

# NTCIP 1206:2005

National Transportation  
Communications for ITS Protocol

Object Definitions for Data  
Collection and Monitoring (DCM)  
Devices

Joint Standard of AASHTO, ITE, and NEMA

version 01.23



*A Joint Standard of AASHTO, ITE, and NEMA*

# NTCIP 1206:2005 v01.23

---

## National Transportation Communications for ITS Protocol Object Definitions for Data Collection and Monitoring (DCM) Devices

---

November 2005

*Published by*

**American Association of State Highway and Transportation Officials (AASHTO)**

444 North Capitol Street, N.W., Suite 249  
Washington, D.C. 20001

**Institute of Transportation Engineers (ITE)**

1099 14th Street, N.W., Suite 300 West  
Washington, D.C. 20005-3438

**National Electrical Manufacturers Association (NEMA)**

1300 North 17th Street, Suite 1752  
Rosslyn, Virginia 22209-3806

## NOTICES

### Copyright Notice

© 2005 by the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the National Electrical Manufacturers Association (NEMA). All intellectual property rights, including, but not limited to, the rights of reproduction, translation, and display are reserved under the laws of the United States of America, the Universal Copyright Convention, the Berne Convention, and the International and Pan American Copyright Conventions. Except as licensed or permitted, you may not copy these materials without prior written permission from AASHTO, ITE, or NEMA. Use of these materials does not give you any rights of ownership or claim of copyright in or to these materials.

Visit [www.ntcip.org](http://www.ntcip.org) for other copyright information, for instructions to request reprints of excerpts, and to request reproduction that is not granted below.

### PDF File License Agreement

To the extent that these materials are distributed by AASHTO / ITE / NEMA in the form of an Adobe® Portable Document Format (PDF) electronic data file (the "PDF File"), AASHTO / ITE / NEMA authorizes each registered PDF File user to view, download, copy, or print the PDF File available from the authorized Web site, subject to the terms and conditions of this license agreement:

- (a) you may download one copy of each PDF File for personal, noncommercial, and intraorganizational use only;
- (b) ownership of the PDF File is not transferred to you; you are licensed to use the PDF File;
- (c) you may make one more electronic copy of the PDF File, such as to a second hard drive or burn to a CD;
- (d) you agree not to copy, distribute, or transfer the PDF File from that media to any other electronic media or device;
- (e) you may print one paper copy of the PDF File;
- (f) you may make one paper reproduction of the printed copy;
- (g) any permitted copies of the PDF File must retain the copyright notice, and any other proprietary notices contained in the file;
- (h) the PDF File license does not include (1) resale of the PDF File or copies, (2) republishing the content in compendiums or anthologies, (3) publishing excerpts in commercial publications or works for hire, (4) editing or modification of the PDF File except those portions as permitted, (5) posting on network servers or distribution by electronic mail or from electronic storage devices, and (6) translation to other languages or conversion to other electronic formats;
- (i) other use of the PDF File and printed copy requires express, prior written consent.

### Data Dictionary and MIB Distribution Permission

To the extent that these materials are distributed by AASHTO / ITE / NEMA in the form of a Data Dictionary ("DD") or Management Information Base ("MIB"), AASHTO / ITE / NEMA extend the following permission:

You may make and/or distribute unlimited copies, including derivative works, of the DD or MIB, including copies for commercial distribution, provided that:

- (i) each copy you make and/or distribute contains the citation "Derived from NTCIP 0000 [insert the document number]. Used by permission of AASHTO / ITE / NEMA.";

- (ii) the copies or derivative works are not made part of the standards publications or works offered by other standards developing organizations or publishers or as works-for-hire not associated with commercial hardware or software products intended for field implementation;
- (iii) use of the DD or MIB is restricted in that the syntax fields may be modified only to reflect a more restrictive subrange or enumerated values;
- (iv) the description field may be modified but only to the extent that: (a) only those bit values or enumerated values that are supported are listed; and (b) the more restrictive subrange is expressed.

These materials are delivered "AS IS" without any warranties as to their use or performance.

**AASHTO / ITE / NEMA and their suppliers do not warrant the performance or results you may obtain by using these materials. AASHTO / ITE / NEMA and their suppliers make no warranties, express or implied, as to noninfringement of third party rights, merchantability, or fitness for any particular purpose. In no event will AASHTO / ITE / NEMA or their suppliers be liable to you or any third party for any claim or for any consequential, incidental or special damages, including any lost profits or lost savings, arising from your reproduction or use of these materials, even if an AASHTO / ITE / NEMA representative has been advised of the possibility of such damages.**

Some states or jurisdictions do not allow the exclusion or limitation of incidental, consequential or special damages, or the exclusion of implied warranties, so the above limitations may not apply to you.

Use of these materials does not constitute an endorsement or affiliation by or between AASHTO, ITE, or NEMA and you, your company, or your products and services.

If you are unwilling to accept the foregoing restrictions, you should immediately return these materials.

### **PRL and RTM Distribution Permission**

To the extent that these materials are distributed by AASHTO / ITE / NEMA in the form of a Profile Requirements List ("PRL") or a Requirements Traceability Matrix ("RTM"), AASHTO / ITE / NEMA extend the following permission:

- (i) you may make and/or distribute unlimited copies, including derivative works of the PRL (then known as a Profile Implementation Conformance Statement ("PICS")) or the RTM, provided that each copy you make and/or distribute contains the citation "Based on NTCIP 0000 [insert the document number] PRL or RTM. Used by permission. Original text (C) AASHTO / ITE / NEMA.";
- (ii) you may not modify the PRL or the RTM except for the Project Requirements column, which is the only column that may be modified to show a product's implementation or the project-specific requirements; and
- (iii) if the PRL or RTM excerpt is made from an unapproved draft, add to the citation "PRL (or RTM) excerpted from a draft document containing preliminary information that is subject to change."

This limited permission does not include reuse in works offered by other standards developing organizations or publishers, and does not include reuse in works-for-hire, compendiums, or electronic storage devices that are not associated with commercial hardware or software products intended for field installation.

A PICS is a Profile Requirements List which is completed to indicate the features that are supported in an implementation. Visit [www.ntcip.org](http://www.ntcip.org) for information on electronic copies of the MIBs, PRLs, and RTMs.

### **Content and Liability Disclaimer**

The information in this publication was considered technically sound by the consensus of persons engaged in the development and approval of the document at the time it was developed. Consensus does not necessarily mean that there is unanimous agreement among every person participating in the development of this document.

AASHTO, ITE, and NEMA standards and guideline publications, of which the document contained herein is one, are developed through a voluntary consensus standards development process. This process brings together volunteers and/or seeks out the views of persons who have an interest in the topic covered by this publication. While AASHTO, ITE, and NEMA administer the process and establish rules to promote fairness in the development of consensus, they do not write the document and they do not independently test, evaluate, or verify the accuracy or completeness of any information or the soundness of any judgments contained in their standards and guideline publications.

AASHTO, ITE, and NEMA disclaim liability for any personal injury, property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, application, or reliance on this document. AASHTO, ITE, and NEMA disclaim and make no guaranty or warranty, express or implied, as to the accuracy or completeness of any information published herein, and disclaims and makes no warranty that the information in this document will fulfill any of your particular purposes or needs. AASHTO, ITE, and NEMA do not undertake to guarantee the performance of any individual manufacturer or seller's products or services by virtue of this standard or guide.

In publishing and making this document available, AASHTO, ITE, and NEMA are not undertaking to render professional or other services for or on behalf of any person or entity, nor are AASHTO, ITE, and NEMA undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. Information and other standards on the topic covered by this publication may be available from other sources, which the user may wish to consult for additional views or information not covered by this publication.

AASHTO, ITE, and NEMA have no power, nor do they undertake to police or enforce compliance with the contents of this document. AASHTO, ITE, and NEMA do not certify, test, or inspect products, designs, or installations for safety or health purposes. Any certification or other statement of compliance with any health or safety-related information in this document shall not be attributable to AASHTO, ITE, or NEMA and is solely the responsibility of the certifier or maker of the statement.

### **Trademark Notice**

NTCIP is a trademark of AASHTO / ITE / NEMA. All other marks mentioned in this document are the trademarks of their respective owners.

## ACKNOWLEDGEMENTS

This publication was prepared by the NTCIP Data Collection and Monitoring (DCM) Working Group, which is a subdivision of the Joint Committee on the NTCIP. The Joint Committee is organized under a Memorandum of Understanding among the American Association of State Highway and Transportation Officials (AASHTO), the Institute of Transportation Engineers (ITE), and the National Electrical Manufacturers Association (NEMA). The Joint Committee on the NTCIP consists of six representatives from each of the standards organizations, and provides guidance for NTCIP development.

At the time that this document was prepared, the following individuals were active members of the NTCIP DCM Working Group:

- Ralph Gillmann
- Dan Gossack
- Jason Hedley
- Andrew Pratt
- Joerg 'Nu' Rosenbohm
- Rick Stalowski, Chair
- Paul Stein
- Douglas Terhune
- LJ Wilkinson

Other individuals providing input to the document include:

- Blake Christie (Mitretek)
- Ron Koenderink (IRD)

In addition to the many volunteer efforts, recognition is also given to those organizations who supported the efforts of the working groups by providing comments and funding for the standard, including:

- Alaska DOT and Public Facilities
- Chaparral Systems
- Federal Highway Administration-HPPI 30
- Golden River Traffic Ltd.
- International Road Dynamics Inc. (IRD)
- Iowa State University (CTRE)
- ITERIS, Inc
- PB Farradyne, a Division of PBQD
- PEEK Traffic
- TimeMark Inc.
- TraflInfo Communications, Inc.
- U.S. Department of Transportation Federal Highway Administration JPO
- Wisconsin Department of Transportation (WIDOT)

## FOREWORD

This document references both imperial and metric units; however, all objects are defined using metric units.

This document defines the management information for a Data Collection and Monitoring (DCM) unit. The term DCM includes a range of devices — from traditional traffic counters on the simple end, to more complicated devices such as weigh-in-motion field units. This document defines individual parameters that represent the configuration, status, and control information that are unique to DCMs. This document also defines specific groupings of these parameters and others to address the operational configuration, monitoring, and control of the device in a baseline system configuration.

There are four annexes to this document. Annex A is normative; all other annexes are informative.

This document is an NTCIP Device Data Dictionary Standard. Device Data Dictionaries Standards define management information in terms of objects (data elements, data frames, and messages) for use within NTCIP systems. A Joint NTCIP Device Data Dictionary standards publication is equivalent to these document types at the standards organizations:

AASHTO – Standard Specification  
ITE – Software Standard  
NEMA – Standard

For more information about NTCIP standards, visit the NTCIP Web site at <http://www.ntcip.org>.

### User Comment Instructions

The term “User Comment” includes any type of written inquiry, comment, question, or proposed revision, from an individual person or organization, about any part of this standard publication’s content. A “Request for Interpretation” of this standard publication is also classified as a User Comment. User Comments are solicited at any time. In preparation of this NTCIP standards publication, input of users and other interested parties was sought and evaluated.

All User Comments will be referred to the committee responsible for developing and/or maintaining this standards publication. The committee chairperson, or their designee, may contact the submitter for clarification of the User Comment. When the committee chairperson or designee reports the committee’s consensus opinion related to the User Comment, that opinion will be forwarded to the submitter. The committee chairperson may report that action on the User Comment may be deferred to a future committee meeting and/or a future revision of the standards publication. Previous User Comments and their disposition may be available for reference and information at [www.ntcip.org](http://www.ntcip.org).

A User Comment should be submitted to this address:

NTCIP Coordinator  
National Electrical Manufacturers Association  
1300 North 17th Street, Suite 1752  
Rosslyn, Virginia 22209-3806  
fax: (703) 841-3331  
e-mail: [ntcip@nema.org](mailto:ntcip@nema.org)



A User Comment should be submitted in the following form:

**Standard Publication number and version:**

**Page:**

**Paragraph or Clause:**

**Comment:**

Please include your name, organization, and address in your correspondence.

## Approvals

This document was separately balloted and approved by AASHTO, ITE, and NEMA after recommendation by the Joint Committee on the NTCIP. Each organization has approved this standard as the following standard type, as of the date:

AASHTO – Standard Specification; October 2004

ITE – Software Standard; May 2005

NEMA – Standard; November 2004

## History

From 1997 to 1999, this document was referenced as TS 3.DCM. However, to provide an organized numbering scheme for the NTCIP documents, this document is now referenced as NTCIP 1206. The technical specifications of NTCIP 1206 are identical to the former reference, except as noted in the development history below:

NTCIP 1206 v01.17. November 2001 – Accepted as a User Comment Draft by the Joint Committee on the NTCIP. February 2002 – NTCIP Standards Bulletin B0072 distributed v01.18 for user comment.

NTCIP 1206 v01.21. November 2003 – Accepted v01.21 as a Recommended Standard by the Joint Committee on the NTCIP. July 2004 – NTCIP Standards Bulletin B0095 referred v01.22b for balloting. Approved by AASHTO in October 2004, approved by ITE in May 2005, and approved by NEMA in November 2004.

NTCIP 1206:2005 v01.23. November 2005 – Edited document for publication; revised front matter.

## Compatibility of Versions

All NTCIP Standards Publications have a major and minor version number for configuration management. The version number syntax is "v00.00a," with the major version number before the period, and the minor version number and edition letter (if any) after the period.

Anyone using this document should seek information about the version number that is of interest to them in any given circumstance. The MIB, the PRL, and the PICS should all reference the version number of the standards publication that was the source of the excerpted material.

Compliant systems based on later, or higher, version numbers MAY NOT be compatible with compliant systems based on earlier, or lower, version numbers. Anyone using this document should also consult NTCIP 8004 for specific guidelines on compatibility.

## INTRODUCTION

This publication defines management information related to a Data Collection and Monitoring device. DCM management information includes individual parameters that represent the configuration, status, and control information of such a device. The objects are defined using several ASN.1 Macros that were initially developed for use with Internet information management. The macros have been modified to include additional information specific to NTCIP and ITS Data Dictionaries and Message Sets.

This standard defines requirements that are applicable to an NTCIP environment that involves the control of roadside-bound devices. While the term 'data collection and monitoring unit' implies some type of physical device, many of the data concepts are applicable to any logical implementation. By definition, a DCM operates in the context of a "system" that includes roadside devices that are capable of communicating and office-based transportation management center software. The standard, therefore, imposes requirements on both of these "system" components.

The following **keywords** apply to this document: *AASHTO, ITE, NEMA, NTCIP, DCM, weigh-in-motion, WIM, traffic counters, vehicle classification, data binning*

In 1992, the NEMA 3-TS Transportation Management Systems and Associated Control Devices Section began the effort to develop the NTCIP. Under the guidance of the Federal Highway Administration's NTCIP Steering Group, the NEMA effort was expanded to include the development of communications standards for all transportation field devices that could be used in an ITS network.

In September 1996, an agreement was executed among AASHTO, ITE, and NEMA to jointly develop, approve, and maintain the NTCIP standards. The NTCIP Joint Committee established the Data Collection and Monitoring Working Group (DCM WG) in order to define a common set of management information related to roadside devices that collect traffic information on a non-real-time basis. The first meeting of the working group was held in May 1998.

After considering all functionality that could be considered appropriate to a data collection and monitoring device, the WG developed a work plan based on two phases. The initial phase sought to address the information and operational requirements of configuring and monitoring DCM devices. Within the second phase, the file structures to retrieve the collected and compounded data will be developed. This current version of this standard includes the results of the both phases.

## Table of Contents

|  |           |
|--|-----------|
| Acknowledgements .....   | I         |
| Foreword .....   | II        |
| Introduction .....   | IV        |
| <b>1 GENERAL .....</b>   | <b>1</b>  |
| <b>1.1 Scope .....</b>   | <b>1</b>  |
| <b>1.2 References.....</b>   | <b>1</b>  |
| 1.2.1 Normative References .....   | 2         |
| 1.2.2 Other References.....  | 2         |
| <b>1.3 Contact Information.....</b>  | <b>3</b>  |
| 1.3.1 ISO/IEC Standards.....   | 3         |
| 1.3.2 RFC Documents.....   | 3         |
| <b>1.4 General Statements .....</b>  | <b>4</b>  |
| <b>1.5 How To Use This Document .....</b>                                    | <b>4</b>  |
| <b>1.6 Terms and Abbreviations.....</b>                                      | <b>4</b>  |
| <b>1.7 Operational Description .....</b>                                     | <b>5</b>  |
| <b>1.8 Supplemental Figures .....</b>  | <b>8</b>  |
| <b>2 DCM OBJECT DEFINITIONS .....</b>  | <b>10</b> |
| <b>2.1 Data Collection and Monitoring (DCM) MIB Header Information .....</b> | <b>11</b> |
| <b>2.2 DCM SYNTAX Definitions (Type Assignments).....</b>                    | <b>12</b> |
| 2.2.1 Table Row Maintenance (DcmRowStatus).....                              | 12        |
| 2.2.2 Time Tag Index (DcmTimeTagIndex) .....                                 | 12        |
| 2.2.3 Maximum Number Of Rows (DcmMaxNumRows) .....                           | 12        |
| 2.2.4 Current Number Of Rows (DcmMaxNumRows).....                            | 12        |
| 2.2.5 IO Board Number (DcmIOBoardNum) .....                                  | 13        |
| 2.2.6 IO Board Function (DcmIOBoardFtn) .....                                | 13        |
| 2.2.7 Logical IO Number (DcmLogIONum).....                                   | 13        |
| 2.2.8 IO Parameter Type (DcmIOParamType) .....                               | 13        |
| 2.2.9 IO Parameter Value (DcmIOParamValue).....                              | 14        |
| 2.2.10 Array Number (DcmArrayNum).....                                       | 15        |
| 2.2.11 Array Parameter Type (DcmArrayParamType) .....                        | 15        |
| 2.2.12 Array Parameter Value (DcmArrayParamValue).....                       | 16        |
| 2.2.13 Array Parameter File Name (DcmArrayParamFileName).....                | 16        |
| 2.2.14 Filter Number (DcmFilterNum) .....                                    | 16        |
| 2.2.15 Study Number (DcmStudyNum) .....                                      | 16        |
| 2.2.16 File Study Index (DcmFileStudyIndex).....                             | 16        |
| 2.2.17 File Structure Number (DcmFileStrucNum) .....                         | 17        |
| 2.2.18 Binned Filter Number (DcmBinnedFilterNum) .....                       | 17        |
| <b>2.3 Vehicle Criteria Node.....</b>  | <b>17</b> |
| 2.3.1 Maximum Number Of Vehicle Criteria Table Rows .....                    | 18        |
| 2.3.2 Current Number Of Vehicle Criteria Table Rows.....                     | 18        |
| 2.3.3 Vehicle Criteria Table.....  | 19        |
| 2.3.3.1 Vehicle Criteria Index .....   | 19        |
| 2.3.3.2 Vehicle Criteria OID.....  | 19        |
| 2.3.3.3 Vehicle Criteria Support BitMap .....                                | 19        |
| 2.3.4 Axle Number.....   | 20        |
| 2.3.5 Number of Axles.....   | 20        |
| 2.3.6 Vehicle Class .....  | 20        |
| 2.3.7 Vehicle Speed .....  | 21        |
| 2.3.8 Vehicle Length .....   | 21        |

|            |   |           |
|------------|---|-----------|
| 2.3.9      | Vehicle Front Overhang .....                                  | 21        |
| 2.3.10     | Vehicle Rear Overhang.....                                    | 21        |
| 2.3.11     | Axle Spacing .....  | 21        |
| 2.3.12     | Vehicle Wheelbase .....                                       | 22        |
| 2.3.13     | Vehicle Clearance .....                                       | 22        |
| 2.3.14     | Vehicle Height .....  | 22        |
| 2.3.15     | Axle Width .....  | 22        |
| 2.3.16     | Vehicle Width .....   | 22        |
| 2.3.17     | Axle Tire Count.....  | 23        |
| 2.3.18     | Axle Tire Track .....   | 23        |
| 2.3.19     | Vehicle Gap.....  | 23        |
| 2.3.20     | Vehicle Headway .....   | 23        |
| 2.3.21     | Left Wheel Weight.....  | 24        |
| 2.3.22     | Right Wheel Weight .....                                      | 24        |
| 2.3.23     | Axle Weight <sup>24</sup> .....                               | 24        |
| 2.3.24     | Sensor Weights.....   | 24        |
| 2.3.25     | Gross Vehicle Weight.....                                     | 25        |
| 2.3.26     | Vehicle Sequence Number .....                                 | 25        |
| 2.3.27     | Vehicle Status Flag .....                                     | 25        |
| 2.3.28     | Axle Weight Violation Code.....                               | 26        |
| 2.3.29     | Vehicle Acceleration.....                                     | 27        |
| 2.3.30     | Number of Vehicle IDs .....                                   | 27        |
| 2.3.31     | Vehicle ID .....  | 27        |
| 2.3.32     | Vehicle Time Tag in 1000 <sup>th</sup> Seconds .....          | 28        |
| <b>2.4</b> | <b>Device Setup Node.....</b>                                 | <b>28</b> |
| 2.4.1      | Unique Device ID .....  | 28        |
| 2.4.2      | Battery Voltage.....  | 28        |
| 2.4.3      | Charging Current.....   | 28        |
| 2.4.4      | Current Number Of IO Boards .....                             | 28        |
| 2.4.5      | Maximum Number Of IO Board Configuration Table Rows.....      | 29        |
| 2.4.6      | Current Number Of IO Board Configuration Table Rows .....     | 29        |
| 2.4.7      | IO Board Configuration Table .....                            | 29        |
| 2.4.7.1    | IO Board Number .....   | 30        |
| 2.4.7.2    | IO Board Function .....                                       | 30        |
| 2.4.7.3    | IO Board Number Of IO.....                                    | 30        |
| 2.4.7.4    | IO Board Function Type .....                                  | 30        |
| 2.4.7.5    | IO Board Description .....                                    | 31        |
| 2.4.7.6    | IO Board Status .....   | 32        |
| 2.4.7.7    | IO Board Control .....  | 32        |
| 2.4.8      | Maximum Number Of Physical To Logical Mapping Table Rows..... | 33        |
| 2.4.9      | Current Number Of Physical To Logical Table Rows .....        | 33        |
| 2.4.10     | Physical to Logical Mapping Table .....                       | 33        |
| 2.4.10.1   | IO Board Number.....  | 33        |
| 2.4.10.2   | IO Board Function.....  | 34        |
| 2.4.10.3   | Physical IO Number.....                                       | 34        |
| 2.4.10.4   | Logical IO Number.....  | 34        |
| 2.4.10.5   | Physical IO Status .....                                      | 34        |
| 2.4.10.6   | Physical IO Control.....                                      | 35        |
| 2.4.11     | Maximum Number Of Logical IO Parmater Table Rows.....         | 35        |
| 2.4.12     | Current Number Of Logical IO Parameter Table Rows .....       | 35        |
| 2.4.13     | Logical IO Parameter Table .....                              | 35        |
| 2.4.13.1   | IO Parameter Logical IO Number .....                          | 36        |
| 2.4.13.2   | IO Parameter Type .....                                       | 36        |
| 2.4.13.3   | IO Parameter Value .....                                      | 36        |
| 2.4.13.4   | IO Parameter Row Admin.....                                   | 37        |

|  |           |
|--|-----------|
| <b>2.5 Operating Status Configuration Node .....</b>                 | <b>37</b> |
| 2.5.1 dcm Resets .....   | 37        |
| 2.5.2 Maximum Number Of Table Clear Table Rows .....                 | 38        |
| 2.5.3 Current Number Of Table Clear Table Rows.....                  | 38        |
| 2.5.4 Table Clear Table.....   | 38        |
| 2.5.4.1 Table Clear Index .....                                      | 39        |
| 2.5.4.2 Table Clear Object Identifier.....                           | 39        |
| 2.5.4.3 Table Clear Action.....                                      | 39        |
| 2.5.4.4 Table Clear Row Admin .....                                  | 39        |
| 2.5.5 Current Number Of User Configuration Settings .....            | 40        |
| 2.5.6 Maximum Number Of User Reset Config Table Rows .....           | 40        |
| 2.5.7 Current Number Of User Reset Config Table Rows.....            | 40        |
| 2.5.8 User Reset Config Table.....                                   | 40        |
| 2.5.8.1 User Reset Configuration Index.....                          | 41        |
| 2.5.8.2 User Reset Table Object Identifier .....                     | 41        |
| 2.5.8.3 User Reset Config Table Action.....                          | 41        |
| 2.5.8.4 User Reset Config Row Admin .....                            | 42        |
| 2.5.9 Maximum Number Of Object Change ID Table Rows .....            | 42        |
| 2.5.10 Current Number Of Object Change ID Table Rows.....            | 42        |
| 2.5.11 Object Change ID Table.....                                   | 42        |
| 2.5.11.1 Object Change ID Table Index .....                          | 43        |
| 2.5.11.2 Object Change ID Table OID.....                             | 43        |
| 2.5.11.3 Object Change ID Table Time .....                           | 43        |
| 2.5.11.4 Object Change ID Row Admin.....                             | 43        |
| <b>2.6 Site Setup Node.....</b>                                      | <b>43</b> |
| 2.6.1 Unique Site ID .....   | 43        |
| 2.6.2 Maximum Length of Site Description .....                       | 44        |
| 2.6.3 Site Description .....   | 44        |
| 2.6.4 Maximum Number of Sensors per Array.....                       | 44        |
| 2.6.5 Maximum Number of Arrays .....                                 | 44        |
| 2.6.6 Current Number Of Arrays .....                                 | 44        |
| 2.6.7 Maximum Number Of Logical IO To Array Mapping Table Rows.....  | 45        |
| 2.6.8 Current Number Of Logical IO To Array Mapping Table Rows ..... | 45        |
| 2.6.9 Logical IO To Array Mapping Table .....                        | 45        |
| 2.6.9.1 Array Number .....   | 46        |
| 2.6.9.2 Logical IO Number .....                                      | 46        |
| 2.6.9.3 IO Spacing.....  | 46        |
| 2.6.9.4 IO Position.....   | 46        |
| 2.6.9.5 IO Functionality.....  | 47        |
| 2.6.9.6 IO Row Administration.....                                   | 48        |
| 2.6.10 Maximum Number of Calibration Factors per Array .....         | 48        |
| 2.6.11 Maximum Number Of Array Parameter Table Rows .....            | 48        |
| 2.6.12 Current Number Of Array Parameter Table Rows.....             | 48        |
| 2.6.13 Array Parameter Table.....                                    | 48        |
| 2.6.13.1 Array Number.....   | 49        |
| 2.6.13.2 Array Parameter Type .....                                  | 49        |
| 2.6.13.3 Array Parameter Value .....                                 | 49        |
| 2.6.13.4 Array Parameter FileName Pointer .....                      | 50        |
| 2.6.13.5 Array Parameter Table Row Administration .....              | 50        |
| 2.6.14 Maximum Number Of Array Speed Calibration Table Rows .....    | 50        |
| 2.6.15 Current Number Of Array Speed Calibration Table Rows.....     | 50        |
| 2.6.16 Array Speed Calibration Table.....                            | 50        |
| 2.6.16.1 Array Number.....   | 51        |
| 2.6.16.2 First referenced Logical IO Number .....                    | 51        |
| 2.6.16.3 Second referenced Logical IO Number .....                   | 51        |
| 2.6.16.4 Array Speed Calibration Factor .....                        | 51        |

|            |   |           |
|------------|---|-----------|
| 2.6.16.5   | Array Speed Calibration Table Row Administration .....      | 52        |
| 2.6.17     | Max Number of Axles .....                                   | 52        |
| 2.6.18     | Max Number of Filters .....                                 | 52        |
| 2.6.19     | Current Number Of Filters .....                             | 52        |
| 2.6.20     | Maximum Number Of Filter Configuration Table Rows .....     | 53        |
| 2.6.21     | Current Number Of Filter Configuration Table Rows .....     | 53        |
| 2.6.22     | Filter Configuration Table .....                            | 53        |
| 2.6.22.1   | Filter Number .....   | 53        |
| 2.6.22.2   | Filter Index .....  | 54        |
| 2.6.22.3   | Filter Criteria .....                                       | 54        |
| 2.6.22.4   | Filter Relation .....                                       | 54        |
| 2.6.22.5   | Filter Value .....  | 55        |
| 2.6.22.6   | Filter Row Relation .....                                   | 55        |
| 2.6.22.7   | Filter Configuration Table Row Administration .....         | 55        |
| 2.6.23     | Maximum Number Of Logical Output To Filter Table Rows ..... | 55        |
| 2.6.24     | Current Number Of Logical Output To Filter Table Rows ..... | 56        |
| 2.6.25     | Logical Output To Filter Mapping Table .....                | 56        |
| 2.6.25.1   | OFM IO Num .....  | 56        |
| 2.6.25.2   | Output Filter Map Index .....                               | 57        |
| 2.6.25.3   | Filter Number .....   | 57        |
| 2.6.25.4   | Output State .....  | 57        |
| 2.6.25.5   | Output State Time .....                                     | 58        |
| 2.6.25.6   | Output Filter Map Relationship .....                        | 58        |
| 2.6.25.7   | Output Filter Map Row Admin .....                           | 59        |
| 2.6.26     | Max Number of Vehicle ID's .....                            | 59        |
| <b>2.7</b> | <b>Study Setup Node .....</b>                               | <b>59</b> |
| 2.7.1      | Current Number Of Studies .....                             | 59        |
| 2.7.2      | Maximum Number of Studies .....                             | 59        |
| 2.7.3      | Maximum Number Of Study Configuration Table Rows .....      | 60        |
| 2.7.4      | Current Number Of Study Configuration Table Rows .....      | 60        |
| 2.7.5      | Study Configuration Table .....                             | 60        |
| 2.7.5.1    | Study Number .....  | 60        |
| 2.7.5.2    | Study Type .....  | 61        |
| 2.7.5.3    | Study Start Type .....                                      | 61        |
| 2.7.5.4    | Study Start Date and Time .....                             | 62        |
| 2.7.5.5    | Study End Type .....  | 62        |
| 2.7.5.6    | Study End Date and Time .....                               | 62        |
| 2.7.5.7    | Study File Index .....                                      | 63        |
| 2.7.5.8    | Study Configuration Row Admin .....                         | 63        |
| 2.7.6      | Maximum Number Of Array To Study Mapping Table Rows .....   | 63        |
| 2.7.7      | Current Number Of Array To Study Mapping Table Rows .....   | 63        |
| 2.7.8      | Array To Study Mapping Table .....                          | 63        |
| 2.7.8.1    | Study Number .....  | 64        |
| 2.7.8.2    | Array Number .....  | 64        |
| 2.7.8.3    | Study to Array Enable .....                                 | 64        |
| 2.7.8.4    | Array to Study Mapping Table Row Admin .....                | 65        |
| 2.7.9      | Maximum Number Of Filter To Study Mapping Table Rows .....  | 65        |
| 2.7.10     | Current Number Of Filter To Study Mapping Table Rows .....  | 65        |
| 2.7.11     | Filter to Study Mapping Table .....                         | 65        |
| 2.7.11.1   | Study Number .....  | 66        |
| 2.7.11.2   | Filter Number .....   | 66        |
| 2.7.11.3   | Study to Filter Mapping Relationship .....                  | 66        |
| 2.7.11.4   | Filter to Study Mapping Table Row Admin .....               | 67        |
| <b>2.8</b> | <b>Study Data Setup Node .....</b>                          | <b>67</b> |
| 2.8.1      | Display Length Units .....                                  | 67        |

|          |  |    |
|----------|--|----|
| 2.8.2    | Display Speed Units .....                                      | 68 |
| 2.8.3    | Display Weight Units .....                                     | 68 |
| 2.8.4    | Maximum Number of Headings For All Studies .....               | 69 |
| 2.8.5    | Maximum Number of Bins For All Studies .....                   | 69 |
| 2.8.6    | Maximum Number Of Binned Filter Definition Table Rows .....    | 69 |
| 2.8.7    | Current Number Of Binned Filter Definition Table Rows .....    | 69 |
| 2.8.8    | Binned Filter Definition Table .....                           | 69 |
| 2.8.8.1  | Binned Filter Number .....                                     | 70 |
| 2.8.8.2  | Binned Filter Index .....                                      | 70 |
| 2.8.8.3  | Bin Heading .....  | 71 |
| 2.8.8.4  | Bin Minimum Value .....  | 71 |
| 2.8.8.5  | Bin Maximum Value .....  | 71 |
| 2.8.8.6  | Bin Number to Index Relationship .....                         | 71 |
| 2.8.8.7  | Binned Filter Definition Table Row Admin .....                 | 72 |
| 2.8.9    | Maximum Number Of Binned Study Configuration Table Rows .....  | 72 |
| 2.8.10   | Current Number Of Binned Study Configuration Table Rows .....  | 72 |
| 2.8.11   | Binned Study Configuration Table .....                         | 72 |
| 2.8.11.1 | Study Number .....   | 73 |
| 2.8.11.2 | Heading Number .....   | 73 |
| 2.8.11.3 | Bin Label Number .....   | 73 |
| 2.8.11.4 | Binned Filter Number .....                                     | 74 |
| 2.8.11.5 | Bin Relation Table Row Admin .....                             | 74 |
| 2.8.12   | Maximum Number Of PVR Study Configuration Table Rows .....     | 74 |
| 2.8.13   | Current Number Of PVR Study Configuration Table Rows .....     | 74 |
| 2.8.14   | PVR Study Configuration Table .....                            | 74 |
| 2.8.14.1 | Study Number .....   | 75 |
| 2.8.14.2 | PVR Study Index .....  | 75 |
| 2.8.14.3 | PVR Parameter .....  | 75 |
| 2.8.14.4 | PVR Study Configuration Table Row Admin .....                  | 76 |
| 2.8.15   | Maximum Number Of Event Study Configuration Table Rows .....   | 76 |
| 2.8.16   | Current Number Of Event Study Configuration Table Rows .....   | 76 |
| 2.8.17   | Event Study Configuration Table .....                          | 76 |
| 2.8.17.1 | Study Number .....   | 77 |
| 2.8.17.2 | Event Number Size .....  | 77 |
| 2.8.17.3 | Timer Event Maximum Period .....                               | 77 |
| 2.8.17.4 | Event Study Config Table Row Admin .....                       | 77 |
| 2.8.18   | Maximum Number Of Event To Logical IO Mapping Table Rows ..... | 78 |
| 2.8.19   | Current Number Of Event To Logical IO Mapping Table Rows ..... | 78 |
| 2.8.20   | Event To Logical IO Mapping Table .....                        | 78 |
| 2.8.20.1 | Study Number .....   | 79 |
| 2.8.20.2 | Event Configuration Number .....                               | 79 |
| 2.8.20.3 | Event Number .....   | 79 |
| 2.8.20.4 | Logical IO Number .....  | 80 |
| 2.8.20.5 | Logical IO State .....   | 80 |
| 2.8.20.6 | Event Value Size .....   | 80 |
| 2.8.20.7 | Timestamp Size .....   | 80 |
| 2.8.20.8 | Event Configuration Table Row Admin .....                      | 81 |
| 2.8.21   | Maximum Number Of Data Recording Enable Table Rows .....       | 81 |
| 2.8.22   | Current Number Of Data Recording Enable Table Rows .....       | 81 |
| 2.8.23   | Data Recording Enable Table .....                              | 81 |
| 2.8.23.1 | Study Number .....   | 82 |
| 2.8.23.2 | Data Recording Enable Status .....                             | 82 |
| 2.8.23.3 | Data Recording Control .....                                   | 82 |
| 2.8.24   | Maximum Number Of Monitor Enable Table Rows .....              | 83 |
| 2.8.25   | Current Number Of Monitor Enable Table Rows .....              | 83 |
| 2.8.26   | Monitor Enable Table .....                                     | 83 |

|            |   |           |
|------------|---|-----------|
| 2.8.26.1   | Study Number .....  | 85        |
| 2.8.26.2   | Logical IO Number .....   | 85        |
| 2.8.26.3   | Monitor Enable Type.....  | 85        |
| 2.8.26.4   | Monitor Enable Time Interval.....                                 | 86        |
| 2.8.26.5   | Monitor Enable Control .....                                      | 86        |
| 2.8.26.6   | Monitor Enable Status .....                                       | 87        |
| 2.8.26.7   | Monitor Enable Poll Now .....                                     | 87        |
| 2.8.27     | Array Parameter Change Record Table .....                         | 88        |
| 2.8.27.1   | Time Tag88 .....  |           |
| 2.8.27.2   | Array Number.....   | 88        |
| 2.8.27.3   | Array Parameter Type .....  | 89        |
| 2.8.27.4   | Array Parameter Value .....                                       | 89        |
| 2.8.27.5   | Array Parameter FileName Pointer .....                            | 89        |
| 2.8.28     | Logical IO Parameter Change Record Table.....                     | 89        |
| 2.8.28.1   | IOPC Time Tag.....  | 90        |
| 2.8.28.2   | IOPC Logical IO Number .....                                      | 90        |
| 2.8.28.3   | IOPC IO Parameter Type .....                                      | 90        |
| 2.8.28.4   | IOPC IO Parameter Value .....                                     | 90        |
| 2.8.29     | Log Data Record Table .....                                       | 90        |
| 2.8.29.1   | Time Tag91 .....  |           |
| 2.8.29.2   | Log Data .....  | 91        |
| 2.8.30     | Data Structure Table .....  | 91        |
| 2.8.30.1   | Study Number .....  | 92        |
| 2.8.30.2   | Data Structure Table Index.....                                   | 92        |
| 2.8.30.3   | Start time associated with the data in this packet .....          | 93        |
| 2.8.30.4   | End time associated with the data in this packet.....             | 93        |
| 2.8.30.5   | Number of records encoded in the data section of this table ..... | 93        |
| 2.8.30.6   | Data Encoding Code.....   | 93        |
| 2.8.30.7   | Collected Data .....  | 94        |
| <b>2.9</b> | <b>File Setup Node .....</b>                                      | <b>95</b> |
| 2.9.1      | Current Number Of File Structures .....                           | 95        |
| 2.9.2      | Maximum Number Of File Structure Table Rows .....                 | 95        |
| 2.9.3      | Current Number Of File Structure Table Rows.....                  | 95        |
| 2.9.4      | File Structure Table.....   | 95        |
| 2.9.4.1    | File Structure Number .....                                       | 96        |
| 2.9.4.2    | File Structure Index .....  | 96        |
| 2.9.4.3    | File Structure Table OID.....                                     | 96        |
| 2.9.4.4    | File Structure Table Row Admin .....                              | 96        |
| 2.9.5      | Maximum Number Of File Parameter Table Rows .....                 | 97        |
| 2.9.6      | Current Number Of File Parameter Table Rows.....                  | 97        |
| 2.9.7      | File Parameter Table.....   | 97        |
| 2.9.7.1    | File Study Index.....   | 97        |
| 2.9.7.2    | File Structure Number .....                                       | 98        |
| 2.9.7.3    | File Recording Interval .....                                     | 98        |
| 2.9.7.4    | File Recording Frequency .....                                    | 98        |
| 2.9.7.5    | FP Logical IO Number .....  | 99        |
| 2.9.7.6    | Relative Address Flag .....                                       | 99        |
| 2.9.7.7    | File Encoding Code .....  | 99        |
| 2.9.7.8    | File Parameter Table Row Admin .....                              | 100       |
| 2.9.8      | Data File Integrity Object.....                                   | 100       |
| 2.9.9      | Maximum Number Of File Directory Structure Table Rows.....        | 100       |
| 2.9.10     | Current Number Of File Directory Structure Table Rows .....       | 100       |
| 2.9.11     | File Directory Structure Table .....                              | 100       |
| 2.9.11.1   | Logical IO Number Index.....                                      | 101       |
| 2.9.11.2   | File Number .....   | 101       |
| 2.9.11.3   | File Name.....  | 101       |



|                |  |            |
|----------------|--|------------|
| 2.9.11.4       | Start Date/Time of Data File .....                     | 102        |
| 2.9.11.5       | End Date/Time of Data File .....                       | 102        |
| 2.9.11.6       | File Size .....  | 102        |
| 2.9.11.7       | File Download Flag .....                               | 102        |
| 2.9.11.8       | Open Flag .....  | 102        |
| <b>2.10</b>    | <b>Error Logging Node .....</b>                        | <b>103</b> |
| 2.10.1         | Maximum Number Of Error Code Table Rows .....          | 103        |
| 2.10.2         | Current Number Of Error Code Table Rows .....          | 103        |
| 2.10.3         | Dcm Error Code Table .....                             | 103        |
| 2.10.3.1       | Error Code Index .....                                 | 104        |
| 2.10.3.2       | Error Code Object Identifier .....                     | 104        |
| 2.10.3.3       | Dcm Error Code .....                                   | 104        |
| <b>2.11</b>    | <b>DCM Relative Address OID Object .....</b>           | <b>105</b> |
| <b>2.12</b>    | <b>DCM MIB Version number .....</b>                    | <b>106</b> |
| <b>ANNEX A</b> | <b>INFORMATION PROFILE .....</b>                       | <b>107</b> |
| A.1            | Notation .....   | 108        |
| A.1.1          | TYPE Symbols .....                                     | 108        |
| A.1.2          | Status Symbols .....                                   | 108        |
| A.1.3          | Conditional Status Notation .....                      | 108        |
| A.1.4          | Support Column .....                                   | 109        |
| A.2            | DCM Conformance Groups .....                           | 109        |
| A.3            | Vehicle Criteria Conformance Group .....               | 110        |
| A.4            | Site Info Conformance Group .....                      | 112        |
| A.5            | Operating Status Config Conformance Group .....        | 112        |
| A.6            | Configure Sensor Arrays Conformance Group .....        | 114        |
| A.7            | Configure General Study Conformance Group .....        | 117        |
| A.8            | Configure Filters Conformance Group .....              | 119        |
| A.9            | Data File Setup Conformance Group .....                | 120        |
| A.10           | Binned Studies Conformance Group .....                 | 122        |
| A.11           | PVR Studies Conformance Group .....                    | 123        |
| A.12           | Event Studies Conformance Group .....                  | 123        |
| A.13           | Monitor Studies Conformance Group .....                | 124        |
| A.14           | Log Studies Conformance Group .....                    | 125        |
| A.15           | Array Parameter Studies Conformance Group .....        | 125        |
| A.16           | Logical IO Parameter Studies Conformance Group .....   | 126        |
| A.17           | Global Time Management Conformance Group .....         | 127        |
| A.18           | STMF Conformance Group .....                           | 127        |
| A.19           | FTP Conformance Group .....                            | 127        |
| A.20           | Information Profile (PICS) Example (Informative) ..... | 127        |
| A.20.1         | PICS Example Conventions .....                         | 128        |
| A.20.2         | DCM Conformance Groups .....                           | 128        |
| A.20.3         | Vehicle Criteria Conformance Group .....               | 129        |
| A.20.4         | Site Info Conformance Group .....                      | 132        |
| A.20.5         | Operating Status Config Conformance Group .....        | 132        |
| A.20.6         | Configure Sensor Arrays Conformance Group .....        | 134        |
| A.20.7         | Configure General Study Conformance Group .....        | 137        |
| A.20.8         | Configure Filters Conformance Group .....              | 139        |
| A.20.9         | Data File Setup Conformance Group .....                | 141        |
| A.20.10        | Binned Studies Conformance Group .....                 | 143        |
| A.20.11        | PVR Studies Conformance Group .....                    | 144        |
| A.20.12        | Event Studies Conformance Group .....                  | 144        |
| A.20.13        | Monitor Studies Conformance Group .....                | 146        |
| A.20.14        | Log Studies Conformance Group .....                    | 146        |
| A.20.15        | Array Parameter Studies Conformance Group .....        | 147        |
| A.20.16        | Logical IO Parameter Studies Conformance Group .....   | 147        |

|   |            |
|---|------------|
| A.20.17 Global Time Management Conformance Group.....                         | 148        |
| A.20.18 STMF Conformance Group .....  | 148        |
| A.20.19 FTP Conformance Group .....   | 149        |
| <b>ANNEX B TREE STRUCTURE TABLES .....</b>                                    | <b>150</b> |
| B.1 Vehicle Criteria Node (see Section 2.3).....                              | 150        |
| B.2 Device Setup Node (see Section 2.4).....                                  | 150        |
| B.3 Operating Status Configuration Node (see Section 2.5) .....               | 150        |
| B.4 Site Setup Node (see Section 2.6).....                                    | 151        |
| B.5 Study Setup Node (see Section 2.7) .....                                  | 152        |
| B.6 Study Data Setup Node (see Section 2.8).....                              | 152        |
| B.7 File Setup Node (see Section 2.9).....                                    | 154        |
| B.8 Error Logging Node (see Section 2.10) .....                               | 155        |
| B.9 Table ER (Entity Relationship) Diagram .....                              | 156        |
| <b>ANNEX C EXAMPLES .....</b>   | <b>157</b> |
| C.1 How To Configure a DCM Device (Informative) .....                         | 157        |
| C.1.1 Determine Device Capabilities.....                                      | 157        |
| C.1.2 Configure Site Information .....  | 157        |
| C.1.3 Configure General Study.....  | 157        |
| C.1.4 Configure Study Details .....   | 157        |
| C.1.5 Verify System Is Working.....   | 158        |
| C.1.6 Start Each Study .....  | 159        |
| C.1.7 Collect Data.....   | 159        |
| C.2 dcm Data File Structure (Normative) .....                                 | 159        |
| C.2.1 Configuring A dcm Device To Create Data Files.....                      | 159        |
| C.2.2 Transferring Data Files From A dcm Device To A Central Application..... | 159        |
| C.2.3 Dcm Data File Structure.....  | 160        |
| C.2.4 Dcm Data File Encoding Table .....                                      | 163        |
| C.3 Examples (INFORMATIVE) .....  | 165        |
| C.3.1 Binned Study Example (Informative) .....                                | 165        |
| C.3.1.1 Determine Device Capabilities .....                                   | 166        |
| C.3.1.2 Configure Site Information.....                                       | 167        |
| C.3.1.3 Configure General Study.....  | 168        |
| C.3.1.4 Configure Study Details.....  | 169        |
| C.3.1.5 Verify Proper Operation Of Sensors/Arrays.....                        | 172        |
| C.3.1.6 Validate And Start The Recording Study .....                          | 173        |
| C.3.1.7 Data File Formats.....  | 173        |
| C.3.1.8 Binned Data Bins Ordering (Normative).....                            | 189        |
| C.3.2 Per Vehicle Record (PVR) Study Example (Informative).....               | 192        |
| C.3.2.1 Determine Device Capabilities.....                                    | 193        |
| C.3.2.2 Configure Site Information.....                                       | 194        |
| C.3.2.3 Configure General Study.....  | 195        |
| C.3.2.4 Configure Study Details.....  | 197        |
| C.3.2.5 Verify Proper Operation Of Sensors/Arrays.....                        | 198        |
| C.3.2.6 Validate And Start The Recording Study .....                          | 199        |
| C.3.2.7 Data File Formats.....  | 199        |
| C.3.3 Event Study Example (Informative).....                                  | 214        |
| C.3.3.1 Determine Device Capabilities .....                                   | 215        |
| C.3.3.2 Configure Site Information.....                                       | 216        |
| C.3.3.3 Configure General Study.....  | 216        |
| C.3.3.4 Configure Study Details.....  | 218        |
| C.3.3.5 Verify Proper Operation Of Sensors/Arrays.....                        | 219        |
| C.3.3.6 Validate And Start The Recording Study .....                          | 220        |
| C.3.3.7 Data File Formats.....  | 221        |
| C.3.4 Log File Study Example (Informative).....                               | 227        |
| C.3.4.1 Determine Device Capabilities.....                                    | 227        |

|   |            |
|---|------------|
| C.3.4.2 Configure Site Information.....   | 227        |
| C.3.4.3 Configure General Study.....  | 227        |
| C.3.4.4 Configure Study Details.....  | 229        |
| C.3.4.5 Verify Proper Operation Of Sensors/Arrays.....                            | 229        |
| C.3.4.6 Validate And Start The Recording Study.....                               | 229        |
| C.3.4.7 Data File Formats.....  | 230        |
| C.3.5 Array and Logical IO Parameter Change Study Example (Informative).....      | 232        |
| C.3.5.1 Determine Device Capabilities.....  | 232        |
| C.3.5.2 Configure Site Information.....   | 232        |
| C.3.5.3 Configure General Study.....  | 233        |
| C.3.5.4 Configure Study Details.....  | 234        |
| C.3.5.5 Verify Proper Operation Of Sensors/Arrays.....                            | 235        |
| C.3.5.6 Validate And Start The Recording Study.....                               | 235        |
| C.3.5.7 Data File Formats.....  | 235        |
| C.3.6 Monitor Mode Examples (Informative).....                                    | 241        |
| C.3.6.1 Binned Monitor Mode Example 1: (Informative).....                         | 242        |
| C.3.6.2 Binned Monitor Mode Example 2: (Informative).....                         | 245        |
| C.3.6.3 Binned Monitor Mode Example 3: (Informative).....                         | 248        |
| C.3.6.4 PVR Monitor Mode Example 1: (Informative).....                            | 251        |
| C.3.6.5 PVR Monitor Mode Example 2: (Informative).....                            | 254        |
| C.3.6.6 Event Monitor Mode Example 1: (Informative).....                          | 257        |
| C.3.6.7 Event Monitor Mode Example 2: (Informative).....                          | 261        |
| C.3.7 SNMP 'GETNEXT' Example: (Informative).....                                  | 264        |
| C.3.8 SNMP Encoding of a 'GET RESPONSE' on a Table – EXAMPLE (Informative).....   | 266        |
| <b>ANNEX D TYPICAL COMMUNICATIONS PROFILES LIST .....</b>                         | <b>267</b> |
| D.1 DCM Typical Communications Architectures .....                                | 268        |
| D.1.1 Dial-up / Direct Connect (for Configuration or Setup of the DCM Unit) ..... | 268        |
| D.1.2 Dial-up / Direct-Connect / Network (for File Transfers) .....               | 268        |

### Table of Figures

|   |     |
|---|-----|
| Figure 1: Sensor/Array/PVR/Binned/Data File Relationship..... | 7   |
| Figure 2: Array Layout.....                                   | 7   |
| Figure 3: DCM Node – Organizational Chart.....                | 8   |
| Figure 4: DCM Node – tree structure.....                      | 9   |
| Figure C-1: Binned Study Sensor Array .....                   | 165 |
| Figure C-2: PVR Study Sensor Array .....                      | 192 |
| Figure C-3: Event Study Sensor Array.....                     | 214 |

< This page intentionally left blank. >

## Section 1

### GENERAL

#### 1.1 SCOPE

The messaging between central control entities and Data Collection and Monitoring (DCM) devices is accomplished using the NTCIP Application Layer services to convey requests to access or modify values of DCM object definitions resident in the devices via an NTCIP network. An NTCIP message consists of a specific Application Layer service and a set of data objects.

DCM devices usually record data over a period of time and transmit this data in the form of a file to a central entity. The DCM object definitions defined in Section 2 of this standard are used to configure the device. An NTCIP message using these object definitions should be compatible with the Simple Transportation Management Framework (STMF).

The methodology defined in Section 3 may be used to transmit files using the AP-TFTP or AP-FTP profiles. Section 3 describes how to setup files in such a way that it allows any central system to 'parse' and process the contents of the data files.

The scope of this document is limited to the functionality related to DCMs used within a transportation environment. The limits and descriptions of the parameters are established to give the user maximum flexibility to operate devices that either exist at the time this document was authored or may exist in the future. This publication defines object definitions which are specific to DCM units and also defines standardized conformance groups (Section 4) that may be used for conformance statements.

This standard includes four (4) Annexes. **Annex A is normative** and defines the organization of object definitions into conformance groups. **Informative Annex B** provides all SNMP tables defined in Section 2 as real tables to provide the user of this document with a better overview as well as with a guidance annex. **Informative Annex C** provides examples of configuring different types of studies as well as encoding tables using the SNMP/BER encoding. **Informative Annex D** provides a list of typical Communications Profiles for use with DCM equipment utilizing the object definitions and file transfer mechanism defined in this standard.

In order to achieve the desired DCM functionality, some of the object definitions described in other standards (see Normative References) such as TS 3.4 - Global Object Definitions may need to be utilized. Object definitions from other standards that are required to be used in conjunction with this standard are not re-defined in this standard, but are referenced in conformance group definitions (Annex A) within this standard.

#### 1.2 REFERENCES

For approved revisions, contact:

NTCIP Coordinator  
**National Electrical Manufacturers Association**  
1300 North 17th Street, Suite 1752  
Rosslyn, VA 22209-3806  
fax: (703) 841-3331  
e-mail: [ntcip@nema.org](mailto:ntcip@nema.org)