SA TS 5719:2017

Technical Specification

Communications protocol for dynamic message signs and road weather information systems

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- Australian Industry Group
- CIE Australia
- Department of Planning, Transport and Infrastructure, SA
- Department of Transport Main Roads, Qld
- Hire and Rental Industry Association of Australia
- IES: The Lighting Society
- Intelligent Transport Systems Australia
- Lighting Council Australia
- Main Roads Western Australia
- Roads and Maritime Services
- Traffic Management and Safety - Roads ACT
- VicRoads

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PREFACE

This Technical Specification was prepared by Standards Australia Committee LG-006, Road Traffic Signals in collaboration with Standards Australia Committee IT-023, Transport Information and Control Systems.

The objective of this Technical Specification is to provide an agreed communications protocol for dynamic message signs and road weather information systems, in line with the existing prevailing practice based on the Roads and Maritime Services roadside device communications protocol. The intention is to cater for the current interim needs before the switch to a mainstream international communications protocol by Australian road authorities.

This Technical Specification includes requirements for the complete communications protocol, including link establishment and error reporting.

The terms ‘normative’ and ‘informative’ have been used in this Technical Specification to define the appendix to which it applies. A ‘normative’ appendix is an integral part of the Technical Specification, whereas an ‘informative’ appendix is only for information and guidance.

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SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Technical Specification defines the physical means and protocols to be used to communicate with dynamic message signs (DMS) and road weather information systems (RWIS). Where necessary, the functionality required to implement the protocol is described.

NOTES:

1 For the purpose of this Technical Specification DMS consist of variable message signs (VMS), changeable message signs (CMS), electronic speed limit signs (ESLS), lane use signs (LUS) and school zone alert signs (SZAS).

2 This communication protocol also supports the display of travel times on VMS.

1.2 DEFINITIONS

For the purposes of this document, the definitions below apply.

1.2.1 Address field (ADDR)

A field in a data packet or non-data packet for the slave address.

1.2.2 Changeable message signs (CMS)

A sign, including control equipment where the host control system can only select predefined messages to be displayed.

1.2.3 Checksum

A method used to detect errors in transmitted or stored digital data.

1.2.4 Command

An application message requiring a reply.

1.2.5 Device controller

A logical entity that controls the roadside device of interest. Multiple instances of the logical entity may run on a single physical device.

1.2.6 Dynamic message signs (DMS)

Stationary traffic control devices capable of displaying one or more alternative messages that provide travellers with real-time, traffic-related messages.

1.2.7 Electronic speed limit signs (ESLS)

A specific type of CMS that displays regulatory speed limits.

1.2.8 Interlocking

A device controller function that prevents the display of particular combinations of symbols and/or speed limits on adjacent signs over a single carriageway that are considered to be dangerous, logically conflicting or ambiguous.

NOTE: The details of such functionality and combinations are normally defined in the device specifications and are out of the scope of this Technical Specification.

1.2.9 Lane use signs (LUS)

A specific type of CMS that displays regulatory lane control symbols or signals.

NOTES:

1 ESLS and LUS functionality is typically provided by a single device.

2 LUS are also known as lane use management signs (LUMS) or lane control signs (LCS).

1.2.10 Master

A remote host control system that communicates or establishes communications with the device controller (unless the context dictates otherwise).

1.2.11 Reply

An application message responding to a command.

1.2.12 Road data processor (RDP)

A standalone remote control computer that acts as a front end of the host control system (master).

1.2.13 Road weather information system (RWIS)

A system that collects weather related information via a variety of sensors and then processes this information to provide driving conditions to road users via information signs.

1.2.14 School zone alert signs (SZAS)

A specific type of CMS that displays or draws attention to applicable regulatory speed limits during the school zone operating period.

1.2.15 Slave

A device controller of a DMS or RWIS to which this Technical Specification applies.

1.2.16 Variable message signs (VMS)

A sign, including control equipment where the content of the displayed messages can be changed dynamically by a host control system.

SECTION 2 COMMUNICATIONS ARCHITECTURE

2.1 PROTOCOL OVERVIEW

The roadside device communications protocol is an asynchronous, half-duplex protocol designed to be independent of the communications medium. This enables operation on different types of data circuits such as multi-point/point-to-point and switched/non-switched systems.

The roadside device communications protocol provides the following:

(a) Framing.

(b) Lost packet detection.

(c) Error checking.

(d) Security (authentication).

(e) Data transfer.

NOTE: This communications protocol uses the sign-magnitude format to provide signed integer values (see Table 2.1).

TABLE 2.1

SIGNED INTEGER VALUES EXAMPLES

Temperature	Decimal value	Hexadecimal value
+30.5ºC	305	0x0131
+0.5ºC	5	0x0005
0ºC	0	0x0000
–0.5ºC	–5	0x8005
–30.5ºC	–305	0x8131
Sensor not present or faulty	–32767	0xFFFF

The protocol has been designed to be independent of the communications media. This allows a single set of application messages to be used to exchange data with all device controllers regardless of the physical arrangement. As a result, the messages passed on a permanent multi-drop link are the same as those used over a point-to-point switched link.

2.2 PHYSICAL SYSTEM ARCHITECTURE

The master communicates with the roadside device controller located close to the device (or a number of devices as may be the case for signs). The master may be the host control system or the road data processor (RDP). The RDP may be either a standalone remote control computer or a local operator terminal.

Communications between the master and the device controller may be via dial-up phone lines, radio links or a dedicated line.

Figure 2.1 below shows the following physical system architecture arrangements:

(a) A number of roadside device controllers permanently linked with the host control system. In this case the communication between the master and the device controller is via a multi-drop link, thus allowing a number of device controllers to be supported on a single link.

(b) A number of roadside device controllers linked to a RDP. The RDP acts as a master and may be co-located with host control system or located on the side of the road.