Traffic Open Products and Specifications

TOPAS 2522A

Remote Monitoring and Control of Traffic Control Equipment via a Telecommunications Network

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A (v1)	15/01/15	Draft	Admin
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TOPAS 2522 A

REMOTE MONITORING AND CONTROL OF TRAFFIC CONTROL EQUIPMENT VIA A TELECOMMUNICATIONS NETWORK

CONTENTS

1 INTRODUCTION

1.1 This specification covers the necessary requirements for remote monitoring and control equipment for use with traffic control equipment via a dial-up connection.

1.2 TOPAS specifications are explicitly purchasing specifications and compliance with them is not mandatory. However Local and other Purchasing Authorities may typically require that equipment purchased complies with TOPAS specifications and is TOPAS registered.

1.3 Manufacturers may register products as being compliant with this specification, using the process defined in TOPAS 0600

1.4 TOPAS registration requires manufacturers submit a Technical File to an appropriate Technical Assessor to aid compliance verification. The content requirement for the Technical File is defined in Appendix Z of this specification.

1.5 Guidance to potential users of this Product is given in Appendix A.

1.6 Within this specification, “The Product” shall mean all components necessary to provide a complete operational unit meeting the requirements of this specification and the common requirements defined in TOPAS0600.

Implementation

1.7 This specification implements requirements as originally defined in HA specification TR 2522A. Product Approvals to TR2522A may be used to register products to this specification as defined in TOPAS 0600

1.8 This specification will be immediately implemented from the date of issue for all new TOPAS Registrations

Glossary of Terms

1.9 A comprehensive glossary of terms is given in Highways Agency document TA84 Code of Practice for Traffic Control and Information Systems for public highways.

2 FUNCTIONAL REQUIREMENTS

General

2.1 This specification defines the requirements of a Product to provide remote monitoring and control of traffic control equipment via a dial-up telecommunications network.

2.2 The Product shall be designed for connection to traffic signal controllers complying with TOPAS 2500.

2.3 For the purposes of this Product specification remote monitoring and control systems are divided into two classes as follows:

i) Monitoring and Control systems, which monitor traffic control equipment for faults, status and timings and, in addition, provide a means of remotely controlling traffic control equipment;

ii) Monitoring-Only systems, which provide the monitoring facilities described in i) above, but which do not provide any means of influencing the operation of the traffic control equipment.

2.4 The Product shall comprise an Instation, which may be either a shared UTC computer, or a dedicated processor; a data transmission system via a dial-up telecommunications network; and an Outstation Monitoring and Control Unit (OMCU), or Outstation Monitoring Unit (OMU) at each outstation.

Performance

Instation Equipment

2.5 The instation equipment shall be capable of performing the following functions:

a) Transmit information to the outstation to affect those control functions specified in the Works Specification accompanying the procurement contract. (See the NOTE following clause 2.23 (b)).

b) Transmit to the outstation the necessary messages to gain access to the monitoring information specified in the Works Specification.

c) Receive from the outstation information messages transmitted in response to a) and b) above.

d) Provide a means of operator input of the specified control information, which shall take priority over automatically, generated control information.

e) Provide a means of displaying the monitored information received from the outstations as specified in the Works Specification.

f) Provide an alarm and fault report:

i) to report the reception of outstation fault reports;

ii) to report the system's detection of an instation or data transmission fault.

g) Provide a non-volatile medium for the automatic recording of detected instation and outstation faults, together with the date and time of reporting of each fault. The capacity of this fault recording facility will be specified in the Works Specification.

Outstation Monitoring and Control unit (OMCU)

2.6 Traffic control equipment functions to be monitored by the OMCU shall be as defined in the Works Specification.

2.7 The OMCU shall monitor information presented at the controller interface and return all or selected information as specified in the Works Specification on demand from the instation.

2.8 Unless specified otherwise in the Works Specification, the OMCU shall be capable of returning selected information to the instation automatically by means of auto-dialling equipment. The information to be returned shall be specified in the Works Specification.

2.9 The control functions of the OMCU shall be as defined in the Works Specification.

2.10 Monitoring and control information exchanged between OMCU and controller via an interface as defined in TOPAS 2523 or by another approved method.

2.11 Where specified in the Works Specification the OMCU shall incorporate a Master Time Clock System (MTCS), which shall provide the facilities necessary to operate a controller to specification TOPAS 2500 in a cableless linking mode, where timetable and plan timings may be transmitted from the instation to the OMCU for storage and subsequent implementation.

2.12 Where the facility in 2.11 above is provided, the OMCU shall also include the facility to monitor controller stage greens and check for compliance with stages demanded by the MTCS. Failure to comply shall cause the signal controller to revert to local control.

Data Transmission System

2.13 The Data Transmission system shall incorporate an error checking facility, which shall be described in detail in the manufacturer's or supplier's product specification. The detection, at the instation or outstation, of any data transmission error, which the system is incapable of correcting automatically, shall activate the alarm described in clause 2.5 (f) (ii) and record the event in accordance with clause 2.5 (g).

2.14 No implementation of control data shall take place until the data has been verified by the error detection system.

2.15 Adequate safeguards shall be provided to minimise the possibility of unauthorised control of equipment, e.g. the use of access codes.

2.16 The Data Transmission System between the Instation and the OMCU shall be one of the following:

PSTN or GPRS Network

2.17 The Instation data transmission equipment shall include at least one auto-dialling unit and each outstation shall be provided with an auto-answering unit.

2.18 Where specified in the Works Specification the instation shall also include an auto-answering facility and each outstation shall be provided with an auto-dialling facility.

2.19 All equipment shall be approved by BABT for connection to a PSTN or GPRS network.

2.20 All transmission equipment shall operate in accordance with the current issue of British Standards specifications BS6305, 6317, 6320, 6789, BS EN 41003 for the use of equipment connected to a PSTN or GPRS network.

Digital IP Network

2.21 The digital IP network between the Instation and the OMCU shall be point-to-point configured connection using Wide Area Networking (WAN) technologies.

2.22 A permanently established virtual circuit (PVC) shall be provided between the Instation and the OMCU.

Controller/OMCU Interface

2.23 The system connection to signal controllers to specification TOPAS 2500 shall be by any of the means described below, or a combination of these means:

a) By means of the interface described in TOPAS 2523, or other approved serial interface.

b) By means of direct connections to the controller.

NOTE: Certain control facilities available at this interface are not suitable for remote operation because their safe use requires the presence of an Engineer on site. For signal controllers to TOPAS 2500 it is not possible to remotely use commands requiring access Level 3 or higher as defined in TOPAS 2523.

Construction

2.24 The OMCU and outstation data transmission equipment shall be designed for mounting as follows:

a) As ancillary equipment within an existing traffic signal controller case.

b) Within a freestanding equipment case manufactured from suitable material to provide mechanical protection for the equipment in the intended environment. The housing shall be designed to maintain the mechanical, environmental and the EMC protection for a minimum of 15 years, with suitable maintenance.

Equipment Interconnection

2.25 The outputs of the Product are isolated from earth and the power supplies.

2.26 The output is protected from accidental reversal of the current flow.

2.27 The wiring form or cable between the outstation equipment and traffic control equipment shall be terminated at some convenient point within the equipment case. The terminal provided for the wiring from the traffic control equipment shall be capable of easy disconnection and of approved design.

NOTE: Screw terminals that entail a direct contact between the retaining screw and the terminated wire will not be acceptable.

Electrical Requirements

2.28 All equipment shall be suitable for operation in accordance with this specification when connected to the UK mains supply.

2.29 All wiring, termination, earthing and labelling shall be in accordance with BS 7671.

Environmental Testing

2.30 The equipment shall be tested by an approved body to ensure that the following environmental performance requirements as specified in TR 2130C in the following areas have been satisfied:

- Dry Heat} Change of Cold} Temperature
- Damp Heat Cyclic
- Solar Radiation
- Water Penetration (to IP ratings in clause 2.31)
- Drop and Topple
- Bump
- Vibration transportation
- Vibration, random, Operational

2.31 The equipment case housing the outstation equipment is to BS EN 60529 IP 55 or better.

Failure Modes

2.32 Any detected failure of the instation or data transmission equipment shall result in termination of transmission of control data.

2.33 Where possible, failure of the OMCU shall cause all control signals to be inhibited in such a manner as to cause the controller to assume its fallback mode automatically.

Reliability

2.34 The reliability of the OMCU shall be such that it has an average failure rate of no more than 1 failure in 4 years with a life expectancy of 15 years.

3 REFERENCES

3.1 Where undated references are listed, the latest issue of the publication applies.

British Standards

3.2 British Standards are published by the British Standards Institution, London

BS 6305: 1992	Requirements for apparatus for connection to public switched telephone networks
BS 6317: 1992	Requirements for the connection of apparatus to a single exchange line of the PSTN
BS 6320: 1992	Specification for modems for connection to PSTN
BS 7671	Requirements for electrical installations. IEE Wiring Regulations. Sixteenth edition
BS 6789 Pt 1: 1984	Requirements for added facilities on telephones and modems for connection to British Telecommunications PSTN
BS 6789-3.1: 1985	Requirements for auto-calling facilities
BS 6789-3.2: 1987	Requirements for auto-answering and auto-clearing facilities
BS 7987	Road Traffic Signal Systems
BS EN 41003	Safety requirements for equipment to be connected to telecommunications networks
BS EN 50293	Electromagnetic Compatibility - Road Traffic Signal Systems
BS EN 60529	Degrees of protection by enclosures (IP Code)

Specifications

3.3 TOPAS Limited Specifications are available from www.topasgroup.org.uk

TR 2130	Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment
TOPAS 2500	Traffic Signal Controller
TOPAS 2523	Traffic Control Equipment Interfacing Specification
TOPAS 0600	Statutory Approval of Equipments for the Control of Vehicular and Pedestrian Traffic on Roads

Other Publications

3.4 Other publications can be obtained from the Stationary Office.

MCHW	Volume 1 Specification for Highways Works
Directive 89/336/EEC	EMC Regulations 1992 (Statutory Instrument 1992 No 2372)

APPENDIX A INFORMATIVE GUIDE

General

A1 This Appendix is an informative guide to Highways Authorities who wish to purchase / hire and use remote monitoring and control equipment that has been declared conformant to this specification. Prospective purchasers/hirers should ensure that the procurement contract addresses the following issues.

Works Specification

A2 The purchaser should define the following requirements that relate to a specific scheme in the form of a Works specification:

- A list of the control functions to be provided for the interchange;
- A list of the monitoring functions to be provided for the interchange;
- The capacity of the Fault recording facility to be provided;
- The requirements for the Master Time Clock System if required;
- The scheme specific telecommunication provisions and requirements.

Marking and Labelling

A3 The purchase contract should call for the outstation equipment to be fitted with a label displaying an emblem as defined by the purchaser together with the following information:

- The HA specification to which it is approved;
- The electrical supply requirements of the equipment.

APPENDIX Z - TECHNICAL FILE CONTENT

This appendix defines the necessary content for a Technical File Pack (a collection of relevant documents) which must be reviewed by an appropriate Technical Assessor as part of the TOPAS Registration process (See TOPAS 0600).

Only the 'ticked' items are required to be present in a Technical File Pack used to support TOPAS Registration against TOPAS 2522A.

Ref	Item	Description	Required
1	Technical File overview document.	A summary document outlining the product, specifying which TOPAS and other relevant specification(s) the product has been designed to comply with, together with a detailed table of contents for the Technical File Pack. Where copies of external certificates or documents are referred to these may be included within the Technical File overview document or supplied separately as part of the Technical File Pack.	√
2	QA accreditation certificate(s).	A copy of the Quality Management Registration Certificates for the organisation applying for TOPAS Product Registration.	√
3	Details of all CE markings that apply to the product.	A list of all directives complied with and how achieved. Typically this would be references to explicit CE Technical Files and certificate's, copies of which would be included in the Technical File Pack.	√
4	A functional design description of the product.	A reference to the overall System Design Documentation for the product (by document part number and issue).	√
5	Product part numbers	A list of top level assembly part numbers and their issue states including all firmware / software part numbers and issues.	√
6	Test procedures and results	A reference to all test schedules and test result documents (by document part number and issue).	√
7	Statement of compliance	A clause by clause statement of compliance against TOPAS 2522A confirming compliance and/or listing caveats or deviations.	√

8	EMC test results	A reference to EMC test performance requirements. Copies of the results of EMC testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack.	N/A
9	Optical test results	A reference to Optical tests performance requirements. Copies of the results of Optical testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack.	
10	Environmental test results	A reference to Environmental tests performance requirements. Copies of the results of the Environmental testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack.	√
11	Radio Agency test results	A reference to Radio Agency tests performance requirements. Copies of the results of Radio Agency testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack.	√
12	Primary Safety Test results	For Traffic Control equipment specifically a reference to the Primary Safety Test schedule and test results by part number and issue. A copy of the test results should be included as part of the Technical File Pack.	N/A
13	Failure Mode Analysis	A reference to the product failure mode analysis requirements and results by document part number and issue.	N/A