Roads

Master Specification

RD-ITS-S6 Field Processors

Document Information	
K Net Number:	13508155
Document Version:	2
Document Date:	August 2020

DEPARTMENT FOR INFRASTRUCTURE AND TRANSPORT

Government of South Australia
Department for Infrastructure and Transport

Document Amendment Record

Version	Change Description	Date	Endorsement record (KNet ref.)
1	Initial issue (formerly R68)	02/07/19	
2	Formatting for publishing	August 2020	

Document Management

Contents

RD-ITS-S6 Field Processors

1 General

1.1 This Part specifies the requirements for the supply of Field Processors (FP) DTUP Standard Templates for ITS applications. It shall be read in conjunction with RD-ITS-D1 “Design for Intelligent Transport System (ITS)” and RD-ITS-S1 “General Requirements for the Supply of ITS Equipment” and if installing, RD-ITS-C1 “Installation and Integration of ITS Equipment”.

1.2 Documents referenced in this Part are listed below:

a) AS 60529 Degrees of Protection Provided by Enclosures (IP Code).

1.3 The following definitions are used in this Part:

Term	Definition
CPU	Central Processing Unit
FP	Field Processor
PC	Personal Computer
PnP	Plug and Play

2 Quality Requirements

2.1 The Contractor shall prepare and implement a Quality Plan that includes or annexes the following documentation:

a) design documentation in accordance with RD-ITS-D1 “Design for Intelligent Transport System (ITS)”;

b) Acceptance Test Plans (refer RD-ITS-S1 “General Requirements for the Supply of ITS Equipment”, Clause 13 “Testing and Acceptance”), which provides full details of all tests necessary;

c) routine maintenance recommendations;

d) Training Plan (refer RD-ITS-S1 “General Requirements for the Supply of ITS Equipment”, Clause 15 “Training”);

e) spare part requirements;

f) manufacturer’s specifications (catalogue extracts) of all major components detailing ratings and performance characteristics; and

g) all layout, fabrication, interconnection and assembly drawings and diagrams necessary for this contract.

2.2 The provision of the quality plan documentation shall constitute a **Hold Point**.

2.3 The Contractor shall provide evidence of STREAMS compatibility in accordance with RD-ITS-D1 “Design for Intelligent Transport System (ITS)” and RD-ITS-S1 “General Requirements for the Supply of ITS Equipment”, Clause 6 “STREAMS”. The evidence of STREAMS compatibility shall constitute a **Hold Point**.

2.4 The Contractor shall provide samples for acceptance in accordance with RD-ITS-S1 “General Requirements for the Supply of ITS Equipment”, Clause 3 “Equipment Requirements”. Provision of the samples listed in this Clause shall constitute a **Hold Point**.

2.5 If not submitted beforehand, the samples and documentation required by this Clause shall be submitted at least 20 working days prior to the commencement of site work or placing an order for Equipment.

3 Functional Requirements

3.1 The Field Processor (FP) shall be an industrial PC and shall interface to, control, and manage the operation of field systems and devices that form part of ITS applications. The FP shall be located within a roadside field cabinet.

4 Equipment Components

4.1 The Field Processor Equipment consists of:

a) FP (rated for operation between -40ºC and +80ºC) including memory and input / output interface cards;

b) separate power supply; and

c) field cabinet, mains power supply and associated infrastructure.

4.2 The Contractor shall ensure that the FP is STREAMS compatible. The Principal will engage Transmax Pty Ltd for the loading and configuration of the STREAMS software onto the FP.

5 Operational Requirements

General

5.1 In addition to the requirements of RD-ITS-S1 “General Requirements for the Supply of ITS Equipment”, the FP shall meet the following general requirements:

a) an industry standard expansion bus shall be supported;

b) a “technology guarantee” backward compatibility of future replacement products for a period of at least five years shall be provided;

c) no hardware modules shall be configured using Plug and Play (PnP) unless the PnP functionality can be disabled (and the module configured) by jumper / BIOS; and

d) all hardware shall be certified as compatible with Linux kernel 2.4.18 or later.

CPU and Motherboard

5.2 The CPU and motherboard shall meet the following requirements:

a) the processor shall be of a 32-bit architecture, compatible with and providing the performance of an Intel Celeron 400 MHz as a minimum; and

b) the processor board shall be capable of stand-alone operation without keyboard, video, disk drive, etc. connected.

System Resources

5.3 The FP system resource requirements include:

a) the system shall be supplied with minimum 64 MB RAM, expandable to 256 MB, in standard DIMM (168-pin) format;

b) the system shall be supplied with minimum 32 MB compact flash disk. The compact flash disk shall be bootable and require no additional software support. The compact flash disk shall have a lifecycle of at least 100,000 writes and be capable of retaining stored data for a minimum of 1 month without mains power;

c) the system shall provide a battery-backed (or equivalent) “Real Time Clock”, capable of retaining accurate date / time for a minimum of 12 months without mains power. The clock shall be accurate to within 1 second per day; and

d) the system shall provide a “Hardware Watchdog” timer circuit with the ability to reset the system on timeout. It shall be possible to enable and disable the watchdog either by software or by jumper / BIOS, and provide a range of timeout values from 1 second to several minutes.

I/O Requirements

5.4 The FP shall provide the following I/O interfaces:

a) Serial Interfaces:

i) minimum four (4) EIA / RS-232C serial ports capable of data rates of 300 bps to 115 kbps;

ii) 16550 or compatible UART;

iii) at least two (2) serial ports shall be configurable for EIA / RS-422 (if specified in the Project Specific Requirements, Appendix B);

iv) isolation shall be available for ports when configured for the EIA / RS-232C and EIA / RS-422 standards. Isolators shall suppress at least 3 KV and be replaceable without opening the enclosure;

v) base addresses and IRQs selectable by jumper / BIOS;

vi) connections made by D-style 9-way connectors with locking screws; and

vii) upgradeable to 24 ports within the enclosure (if specified in the Project Specific Requirements, Appendix B). All additional serial ports shall be able to run both EIA / RS-232C and EIA / RS-422.

b) Parallel Interfaces:

i) minimum 1 x EPP / ECP Parallel port, compatible with IBM LPT: standard;

ii) base addresses and IRQs selectable by jumper / BIOS; and

iii) connections made by D-style 25-way connectors with locking screws.

c) Network Adaptor:

i) 10/100 or 10/100/1000 megabit adaptor with Linux driver;

ii) connection made by standard Ethernet RJ45 modular connector; and

iii) base addresses and IRQs selectable by jumper / BIOS.

d) Modem Adaptor:

i) integrated modem / serial port (matching the stated serial interface requirements) meeting the V.34 standard and capable of operation over Telstra voice-grade dial (PSTN) and two-wire leased (PAPL) lines. This may logically appear in place of one of COM1-4 or as an additional serial port;

ii) alternatively, an external modem meeting the requirements of the integrated modem (above) may be offered, where no suitable integrated modem can be supplied;

iii) supplied with AUSTEL approved connector for connection to the PSTN / PAPL network; and

iv) incorporate (or be provided with) adequate transient protection, filtering and shielding against induced electromagnetic radiation.

e) Display Adaptor:

i) minimum 1 MB video memory, capable of 800 x 600 x 256 colours with connection to CRT made by standard triple-row 15-way video connector with locking screws; and

ii) optionally, an additional interface to flat-panel LCD display with connection to panel made by standard D-style dual-row 15-way connector with locking screws.

f) Permanent Storage Interfaces:

i) removable compact flash; or

ii) alternatively, an IDE hard disk controller (supporting up to LBA Mode 4 devices) may be supplied, with connection made by standard dual-row transition connector with latches (for ribbon cables).

g) Keyboard Interface:

i) standard AT 101-key keyboard interface, with connection made by PS/2-style mini-DIN or standard DIN connector (PS/2-style preferred).

Site Specific Identifier

5.5 The Field Processor shall include a STREAMS site specific identifier which:

a) uniquely identifies a unit; and

b) takes the form of a programmable “dongle” connected to the unit’s parallel or serial interface.

Field Processor Hardware Enclosure(s)

5.6 Further to the requirements of RD-ITS-S3 “ITS Enclosures”, the Enclosures shall comply with the following:

a) FPs shall be suitable for being mounted in telecommunications field cabinets that comply with ITS-01. A space of approximately 300 x 260 x 200 mm will be available for mounting within the cabinets;

b) allowance for expansion;

c) metallic construction of high quality, sealed against dust and moisture to a minimum rating of IP51, as specified in AS 60529;

d) connectors for all data interfaces (excepting the floppy and hard disk) shall be located on a single face of the unit with effective means of restraining any connectors in their sockets. An LED power indicator and recessed momentary-action power reset switch / button shall also be provided on this same face, with power connection made at the rear; and

e) no moving parts or fans.

6 Power Supply Unit

General

6.1 The power supply unit shall:

a) be suitable for connection to nominal 240 V 50Hz earthed-neutral electrical supply, capable of correct operation between 200 V and 265 V a.c;

b) provide (as a minimum) DC output at +5 V and GND, with connection compatible with that required by the processor board / unit;

c) be rated with 20% spare supply capacity when the FP is fully confirmed with all expansion slots filled, and maximum number of I/O cards installed;

d) incorporate (or be provided with) adequate transient protection and filtering;

e) have no exposed 240 V contacts;

f) provide an interface to an UPS or other DC-based backup power supply; and

g) be contained within its own Enclosure.

Optional Equipment

6.2 To ensure flexibility for future applications (by others), information on the availability and costings of the following options shall be provided with the design documentation:

a) two or more additional serial ports;

b) the ability to configure / convert existing or additional serial ports to RS422; and

c) an “External Reset” circuit with the ability to reset the system on timeout. This is similar in operation to the Hardware Watchdog but is a self-contained module, acting independently of the unit.

7 Mechanical & Physical Requirements

7.1 Further to RD-ITS-S1 ”General Requirements for the Supply of ITS Equipment”, Clause 4 “Environmental Requirements”, the FP shall be capable of continuous operation in a field cabinet where the ambient temperature is in the range 0 to +70ºC and humidity is in the range 0-90% (non-condensing).

7.2 Further to RD-ITS-C1 “Installation and Integration of ITS Equipment”, the FP and power supply shall be suitable for shelf mounting in a telecommunications field cabinet that complies with RD-ITS-S3 “ITS Enclosures”. The site specific identifier may be connected to the field cabinet.

8 Hold Points

8.1 The following is a summary of Hold Points referenced in this Part:

Document Ref.	Hold Point	Response Time
2.2	Quality Plan	10 Working Days
2.3	Evidence of STREAMS compatibility	5 Working Days
2.4	Samples for acceptance	5 Working Days

9 Verification Requirements and Records

9.1 The Contractor shall supply the following records:

Table RD-ITS-S6 9-1 Verification Requirements

Document Ref.	Clause and Title	Record to be Provided
RD-ITS-S1	11 “Equipment Manuals”	Operation and maintenance manual(s)
RD-ITS-S1	12 “Warranty”	Manufacturer’s Warranty
RD-ITS-S1	13 “Testing and Acceptance”	Factory Acceptance Test (FAT) Records
RD-ITS-S1	14 “As-Built Documentation”	As-Built documentation
RD-ITS-C1	8 “Testing & commissioning” (where installation is to occur)	Test Records - refer RD-ITS-C1 “Installation and Integration of ITS Equipment”.