ISO 9506-2:2003-07 (E)

Industrial automation systems - Manufacturing Message Specification - Part 2: Protocol specification

Contents

Page

Foreword ix

Introduction x

1 Scope 1
1.1 Specifications 1
1.2 Procedures 1
1.3 Applicability 1
1.4 Conformance 1

2 Normative references 1

3 Definitions 2
3.1 Reference Model definitions 3
3.2 Service Convention definitions 3
3.3 Abstract Syntax Notation definitions 3
3.4 Other definitions 4

4 Abbreviations 7

5 Conventions 7
5.1 Service Conventions 7
5.2 Base of Numeric Values 7
5.3 Notation 7
5.4 Supporting Productions 7
5.5 Pass-through Parameters 8
5.6 Negative Confirmation 8
5.7 Modifiers to a Service Request 8
5.8 Presentation of Errors 9
5.9 Calling and Called MMS-user 9
5.10 Sending and Receiving MMS-user and MMPM 9
5.11 Requesting and Responding MMS-user 9
5.12 Client and Server of a Service 9
5.13 ASN.1 Definitions 9
5.14 Protocol Subset Notation 10
5.15 Determination of the effective protocol 10

6 Elements of Protocol Procedure 11
6.1 Descriptive Conventions 11
6.2 Entering and Leaving the MMS Environment 11
6.3 Operating in the MMS Environment 11
6.4 Handling of Error Conditions 16
6.5 The Reject Service and RejectPDU 17

7 MMS PDU 17
7.1 The Confirmed-RequestPDU 18
7.2 The Unconfirmed-PDU 30
7.3 The Confirmed-ResponsePDU 31
7.4 The Confirmed-ErrorPDU 42
7.5 Common MMS Types 45

8 Environment and General Management Protocol 48
8.1 Introduction 48
8.2 Initiate 48
8.3 Conclude 49
8.4 Abort 49
8.5 Cancel 49
8.6 Reject 50

9 Conditioned Service Response Protocol 51
9.1 Introduction 51
9.2 Access Condition 51
9.3 DefineAccessControlList 51
9.4 GetAccessControlListAttributes 52
9.5 ReportAccessControlledObjects 53
9.6 DeleteAccessControlList 53
9.7 ChangeAccessControl 54

10 VMD Support Protocol 54
10.1 Introduction 54
10.2 Status Response Parameter 54
10.3 Status 55
10.4 UnsolicitedStatus 56
10.5 GetNameList 56
10.6 Identify 56
10.7 Rename 57
10.8 GetCapabilityList 57
10.9 VMDStop 57
10.10 VMDReset 58

11 Domain Management Protocol 58
11.1 Introduction 58
11.2 InitiateDownloadSequence 58
11.3 DownloadSegment 59
11.4 TerminateDownloadSequence 59
11.5 InitiateUploadSequence 60
11.6 UploadSegment 60
11.7 TerminateUploadSequence 61
11.8 RequestDomainDownload 61
11.9 RequestDomainUpload 61
11.10 LoadDomainContent 62
11.11 StoreDomainContent 62
11.12 DeleteDomain 63
11.13 GetDomainAttributes 63

12 Program Invocation Management Protocol 64
12.1 Introduction 64
12.2 CreateProgramInvocation 64
12.3 DeleteProgramInvocation 65
12.4 Start 65
12.5 Stop 66
12.6 Resume 67
12.7 Reset 67
12.8 Kill 68
12.9 GetProgramInvocationAttributes 68
12.10 Select 69
12.11 AlterProgramInvocationAttributes 69
12.12 ReconfigureProgramInvocation 70

13 Unit Control Protocol 70
13.1 Introduction 70
13.2 Control Element 70
13.3 InitiateUnitControlLoad service 71

13.4 UnitControlLoadSegment service 71
13.5 UnitControlUpload service 72
13.6 StartUnitControl service 72
13.7 StopUnitControl service 73
13.8 CreateUnitControl service 73
13.9 AddToUnitControl service 74
13.10 RemoveFromUnitControl service 74
13.11 GetUnitControlAttributes service 74
13.12 LoadUnitControlFromFile service 75
13.13 StoreUnitControlToFile service 75
13.14 DeleteUnitControl service 76

14 Variable Access Protocol 76
14.1 Conventions 76
14.2 Protocol For Specifying Types 77
14.3 Protocol For Specifying Alternate Access 77
14.4 Protocol For Specifying Data Values 78
14.5 Protocol for Specifying Access To Variables 82
14.6 Read 82
14.7 Write 83
14.8 InformationReport 83
14.9 GetVariableAccessAttributes 83
14.10 DefineNamedVariable 84
14.11 DeleteVariableAccess 84
14.12 DefineNamedVariableList 85
14.13 GetNamedVariableListAttributes 85
14.14 DeleteNamedVariableList 86
14.15 DefineNamedType 86
14.16 GetNamedTypeAttributes 86
14.17 DeleteNamedType 87

15 Data Exchange Protocol 87
15.1 Introduction 87
15.2 ExchangeData 87
15.3 GetDataExchangeAttributes 88

16 Semaphore Management Protocol 88
16.1 Introduction 88
16.2 TakeControl 89
16.3 RelinquishControl 89
16.4 DefineSemaphore 90
16.5 DeleteSemaphore 90
16.6 ReportSemaphoreStatus 90
16.7 ReportPoolSemaphoreStatus 91
16.8 ReportSemaphoreEntryStatus 91
16.9 AttachToSemaphore Modifier 92

17 Operator Communication Protocol 92
17.1 Introduction 92
17.2 Input 92
17.3 Output 93

18 Event Management Protocol 93
18.1 Introduction 93
18.2 TriggerEvent 93
18.3 EventNotification 94
18.4 AcknowledgeEventNotification 95
18.5 GetAlarmSummary 95
18.6 GetAlarmEnrollmentSummary 96
18.7 AttachToEventCondition 97

19 Event Condition Protocol 98

19.1 Introduction 98
19.2 DefineEventCondition 98
19.3 DeleteEventCondition 98
19.4 GetEventConditionAttributes 99
19.5 ReportEventConditionStatus 100
19.6 AlterEventConditionMonitoring 100

20 Event Action Protocol 101
20.1 Introduction 101
20.2 DefineEventAction 101
20.3 DeleteEventAction 102
20.4 GetEventActionAttributes 102
20.5 ReportEventActionStatus 103

21 Event Enrollment Protocol 103
21.1 Introduction 103
21.2 DefineEventEnrollment 104
21.3 DeleteEventEnrollment 104
21.4 GetEventEnrollmentAttributes 105
21.5 ReportEventEnrollmentStatus 107
21.6 AlterEventEnrollment 107
21.7 Supporting Productions 108

22 Event Condition List Protocol 108
22.1 Introduction 108
22.2 DefineEventConditionList protocol 108
22.3 DeleteEventConditionList protocol 109
22.4 AddEventConditionListReference protocol 109
22.5 RemoveEventConditionListReference protocol 110
22.6 GetEventConditionListAttributes protocol 110
22.7 ReportEventConditionListStatus protocol 111
22.8 AlterEventConditionListMonitoring protocol 111

23 Journal Management Protocol 112
23.1 Introduction 112
23.2 ReadJournal 112
23.3 WriteJournal 112
23.4 InitializeJournal 113
23.5 ReportJournalStatus 113
23.6 CreateJournal 114
23.7 DeleteJournal 114
23.8 Supporting Productions 114

24 Mapping to Underlying Communication Services 115
24.1 Mapping of PDUs 115
24.2 M-ASSOCIATE Data 115
24.3 Termination of Application Association 116
24.4 Directly-Mapped Abort Service 116
24.5 Construction of MMS PDUs 116
24.6 Delivery of Service Primitives to an MMS-user 116
24.7 Right to Send Data 117
24.8 Reliable Underlying Service 117
24.9 Flow Control 117
24.10 Use of Presentation Contexts 117
24.11 Abstract Syntax Definition 117

25 Configuration and Initialization Statement 117
25.1 Introduction 117
25.2 CIS Part One: Initialization of the VMD 118
25.3 CIS Part Two: Service and Parameter CBBs 130

Annex A (normative) Relation of M-Services to ACSE and Presentation Services 144

A.1 Mapping of M-services 144
A.2 M-DATA service 145
A.3 M-U-ABORT service 145
A.4 M-P-ABORT service 145
A.5 Use of Presentation Contexts 145
A.6 Transfer Syntax Definition 146
A.7 Application Context Name 146

Annex B (normative) Abstract format for Configuration and Initialization 148

B.1 SCI Part One: Initialization of the VMD 148
B.2 Services and parameter CBBs 156

Annex C (normative) File Access Protocol 159

C.1 Introduction 159
C.2 ObtainFile 159

Annex D (informative) File Management Protocol 161

D.1 Overview 161
D.2 FileOpen 161
D.3 FileRead 161
D.4 FileClose 162
D.5 FileRename 162
D.6 FileDelete 162
D.7 FileDirectory 163
D.8 FileAttributes 163

Annex E (informative) Scattered Access 164

E.1 Introduction 164
E.2 DefineScatteredAccess 164
E.3 GetScatteredAccessAttributes 164

Annex F (informative) REAL Data Type 166

F.1 Introduction 166
F.2 REAL Data 166
F.3 End of Module 166

Index 167

Figures Figure 1 - Confirmed Service Request as seen by the Service Requester 12

Figure 2 - Confirmed Service Request as seen by the Service Responder 14

Figure 3 - Unconfirmed Service as seen by the Service Requester 15

Figure 4 - Unconfirmed Service as seen by the Service Responder 16

Tables Table 1 - CIS Implementation Information 119

Table 2 - Capability Description 120

Table 3 - Predefined Access Control object 121

Table 4 - Predefined Domain object 122

Table 5 - Predefined Program Invocation object 123

Table 6 - Predefined Unit Control object 123

Table 7 - Unnamed Variable objects 124

Table 8 - Predefined Named Variable object 124

Table 9 - Predefined Named Variable List object 125

Table 10 - Predefined Named Type object 125

Table 11 - Predefined Data Exchange object 126

Table 12 - Predefined Semaphore object 126

Table 13 - Predefined Operator Station object 127

Table 14 - Predefined Event Condition object 127

Table 15 - Predefined Event Action object 128

Table 16 - Predefined Event Enrollment object 128

Table 17 - Predefined Event Condition List object 129

Table 18 - Predefined Journal object 129

Table 19 - Predefined Journal Entry object 130

Table 20 - Environment & General Management services 131

Table 21 - Environment & General Management parameters 131

Table 22 - Access Control services 132

Table 23 - Access Control parameter 132

Table 24 - VMD Support services 132

Table 25 - VMD Support parameters 133

Table 26 - Domain Management services 133

Table 27 - Domain Management parameters 134

Table 28 - Program Invocation Management services 134

Table 29 - Program Invocation Management parameters 135

Table 30 - Unit Control services 135

Table 31 - Variable Access services 136

Table 32 - Variable Access parameters 137

Table 33 - Data parameters 137

Table 34 - Data Exchange services 137

Table 35 - Semaphore Management services 138

Table 36 - Semaphore Management parameter 138

Table 37 - Operator Communication services 138

Table 38 - Operator Communication parameter 139

Table 39 - Event Management services 139

Table 40 - Event Condition services 139

Table 41 - Event Condition parameters 140

Table 42 - Event Action services 140

Table 43 - Event Enrollment services 140

Table 44 - Event Condition List services 141

Table 45 - Event Condition List parameter 141

Table 46 - Journal Management services 141

Table 47 - Errors parameters 142

Table 48 - File Access service 142

Table 49 - File Management services 142

Table 50 - File Management parameter 142

Table 51 - Scattered Access services 143

Table 52 - Scattered Access parameter 143