevant requirements of this specification.
- 1.2.7 All Bluetooth devices shall be fully compatible with VicRoads existing communications network and platform.
- 1.2.8 Typical versions of the BDS are:
a) Integrated BDS solution, refer to Section 4.
b) Pole Mounted BDS solution, refer to Section 5.
- 1.2.9 The version of BDS to be installed shall be detailed in individual tender documents.
- 1.2.10 The BDS shall have a design life not less than 5 years.

SECTION 2 RELATED SPECIFICATIONS AND DRAWINGS

- 2.1 The fabrication and supply of all components for BDS shall conform to the latest versions of relevant Australian Standards.
- 2.2 All installation works shall conform to the relevant VicRoads specifications and related specifications and standards and relevant VicRoads Drawings as indicated throughout this document.
- 2.3 The following related Australian Standards are defined:

Number	Title
AS/NZS 3000	Wiring Rules
AS 3100	Approval and test specification –General requirements for electrical equipment
AS 4086.1	Secondary batteries for use with stand-alone power systems general requirements
AS 4089.2	Secondary batteries for use with stand-alone power systems installation and maintenance
AS 4509.2	Stand-alone power systems System design guidelines
AS 60038	Standard Voltages
AS 60529	Degrees of protection provided by enclosures (IP code)
AS/NZS 61000.6.1	Part 6.1: Generic Standards – Immunity for residential, commercial and light –industrial environments
AS/NZS 61000.6.3	Part 6.3 - Generic Standards – Emission Standard for residential, commercial and light-industrial environments.

- 2.4 The following related VicRoads specifications and standard drawings are defined:

Number	Title
TCS 011	Roadside Cabinets
TCS 061	The Supply of ITS Field Cabinet
TC 1200	Foundation for Pedestals
TC 1100	Traffic Signal Post

SECTION 3 ACRONYMS

3.1 ACRONYMS

The acronyms used in this document shall be interpreted as follows:

ACMA	Australian Communications and Media Authority
AC	Alternating Current
AS	Australian Standard
BDS	Bluetooth Data Station
BLE	Bluetooth Low Energy
CB	Classic Bluetooth
DPTI	Department of Planning, Transport and Infrastructure (SA)
EMC	Electromagnetic Compatibility
FDS	Freeway Data Station
HTTP	Hyper Text Transfer Protocol
HTTPS	Hyper Text Transfer Protocol Secure
IP	Ingress Protection (degree of protection)
ITS	Intelligent Transport System
NTP	Network Time Protocol
NZS	New Zealand Standard
POE	Power Over Ethernet
TCP/IP	Transmission Control Protocol/Internet Protocol
UV	Ultra Violet

SECTION 4 INTEGRATED BDS

4.1 GENERAL

4.1.1 Integrated BDS solution consists of the Bluetooth device, antenna and the associated power supply that are intended to be installed within an existing cabinet with a network access point and 240V AC socket outlet.

4.1.2 Typical cabinets used for this configuration include:

- Traffic Signal Controller;
- Freeway Data Station;
- ITS Cabinet;
- Distribution Cabinet;

4.2 POWER SUPPLY

4.2.1 Typically power is supplied via a plug pack connected into an existing socket outlet within the cabinet.

4.2.2 Where power is supplied via hard wired connection it shall comply with the requirements of Section 7 of this specification.

4.2.3 Where applicable, power may also be provided via POE.

4.3 COMMUNICATION

4.3.1 Communication can be via existing cabinet modem or a separate modem.

4.3.2 Where a separate modem is used it shall comply with Section 6 of this specification.

SECTION 5 POLE MOUNTED BDS

5.1 GENERAL

5.1.1 Pole Mounted BDS solution consists of the Bluetooth device, antenna, modem & power supply housed within its own weather proof enclosure and mounted on a pole.

5.1.2 Pole mounted BDS solution can be one of following:

- BDS attached to a pole on an existing site, such as:
 - Traffic signal site;
 - Ramp metering site;
 - Street lighting site etc.
- BDS attached to its own standalone pole;

5.1.3 The enclosure shall be marine graded aluminium or UV stable plastic.

5.1.4 Enclosure shall be rated to IP65.

5.2 POWER SUPPLY

5.2.1 Connection to supply for Pole mounted BDS shall be detailed in individual tender documents and shall comply with the requirements of Section 7 of this specification.

5.2.2 Where BDS is attached to existing site the power supply is typically supplied from the spare cores.

5.2.3 Where BDS is attached to its own standalone pole the power is typically supplied using appropriately designed solar panels.

5.3 COMMUNICATION

5.3.1 Communication shall be via a standalone modem in accordance with Section 6 of this specification.

SECTION 6 SYSTEM REQUIREMENTS

6.1 BLUETOOTH COMMUNICATIONS PLATFORM

6.1.1 All BDS shall be fully compatible with Addinsight Bluetooth platform (See Appendix A).

6.2 SECURITY

6.2.1 All BDS shall be fully compliant with VicRoads Information Security Policy at all times.

6.2.2 All BDS shall be fully compliant with VicRoads communications security requirements.

6.3 DATA TRANSMISSION

6.3.1 Each BDS shall be capable of transmitting data via a TCP/IP compatible network link, such as cellular wireless or direct hardwire connection back to a host computer located within the VicRoads Data Centre.

6.4 TIME ACCURACY

6.4.1 BDS shall be able to synchronise its internal clock with VicRoads Network Time Protocol (NTP) server.

6.4.2 All data shall be date/time stamped in minimum resolution of 1 second.

6.5 CONFIGURATION

6.5.1 BDS shall be provided with an interactive browser based user interface using HTTP and HTTPS to provide monitoring, configuration and diagnostic related functions.

6.5.2 Configuration tools shall be provided by the manufacturer.

6.5.3 The configuration tools shall enable configuration of device parameters including Site ID and detection layout via IP network.

6.5.4 The configuration tools shall operate correctly on VicRoads standard operating environment.

6.5.5 For cellular enabled BDS signal strength shall be captured and logged.

6.6 PERFORMANCE REQUIREMENTS

6.6.1 Each BDS shall:

- (a) continuously monitor and transmit Classic Bluetooth and/or Bluetooth low energy MAC address data 24 hours a day;
- (b) be Bluetooth V2 and V4 compatible;
- (c) have an omnidirectional detection range of a minimum of 50m and a maximum 100m and;
- (d) have the ability to transmit messages via Bluetooth beacons.

SECTION 7 ELECTRICAL REQUIREMENTS

7.1 GENERAL

7.1.1 All electrical works shall comply with AS/NZS3000.

7.2 MAINS POWER

7.2.1 Where specified in the individual tender documents, BDS shall be designed for mains power operation.

7.2.2 For mains power operation, an external 240V AC power supply shall be used to power BDS.

7.2.3 Connection to mains power for Integrated BDS shall typically be via plug in power pack.

7.2.4 Connection to mains power for Pole Mounted BDS shall typically be via hard wire connection.

7.2.5 For mains powered BDS, the unit shall be supplied with a minimum 3m long 240V AC power supply cable.

7.2.6 Mains power arrangements shall be specified in individual tender documents.

7.2.7 Where the BDS is installed on an existing VicRoads pole (e.g. a street lighting pole, a traffic signal pole, etc) power shall be sourced from the existing installation.

7.2.8 An in-line fuse shall be incorporated into the unit to ensure a fault does not affect the existing installation.

7.2.9 Under no circumstances, when connected to an existing powered installation, shall a second, separate source of power be installed.

7.3 SOLAR POWER

7.3.1 Where specified in individual tender documents, the BDS shall be designed for solar operation.

7.3.2 The solar power system shall be designed, constructed and installed in accordance with AS 4509.2, AS 4086.1 and AS 4086.2.

7.3.3 The supplier shall design a suitable ‘solar system’. When designing the solar system, consideration must be given to the

- Power consumption,
- Hours of operation,

- Surrounding environment; and
- Average amount of sunlight available.

7.3.4 A solar powered BDS shall be capable of operating on the battery, without charge, for a period not less than four days.

7.3.5 The solar panels shall be installed in a position that minimises the possibility of vandalism and theft. The lowest part of the solar panels should be at least 3m above ground level, or otherwise not accessible to a person of average height without the use of a ladder.

7.4 INTERNAL PROTECTION

7.4.1 All equipment shall be internally protected against damage resulting from:

- lightning strikes at or near the BDS;
- electrical transients on power cabling;
- radio frequency interference and static electrical discharge.

SECTION 8 ENVIRONMENTAL REQUIREMENTS

8.1 TEMPERATURE AND HUMIDITY

- 8.1.1 The BDS and associated equipment shall be designed to operate in ambient air temperatures within the range -15°C to 50°C .
- 8.1.2 The BDS shall be designed to operate against the effects of high humidity, including condensation following a drop in ambient temperature.

8.2 ENCLOSURE PROTECTION

- 8.2.1 For a Pole Mounted BDS solution, enclosure used to house equipment shall meet a rating of IP 65, in accordance with AS 60529.

8.3 ELECTROMAGNETIC COMPATIBILITY (EMC)

- 8.3.1 BDS shall comply with the relevant requirements of the Australian Communications and Media Authority (ACMA) for EMC and shall be labelled with a conforming RCM compliance label as detailed in Figure 6.1 below.



Figure 8.1 RCM compliance label

- 8.3.2 The manufacturer shall obtain written confirmation from the ACMA specifying what the relevant standard for the wireless system is.
- 8.3.3 A copy of the above ACMA determination shall be provided to VicRoads.

SECTION 9 MARKINGS

9.1 MARKINGS

9.1.1 Any field equipment shall be legibly and durably marked, preferably on an interior surface, with the following information:

- (a) The name, trade name or trademark of the manufacturer or responsible supplier.
- (b) Catalogue number or marking which shall distinguish the particular product from other similar items supplied and/or manufactured by the supplier.
- (c) Batch or serial number or other mark which will clearly identify the date of manufacture of the item.
- (d) Other information required under AS 3100.

SECTION 10 DOCUMENTATION

10.1 DOCUMENTATION

10.1.1 The following items are to be supplied with the BDS:

- (a) Documentation showing how the BDS operates, configuration manual, maintenance requirements, fault finding methodology and tuning procedures;
- (b) A schematic diagram or chart showing, as supplied, electrical circuits contained within the BDS;
- (c) A list of all major electrical sub-components detailing their electrical characteristics and operation limits.

SECTION 11 INSTALLATION REQUIREMENTS

11.1 GENERAL

- 11.1.1 The exact locations of a BDS will be detailed in individual tender documents, in general following applies:
- Bluetooth devices on arterial roads are typically installed on existing traffic signal sites;
 - Bluetooth devices on freeways are typically installed on the On-ramps of ramp metering sites.
- 11.1.2 The installation contractor shall be responsible for the supply and installation of all equipment required for the BDS, unless otherwise specified.
- 11.1.3 The BDS and all associated communications and power wiring shall be installed in accordance with all the manufacturer's instructions.
- 11.1.4 All installation works associated with BDS and associated equipment shall comply with the relevant clauses of:
- a) Contract Standard Section 732; and
 - b) The requirements of individual contract documents.
- 11.1.5 All pits and conduits shall be installed in accordance with Contract Standard Section 733.
- 11.1.6 All communication and power cables shall be labelled at both ends. All cables should be neatly trained and organised.

11.2 PRE-QUALIFICATION REQUIREMENTS

- 11.2.1 Only BDS devices supplied by a manufacturer that holds current VicRoads pre-qualification for the Supply of On-road Electronic Devices (SOED) shall be installed.
- 11.2.2 Works required to install a BDS device on an existing traffic signal site, must be carried out by a contractor that holds current VicRoads pre-qualification level for the installation of traffic signals - STS1.
- 11.2.3 Other BDS device installations must be carried out by a contractor that holds current STCE VicRoads pre-qualification level.

11.3 CONFIGURATION

- 11.3.1 The supplier shall configure all network parameters including IP address, Device ID into each applicable device.
- 11.3.2 All parameters including IP addresses and Device IDs shall be obtained from VicRoads.

11.3.3 The supplier shall ensure that the device is configured appropriately with the responsible VicRoads officer before the device is installed on field.

11.4 INTEGRATED BDS SOLUTION INSTALLATION REQUIREMENTS

11.4.1 Integrated BDS solution consists of the Bluetooth device, antenna and the associated power supply.

11.4.2 The BDS components shall be installed within an existing Cabinet (e.g. a traffic signal controller cabinet) with a network access point and 240V AC socket outlet.

11.4.3 The Bluetooth device shall be securely placed (e.g. attached to din rail) and easily accessible for maintenance purposes within the controller cabinet.

11.4.4 All cabling shall be securely strapped and neatly placed in the cabinet not abstracting any equipment.

11.4.5 Antenna shall be installed on top of the controller cabinet and shall be placed so it has optimal detection range.

11.4.6 Antenna shall be sealed to top of cabinet to prevent cabinet leaks. The cabinet shall maintain its IP rating once the antenna is installed.

11.5 POLE MOUNTED BDS SOLUTION INSTALLATION REQUIREMENTS

11.5.1 Pole Mounted BDS solution consists of a Bluetooth device, modem, antenna & power supply housed within its own enclosure.

11.5.2 BDS enclosure shall be attached to a pole in an acceptable matter, approved by VicRoads.

11.5.3 Pole mounted BDS solution can be one of following:

- BDS attached to an existing pole on an existing site such as traffic signal site, ramp metering site or street lighting site etc.;
- Solar powered BDS attached to its own standalone pole.

11.5.4 Where a BDS is installed to a pole on an existing traffic signal, ramp metering site or FDS site a separate circuit breaker shall be installed within the cabinet.

11.5.5 The circuit breaker shall be easily accessible and clearly labelled.

11.5.6 Where a BDS is installed on a traffic signal pedestal, power shall be connected into a spare core of the traffic signal cable.

11.5.7 Where a BDS is installed onto a street lighting pole, power shall be connected as shown in Figure 11.1.

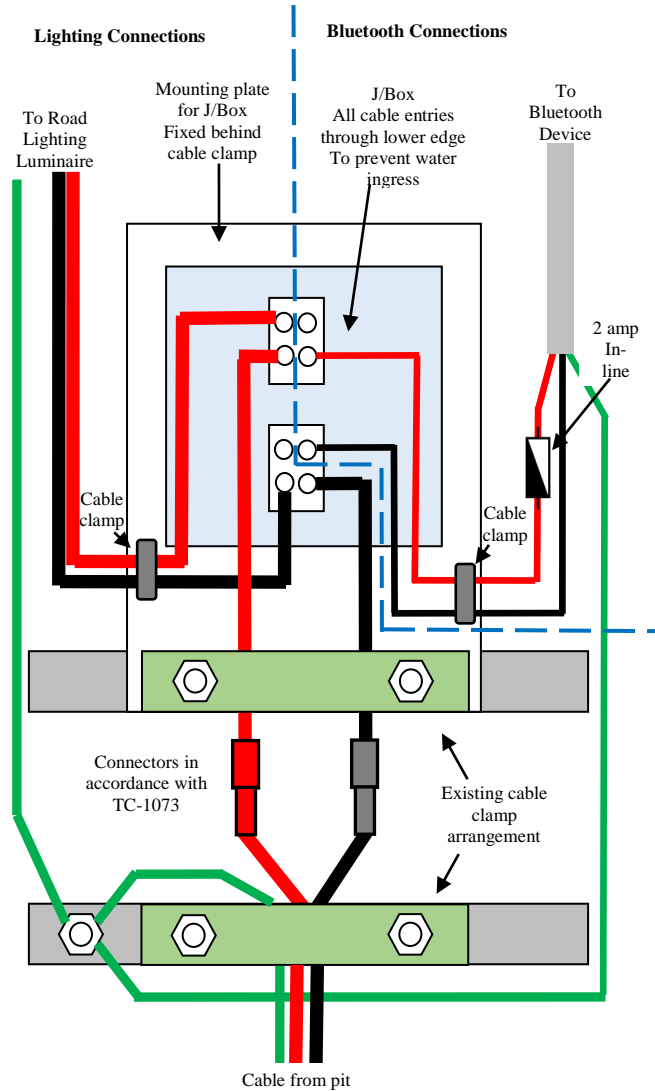


Figure 11.1: Power connection for Bluetooth device mounted on slip base pole

11.5.8 If solar power is required it shall be specified in the individual tender documents.

APPENDIX A

REQUIREMENTS FOR ACCEPTANCE

(Normative)

A1 General

To enable assessment for the purpose of granting acceptance for use for VicRoads projects, the supplier is to submit a formal request for acceptance accompanied by the following:

- (a) Documentation to demonstrate that the BDS complies with the requirements of this specification
- (b) Evidence of suitability for use within the Addinsight environment (i.e. Addinsight certification)
- (c) An outline drawing showing the general presentation and overall dimensions of the BDS.
- (d) Details of the configuration requirements and user manuals for the BDS.

A2 Required NATA accredited testing

The supplier shall provide evidence of compliance with the requirements of Section 8 of this specification. Such evidence shall be as detailed in Table A2 below.

Clause	Requirements	Evidence
8.1	Temperature and humidity	Test Report or other acceptable evidence
8.2	Enclosure protection	Test Report or statement of compliance
8.3	EMC Compliance	Test Report or evidence of RCM mark

Table A2: Require NATA Accredited Testing

A3 Other required testing

- (a) A field trial of minimum 3 months will be required in order to fully test the BDS in VicRoads environment.
- (b) VicRoads may require additional information or testing to be carried out as part of its evaluation.

APPENDIX B

RECOMMENDED MAINTENANCE GUIDELINES

(Informative)

- B1 Regular routine maintenance of BDS recommended.
- B2 If the BDS is installed on the existing asset such as traffic signal or street lighting, it is recommended that it is maintained under the maintenance contract of that asset.
- B3 The maintenance activities to be carried out for Integrated BDS solution should include, but should not be limited to the following:
- (a) Ensure all cables and connectors are in good condition and firmly placed in sockets and connectors;
 - (b) Ensure all wiring and cabling is securely connected and supported;
 - (c) Ensure signal and connection strength;
 - (d) Inspect, repair or replace all faulty, damaged or missing fixing accessories (i.e. washers, nuts and bolts etc.)
 - (e) Ensure there is power to assets;
 - (f) Perform preventative maintenance as per manufacturer's specifications; and
 - (g) Ensure Bluetooth operation is legible;
- B4 The maintenance activities to be carried out for Pole Mounted BDS Solution should include, but should not be limited to the following:
- (a) Check enclosure is intact, secure, clean and undamaged;
 - (b) Ensure all cables and connectors are in good condition and firmly placed in sockets and connectors;
 - (c) Ensure all wiring and cabling is securely connected and supported;
 - (d) Ensure signal and connection strength;
 - (e) Ensure pole is secure at base and tighten rag bolts as necessary;
 - (f) Ensure solar panels are clean (where installed);
 - (g) Inspect and ensure optimum operation and integrity of solar panels and batteries (where installed);
 - (h) Inspect and ensure batteries maintain charge sufficient for continuous operation 24 hours, 3 days a week (where installed);
 - (i) Inspect and ensure locks, where fitted, are secure;
 - (j) Inspect, repair or replace all faulty, damaged or missing fixing accessories (i.e. washers, nuts and bolts etc.)
 - (k) Ensure there is power to assets;
 - (l) Perform preventative maintenance as per manufacturer's specifications; and
 - (m) Ensure Bluetooth operation is legible;