

ITS specification
National transportation
communication for ITS
protocol
(ITS-06-02)

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Document management plan

1) Purpose

This document is to be used in conjunction with the NZ Transport Agency's *Technical specification for ITS field controllers – VMS/CMS all variants*.

This document is to provide a low-level specification for ITS variable message sign (VMS) field controller NTCIP data set.

This document is to be used for all VMS sign equipment, herein referred to as a dynamic message sign (DMS). VMS may be used when not referring to NTCIP elements.

2) Document information

Document name	<i>ITS specification: National transportation communication for ITS protocol</i>
Document number	ITS-06-02
Document status	Provisional
Document availability	This document is located in electronic form on the NZ Transport Agency's website at www.nzta.govt.nz .
Document owner	Russell Pinchen/Kevan Fleckney

3) Scope

The scope of this document is to define the NTCIP Information Level data set to be implemented as part of any NZTA VMS sign supply contract.

4) Other

Note: This document provides a mandatory minimum specification for any ITS field device controller supplied to the NZTA for dynamic signage.

Record of amendments

Amendment number	Section amended	Description of change	Updated by	Effective date

Contents

Document management plan	i
Record of amendments	ii
1.0 Background	1
2.0 General requirements	1
3.0 Definitions	2
4.0 Applicable documents	3
5.0 Information level	5

1.0 Background

The Transit New Zealand ITS Strategy 2004 identified requirements from a number of regions for more Variable Message Signs (VMS) in rural and urban locations.

This requirement created two key issues for Transit at the time:

1. How to communicate with the signs &
2. How to control a number of signs in both urban and rural locations in a manner that was scaleable and non-geographically dependant.

2.0 General requirements

The Dynamic Message Sign (DMS) controller must implement the most recent version of the NTCIP standard that is at the stage of Recommended or higher as of the date of this document, including any and all Approved or Recommended Amendments to these standards as of the same date.

In addition, if a standard or amendment referenced by this procurement has not yet achieved the status of Recommended, the cited version shall prevail. Subsequent amendments or revision to any document may be implemented pending the Engineer's approval. It is the ultimate responsibility of the Vendor to monitor NTCIP activities to discover any more recent versions.

3.0 Definitions

The following terms must apply within the scope of this procurement specification.

DMS	A Dynamic Message Sign includes the sign display, controller, cabinet, and other associated field equipment. The specific type of dynamic message sign (i.e., blank-out sign, changeable message sign, character matrix sign, full-matrix sign, etc.) for this procurement is specified elsewhere within this procurement specification.
FSORS	Full, Standardised Object Range Support
Full, Standardised Object Range Support	Support for, and proper implementation of, all valid values of an object as defined within the object's OBJECT-TYPE macro in the subject NTCIP standard; this is further defined in two distinct sub-requirements: <ul style="list-style-type: none"> a. If the ACCESS of the object is read-write, a Management System must be able to set the object to any valid value as defined by the SYNTAX and DESCRIPTION fields (except that the value of 'other' need not be supported when such a value is defined) and the indicated functionality must be provided. b. The value indicated by the object (e.g., in response to a 'get'), regardless of the ACCESS, must reflect the current condition per the rules specified in the object's DESCRIPTION.
Management System	A computer system used to control an NTCIP component. This includes any laptop software used for field control as well as the central control software
NTCIP Component	A DMS (or VMS) or a Management System.
NTCIP System	A Management System and DMS' controlled by the Management System.
Response Time	The time to prepare and begin transmission of a complete response containing the requested Application Layer information. This is measured as the time from receipt of the closing flag of the request to the transmission of the opening flag of the response when the device has immediate access to transmit.

4.0 Applicable documents

This specification references several standards through their NTCIP designated names. The following list provides the relevant reference to the current version (As of August 2004) of each of these standards.

Standards Applicable to DMS Deployments

Standard	Document Title	Description	Type	Development Status	Date
NTCIP 1203	Object Definitions for Dynamic Message Signs	Defines DMS data for all types of signs that can change state	Data Dictionary	Published. Amendment 1 approved; Version 2 under development	08-04
NTCIP 1201	Global Object Definitions	Defines data, such as time, to be used in multiple device types including DMS	Data Dictionary	Amendment 1 Published. Version 2 in ballot	08-04
NTCIP 1101	Simple Transportation Management Framework	Rules and protocols for organizing, describing and exchanging transportation management information between applications and equipment for interoperability	NTCIP Base Standard	Published. Amendment 1 Version 1 Approved	08-04
NTCIP 1102	Base Standard: Octet Encoding Rules (OER)	Encoding/decoding rules to prepare data for transmission or to decode data before sending it to an application	NTCIP Base Standard	Approved. Recommended Standard	08-02
NTCIP 1103	Simple Transportation Management Protocol (STMP)	Rules for exchanging data with little overhead for interoperability of transportation devices operating over limited bandwidth links.	NTCIP Base Standard	In user comment draft;	08-04
NTCIP 8004	Structure and Identification of Management Information (SMI)	Defines how the NTCIP effort defines and registers its data, including how the SNMP MIB information is mapped into the ITS Data	NTCIP Base Standard	In working group draft.	08-04
NTCIP 2301	Application Profile for Simple Transportation Management Framework (STMF)	Application, presentation, and session layer protocols to provide simple information management services	Communications Protocol Profile – Application Layer	Published. Version 2 under development	08-04

Standard	Document Title	Description	Type	Development Status	Date
NTCIP 2201	Transportation Transport Profile	Defines a transport profile to transmit data when devices are directly connected to the central controller or computer and do not require network	Communications Protocol Profile – Transport Layer	Approved	08-04
NTCIP 2202	Internet (TCP/IP and UDP/IP) Transport Profile	Transport and network layer protocols to provide connectionless and connection-oriented transport services	Communications Protocol Profile – Transport Layer	Published	03-02
NTCIP 2101	Subnet Profile for Point to Multipoint Protocol using RS-232	Data link and physical layer protocols applicable to roadside devices	Communications Protocol Profile – Subnetwork Layer	Published	03-02
NTCIP 2103	Subnet Profile for Point to Point Protocol using RS-232	Rules for point-to-point protocol use over RS-232 related circuits for interoperability of devices linked by dial-up circuits	Communications Protocol Profile – Subnetwork Layer	Approved. Version 2 under development	08-04
NTCIP 2104	Subnetwork Profile for Ethernet	Provides interoperability for devices that communicate over local area network (LAN) interfaces.	Communications Protocol Profile – Subnetwork Layer	Approved	08-04

5.0 Information level

Each NTCIP Component must provide Full, Standardised Object Range Support (FSORS) of all objects required by these procurement specifications, unless otherwise indicated below or approved by the Engineer.

The maximum Response Time for any object or group of objects shall be 200 milliseconds.

The DMS **must** support all mandatory objects of all mandatory Conformance Groups as defined in NTCIP 1201 and NTCIP 1203 as follows:

Mandatory Conformance Groups

1. Configuration
2. Security
3. Sign Configuration
4. Message Table
5. Sign Control

In addition, the DMS **must** support the following optional Conformance Groups as defined in NTCIP 1201 and NTCIP 1203 as follows:

Optional Conformance Groups

1. Scheduling
2. Time Management
3. Timebase Event Schedule
4. Report
5. GUI Appearance
6. Font Configuration
7. VMS Configuration
8. MULTI Configuration
9. MULTI Error Configuration
10. Illumination Brightness Control
11. Auxiliary I/O
12. Pixel Error Status
13. Flashing Text
14. Beacon
15. Enhanced Sign Control
16. Default Message
17. Enhanced Error
18. Temperature status
19. Pixel Service
20. Status error
21. Sign status

The following indicates the object requirements for the mandatory and optional conformance groups listed above.

Mandatory Conformance Group

Object Name	Requirements
<i>globalMaxModules</i>	manufacturer, version, model
<i>communityNamesMax</i>	4
<i>communityNameAccessMask</i>	0-4294967295
<i>dmsNumPermanentMsg</i>	1 (Permanent Message 1 is a test message that allows the user to determine if all pixels are working properly and configured for their actual locations in the display)
<i>dmsMaxChangeableMsg</i>	100
<i>dmsFreeChangeableMemory</i>	100 kb
<i>dmsMaxVolatileMsg</i>	0
<i>dmsFreeVolatileMemory</i>	100 kb
<i>dmsMessageMultiString</i>	MULTI Tags listed below
<i>dmsControlMode</i>	Local, central, central override

Optional Conformance Groups

Scheduling	
Object	Requirements
<i>numActionTableEntries</i>	100

Timebase Event Schedule	
Object	Requirements
<i>maxTimeBaseScheduleEntries</i>	29
<i>MaxDayPlans</i>	15
<i>maxDayPlanEvents</i>	12

Report	
Object	Requirements
<i>maxEventLogConfigs</i>	60
<i>eventConfiguratonMode</i>	Onchange, GreaterThanValue, SmallerThanValue
<i>MaxEventLogSize</i>	255
<i>MaxEventClasses</i>	16

Font	
Object	Requirements
NumFonts	FONT1 4 X 7 FONT2 5 X 7 FONT3 7 X 7 FONT4 7 X 10
MaxFontCharacters	255

Multi configuration	
Object	Requirements
defaultBackgroundColor	0 (Black)
defaultForegroundColor	9 (Amber)
defaultLineJustification	Left, center, and right
defaultPageJustification	Top, middle, and bottom
defaultPageOnTime	All Values (0.1 sec accuracy)
defaultPageOffTime	All Values (0.1 sec accuracy)
defaultCharacterSet	eightBit

Additionally, the software must implement the following tags (opening and closing, where defined) of MULTI as defined in NTCIP 1203.

MULTI Tag	Range
Field	time, temperature, date (1-11)
Flash	0.1 second flash rate, word by word
Font	1,2,3,4, and 5
Justification Line	Left, center, and Right)
Justification Page	(top. Middle, and bottom)
New Line	2
New Page	3 pages total, counting first
Page Time	controllable at 0.1 second increments
Spacing Character	

Illumination/Brightness Control	
Object	Requirements
dmsIllumControl	Photocell, timer, and manual
dmsIllumNumBrightLevels	10
dmsIllumLightOutputStatus	255

Aux IO	
Object	Requirements
maxAuxIOAnalog	1 input, 1 output, and 2 bidirectional

Objects required in the following list must support the Full, Standardised Object Range Support (FSORS) within its standardised range unless otherwise noted or approved by the Engineer:

globalSetIDParameter

eventConfigLogOID

eventConfigAction

eventClassDescription

dmsMessageBeacon

dmsSWReset

dmsMessageTimeRemaining

dmsShortPowerRecoverMessage

dmsLongPowerRecoverMessage

dmsShortPowerLossTime

dmsResetMessage

dmsCommunicationsLossMessage

dmsTimeCommLoss

dmsPowerLossMessage

dmsEndDurationMessage

dmsIllumLightOutputStatus

dmsCurrentSpeed

watchdogFailureCount

dmsStatDoorOpen

lineVolts

signVolts

tempMinCtrlCabinet

tempMaxCtrlCabinet

tempMinAmbient

tempMaxAmbient

tempMinSignHousing

tempMaxSignHousing

defaultFlashOn – 0.1 second increments required flashing resolution

defaultFlashOff – 0.1 second increments required flashing resolution

dmsMultiOtherErrorDescription – If the vendor implements any vendor-specific MULTI tags, the DMS must provide meaningful error messages within this object whenever one of these tags generates an error