

|  |  |
| --- | --- |
| **oneM2M**  **Technical Specification** | |
| Document Number | TS-0007 -V0.8.1 |
| Document Name: | Service Components |
| Date: | 2015-May-05 |
| Abstract: | This document specifies the M2M Services provided by the M2M Services Platform, the integration and interworking of the M2M Services functional architecture of the oneM2M Services Platform and informatively illustrates the use of the M2M Services within the context of complex business services. |

This Specification is provided for future development work within oneM2M only. The Partners accept no liability for any use of this Specification.

The present document has not been subject to any approval process by the oneM2M Partners Type 1. Published oneM2M specifications and reports for implementation should be obtained via the oneM2M Partners' Publications Offices.

About oneM2M

The purpose and goal of oneM2M is to develop technical specifications which address the need for a common M2M Service Layer that can be readily embedded within various hardware and software, and relied upon to connect the myriad of devices in the field with M2M application servers worldwide.

More information about oneM2M may be found at: http//www.oneM2M.org

Copyright Notification

No part of this document may be reproduced, in an electronic retrieval system or otherwise, except as authorized by written permission.

The copyright and the foregoing restriction extend to reproduction in all media.

© 2015, oneM2M Partners Type 1 (ARIB, ATIS, CCSA, ETSI, TIA, TTA, TTC).

All rights reserved.

Notice of Disclaimer & Limitation of Liability

The information provided in this document is directed solely to professionals who have the appropriate degree of experience to understand and interpret its contents in accordance with generally accepted engineering or other professional standards and applicable regulations. No recommendation as to products or vendors is made or should be implied.

NO REPRESENTATION OR WARRANTY IS MADE THAT THE INFORMATION IS TECHNICALLY ACCURATE OR SUFFICIENT OR CONFORMS TO ANY STATUTE, GOVERNMENTAL RULE OR REGULATION, AND FURTHER, NO REPRESENTATION OR WARRANTY IS MADE OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR AGAINST INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. NO oneM2M PARTNER TYPE 1 SHALL BE LIABLE, BEYOND THE AMOUNT OF ANY SUM RECEIVED IN PAYMENT BY THAT PARTNER FOR THIS DOCUMENT, WITH RESPECT TO ANY CLAIM, AND IN NO EVENT SHALL oneM2M BE LIABLE FOR LOST PROFITS OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. oneM2M EXPRESSLY ADVISES ANY AND ALL USE OF OR RELIANCE UPON THIS INFORMATION PROVIDED IN THIS DOCUMENT IS AT THE RISK OF THE USER.

Contents

1 Scope 27

2 References 27

2.1 Normative references 27

2.2 Informative references 27

3 Definitions and abbreviations 27

3.1 Definitions 27

3.2 Abbreviations 28

4 Conventions 29

5 M2M Services Architecture 29

5.1 Introduction 29

5.2 Reference Points 31

5.2.1 Introduction 31

5.2.2 Mca Reference Point 31

5.2.3 Msc Reference Point 31

5.2.3.1 Message Exchange Patterns 31

5.2.3.2 M2M Identifiers 32

5.2.3.2.1 M2M Service Capability Identifier (M2M-Serv-Cap-ID) 32

5.2.4 Mcc' Reference Point 33

5.2.5 Mcn Reference Point 33

5.3 Configurations support by M2M Service Architecture 34

6 M2M Services 34

6.1 Introduction 34

6.2 Service Subscription 34

6.2.1 Overview 34

6.2.2 M2M Service Subscription Entities 34

6.2.2.1 Overview 34

6.2.2.2 M2M Service Subscription Broker Entities 35

6.2.2.3 M2M Service Subscription Management Adapter Entities 35

6.2.2.4 M2M Service Subscription Transport Adapter Entities 36

6.2.3 Service Capabilities 37

6.2.3.1 validateServiceSubscription 37

6.2.3.1.1 Description 37

6.2.3.1.2 Pre-Conditions 37

6.2.3.1.3 Signature - validateServiceSubscription 37

6.2.3.1.4 Post-Conditions 37

6.2.3.1.5 Exceptions 37

6.2.3.1.6 Policies for Use 37

6.2.3.1.7 oneM2M Resource Interworking 37

6.2.3.2 getAE 37

6.2.3.2.1 Description 37

6.2.3.2.2 Pre-Conditions 38

6.2.3.2.3 Signature – getAE 38

6.2.3.2.4 Service Interactions 38

6.2.3.2.5 Post-Conditions 38

6.2.3.2.6 Exceptions 38

6.2.3.2.7 Policies for Use 38

6.2.3.2.8 oneM2M Resource Interworking 39

6.2.3.3 getBroker 39

6.2.3.3.1 Description 39

6.2.3.3.2 Pre-Conditions 39

6.2.3.3.3 Signature – getBroker 39

6.2.3.3.4 Post-Conditions 39

6.2.3.3.5 Exceptions 39

6.2.3.3.6 Policies for Use 39

6.2.3.3.7 oneM2M Resource Interworking 39

6.2.3.4 getManagementAdapter 39

6.2.3.4.1 Description 39

6.2.3.4.2 Pre-Conditions 40

6.2.3.4.3 Signature - getManagementAdapter 40

6.2.3.4.4 Post-Conditions 40

6.2.3.4.5 Exceptions 40

6.2.3.4.6 Policies for Use 40

6.2.3.4.7 oneM2M Resource Interworking 40

6.2.3.5 getTransportAdapter 41

6.2.3.5.1 Description 41

6.2.3.5.2 Pre-Conditions 41

6.2.3.5.3 Signature - getTransportAdapter 41

6.2.3.5.4 Post-Conditions 41

6.2.3.5.5 Exceptions 41

6.2.3.5.6 Policies for Use 41

6.2.3.5.7 oneM2M Resource Interworking 41

6.2.3.6 associateAEWithServiceSubscription 41

6.2.3.6.1 Description 41

6.2.3.6.2 Pre-Conditions 41

6.2.3.6.3 Signature – associateAEWithServiceSubscription 42

6.2.3.6.4 Service Interactions 42

6.2.3.6.5 Post-Conditions 42

6.2.3.6.6 Exceptions 42

6.2.3.6.7 Policies for Use 42

6.2.3.6.8 oneM2M Resource Interworking 43

6.2.3.7 disassociateAEFromServiceSubscription 43

6.2.3.7.1 Description 43

6.2.3.7.2 Pre-Conditions 43

6.2.3.7.3 Signature - disassociateAEFromServiceSubscription 43

6.2.3.7.4 Service Interactions 43

6.2.3.7.5 Post-Conditions 43

6.2.3.7.6 Exceptions 43

6.2.3.7.7 Policies for Use 43

6.2.3.7.8 oneM2M Resource Interworking 44

6.2.3.8 refreshAEAssociationWithServiceSubscription 44

6.2.3.8.1 Description 44

6.2.3.8.2 Pre-Conditions 44

6.2.3.8.3 Signature – refreshAEAssociationWithServiceSubscription 44

6.2.3.8.4 Service Interactions 44

6.2.3.8.5 Post-Conditions 45

6.2.3.8.6 Exceptions 45

6.2.3.8.7 Policies for Use 45

6.2.3.8.8 oneM2M Resource Interworking 45

6.3 Authorization 45

6.3.1 Overview 45

6.3.2 Service Capabilities 46

6.3.2.1 authorizeServiceCapability 46

6.3.2.1.1 Description 46

6.3.2.1.2 Pre-Conditions 46

6.3.2.1.3 Common M2M Service Capability Parameters for Request Authentication and Authorization 46

6.3.2.1.4 Service Interactions 46

6.3.2.1.5 Post-Conditions 46

6.3.2.1.6 Exceptions 46

6.3.2.1.7 Policies for Use 46

6.3.2.1.8 oneM2M Resource Interworking 46

6.4 Data Exchange 47

6.4.1 Overview 47

6.4.2 Data Exchange Entities 47

6.4.2.1 Subscribe-Publish-Notify Data Exchange 47

6.4.2.1.1 Overview 47

6.4.2.1.2 Supporting Rules 47

6.4.2.1.2.1 Overview 47

6.4.2.1.1.2 Publication Resources 47

6.4.2.1.1.3 Delivery Policy 47

6.4.2.1.1.4 Message Retainment Policy 47

6.4.2.1.1.5 Service Subscription Integration 48

6.4.2.2 Request-Response Data Exchange 48

6.4.2.2.1 Overview 48

6.4.2.2.2 Supporting Rules 48

6.4.2.2.2.1 Overview 48

6.4.2.2.2.2 Delivery Policy 48

6.4.2.2.2.3 Service Subscription Integration 48

6.4.3 Service Capabilities 48

6.4.3.1 subscribe 48

6.4.3.1.1 Description 48

6.4.3.1.2 Pre-Conditions 49

6.4.3.1.3 Signature – subscribe 49

6.4.3.1.4 Service Interactions 49

6.4.3.1.5 Post-Conditions 50

6.4.3.1.6 Exceptions 50

6.4.3.1.7 Policies for Use 50

6.4.3.1.8 oneM2M Resource Interworking 50

6.4.3.2 publish 51

6.4.3.2.1 Description 51

6.4.3.2.2 Pre-Conditions 51

6.4.3.2.3 Signature - publish 51

6.4.3.2.4 Service Interactions 51

6.4.3.2.5 Post-Conditions 52

6.4.3.2.6 Exceptions 52

6.4.3.2.7 Policies for Use 52

6.4.3.2.8 oneM2M Resource Interworking 52

6.4.3.3 notify 53

6.4.3.3.1 Description 53

6.4.3.3.2 Pre-Conditions 53

6.4.3.3.3 Signature - notify 53

6.4.3.3.4 Post-Conditions 53

6.4.3.3.5 Exceptions 53

6.4.3.3.6 Policies for Use 53

6.4.3.3.7 oneM2M Resource Interworking 53

6.4.3.4 sendMessage 53

6.4.3.4.1 Desription 53

6.4.3.4.2 Pre-Conditions 54

6.4.3.4.3 Signature - sendMessage 54

6.4.3.4.4 Service Interactions 54

6.4.3.4.5 Post-Conditions 55

6.4.3.4.6 Exceptions 55

6.4.3.4.7 Policies for Use 55

6.4.3.4.8 oneM2M Resource Interworking 56

6.5 Broker 56

6.5.1 Overview 56

6.5.2 Service Capabilities 56

6.5.2.1 subscribe 56

6.5.2.1.1 Description 56

6.5.2.1.2 Pre-Conditions 56

6.5.2.1.3 Signature - subscribe 56

6.5.2.1.4 Post-Conditions 56

6.5.2.1.5 Exceptions 56

6.5.2.1.6 Policies for Use 56

6.5.2.2 publish 56

6.5.2.2.1 Description 56

6.5.2.2.2 Pre-Conditions 57

6.5.2.2.3 Signature - publish 57

6.5.2.3.4 Post-Conditions 57

6.5.2.3.5 Exceptions 57

6.5.2.3.6 Policies for Use 57

6.5.2.3.7 oneM2M Resource Interworking 57

6.5.2.3 notify 57

6.5.2.3.1 Description 57

6.5.2.3.2 Pre-Conditions 58

6.5.2.3.3 Signature - notify 58

6.5.2.3.4 Service Interactions 58

6.5.2.3.5 Post-Conditions 59

6.5.2.3.6 Exceptions 59

6.5.2.3.7 Policies for Use 59

6.5.2.3.8 oneM2M Resource Interworking 60

6.5.2.4 sendMessage 60

6.5.2.4.1 Description 60

6.5.2.4.2 Pre-Conditions 60

6.5.2.4.3 Signature - sendMessage 60

6.5.2.4.4 Post-Conditions 60

6.5.2.4.5 Exceptions 60

6.5.2.4.6 Policies for Use 60

6.5.2.4.6 oneM2M Resource Interworking 60

6.6 Device Management 60

6.6.1 Overview 60

6.6.2 Device Management Entities 61

6.6.2.1 Overview 61

6.6.2.2 Supporting Rules 61

6.6.2.2.1 Report Policy Type 61

6.6.2.2.2 Batch Report Type 61

6.6.2.2.3 Firmware Report Type 61

6.6.2.2.4 Orchestration Rule Type 62

6.6.2.2.5 Firmware Info Type 62

6.6.2.2.6 Service Subscription Integration 62

6.6.2.2.7 Device Info Type 62

6.6.2.2.8 Memory Type 63

6.6.2.2.9 Battery Type 63

6.6.2.2.10 DeviceCapability Type 63

6.6.2.2.11 BatteryStatus Enum 63

6.6.2.2.12 DeviceCapabilityName Enum 64

6.6.2.2.13 LockStatus Enum 64

6.6.2.2.14 Area Network Info Type 64

6.6.2.2.15 Area Network Device Type 65

6.6.2.2.16 Area Network Device Info Type 65

6.6.2.2.17 LogTypeId Enum 65

6.6.2.2.18 LogStatus Enum 65

6.6.2.2.19 LogInfo Type 65

6.6.2.2.20 TroubleshootingReport Type 66

6.6.2.2.21 Log Type 66

6.6.2.2.22 Log Filter Criteria 66

6.6.2.2.23 Action Enum 66

6.6.2.2.24 Status Enum 67

6.6.2.2.25 ActionStatus Type 67

6.6.2.2.26 SoftwareReport Type 67

6.6.2.2.27 PendingReport Enum 67

6.6.2.2.28 OperationMonitor Enum 68

6.6.3 Service Capabilities 68

6.6.3.1 downloadFirmware 68

6.6.3.1.1 Description 68

6.6.3.1.2 Pre-Conditions 68

6.6.3.1.3 Signature - downloadFirmware 68

6.6.3.1.4 Service Interactions 68

6.6.3.1.5 Post-Conditions 69

6.6.3.1.6 Exceptions 69

6.6.3.1.7 Policies for Use 69

6.6.3.1.8 oneM2M Resource Interworking 69

6.6.3.2 installFirmware 69

6.6.3.2.1 Description 69

6.6.3.2.2 Pre-Conditions 69

6.6.3.2.3 Signature - installFirmware 70

6.6.3.2.4 Service Interactions 70

6.6.3.2.5 Post-Conditions 70

6.6.3.2.6 Exceptions 70

6.6.3.2.7 Policies for Use 70

6.6.3.2.8 oneM2M Resource Interworking 71

6.6.3.3 getFirmwareInformation 71

6.6.3.3.1 Description 71

6.6.3.3.2 Pre-Conditions 71

6.6.3.3.3 Signature - getFirmwareInformation 71

6.6.3.3.4 Service Interactions 71

6.6.3.3.5 Post-Conditions 71

6.6.3.3.6 Exceptions 72

6.6.3.3.7 Policies for Use 72

6.6.3.3.8 oneM2M Resource Interworking 72

6.6.3.4 getFirmwareExecStatus 72

6.6.3.4.1 Description 72

6.6.3.4.2 Pre-Conditions 72

6.6.3.4.3 Signature – getFirmwareExecStatus 72

6.6.3.4.4 Service Interactions 72

6.6.3.4.5 Post-Conditions 73

6.6.3.4.6 Exceptions 73

6.6.3.4.7 Policies for Use 73

6.6.3.4.8 oneM2M Resource Interworking 73

6.6.3.5 deviceManagementReport 73

6.6.3.5.1 Description 73

6.6.3.5.2 Pre-Conditions 73

6.6.3.5.3 Signature – deviceManagementReport 74

6.6.3.5.4 Post-Conditions 74

6.6.3.5.5 Exceptions 74

6.6.3.5.6 Policies for Use 74

6.6.3.57 oneM2M Resource Interworking 74

6.6.3.6 upgradeFirmware 74

6.6.3.6.1 Description 74

6.6.3.6.2 Pre-Conditions 74

6.6.3.6.3 Signature - upgradeFirmware 75

6.6.3.6.4 Service Interactions 75

6.6.3.6.5 Post-Conditions 76

6.6.3.6.6 Exceptions 76

6.6.3.6.7 Policies for Use 76

6.6.3.6.8 oneM2M Resource Interworking 76

6.6.3.7 getDeviceInformation 76

6.6.3.7.1 Description 76

6.6.3.7.2 Pre-Conditions 76

6.6.3.7.3 Signature - getDeviceInformation 76

6.6.3.7.4 Service Interactions 76

6.6.3.7.5 Post-Conditions 77

6.6.3.7.6 Exceptions 77

6.6.3.7.7 Policies for Use 77

6.6.3.7.8 oneM2M Resource Interworking 77

6.6.3.8 getDeviceCapabilities 77

6.6.3.8.1 Description 77

6.6.3.8.2 Pre-Conditions 77

6.6.3.8.3 Signature – getDeviceCapabilities 78

6.6.3.8.4 Service Interactions 78

6.6.3.8.5 Post-Conditions 78

6.6.3.8.6 Exceptions 78

6.6.3.8.7 Policies for Use 78

6.6.3.8.8 oneM2M Resource Interworking 78

6.6.3.9 enableDeviceCapability 78

6.6.3.9.1 Description 78

6.6.3.9.2 Pre-Conditions 79

6.6.3.9.3 Signature –enableDeviceCapability 79

6.6.3.9.4 Service Interactions 79

6.6.3.9.5 Post-Conditions 79

6.6.3.9.6 Exceptions 79

6.6.3.9.7 Policies for Use 79

6.6.3.9.8 oneM2M Resource Interworking 80

6.6.3.10 disableDeviceCapability 80

6.6.3.10.1 Description 80

6.6.3.10.2 Pre-Conditions 80

6.6.3.10.3 Signature –disableDeviceCapability 80

6.6.3.10.4 Service Interactions 80

6.6.3.10.5 Post-Conditions 80

6.6.3.10.6 Exceptions 81

6.6.3.10.7 Policies for Use 81

6.6.3.10.8 oneM2M Resource Interworking 81

6.6.3.11 getAreaNetworks 81

6.6.3.11.1 Description 81

6.6.3.11.2 Pre-Conditions 81

6.6.3.11.3 Signature - getAreaNetworks 81

6.6.3.11.4 Service Interactions 81

6.6.3.11.5 Post-Conditions 82

6.6.3.11.6 Exceptions 82

6.6.3.11.7 Policies for Use 82

6.6.3.11.8 oneM2M Resource Interworking 82

6.6.3.12 updateDeviceForAreaNetwork 82

6.6.3.12.1 Description 82

6.6.3.12.2 Pre-Conditions 82

6.6.3.12.3 Signature – updateDeviceForAreaNetwork 82

6.6.3.12.4 Service Interactions 82

6.6.3.12.5 Post-Conditions 83

6.6.3.12.6 Exceptions 83

6.6.3.12.7 Policies for Use 83

6.6.3.12.8 oneM2M Resource Interworking 83

6.6.3.13 rebootDevice 83

6.6.3.13.1 Description 83

6.6.3.13.2 Pre-Conditions 83

6.6.3.13.3 Signature - rebootDevice 84

6.6.3.13.4 Service Interactions 84

6.6.3.13.5 Post-Conditions 84

6.6.3.13.6 Exceptions 84

6.6.3.13.7 Policies for Use 84

6.6.3.13.8 oneM2M Resource Interworking 84

6.6.3.14 resetDevice 85

6.6.3.14.1 Description 85

6.6.3.14.2 Pre-Conditions 85

6.6.3.14.3 Signature - resetDevice 85

6.6.3.14.4 Service Interactions 85

6.6.3.14.5 Post-Conditions 85

6.6.3.14.6 Exceptions 86

6.6.3.14.7 Policies for Use 86

6.6.3.14.8 oneM2M Resource Interworking 86

6.6.3.15 uploadDeviceLog 86

6.6.3.15.1 Description 86

6.6.3.15.2 Pre-Conditions 86

6.6.3.15.3 Signature – uploadDeviceLog 86

6.6.3.15.4 Service Interactions 86

6.6.3.15.5 Post-Conditions 87

6.6.3.15.6 Exceptions 87

6.6.3.15.7 Policies for Use 87

6.6.3.15.8 oneM2M Resource Interworking 87

6.6.3.16 getDeviceLogs 87

6.6.3.16.1 Description 87

6.6.3.16.2 Pre-Conditions 87

6.6.3.16.3 Signature - getDeviceLogs 87

6.6.3.16.4 Service Interactions 88

6.6.3.16.5 Post-Conditions 88

6.6.3.16.6 Exceptions 88

6.6.3.16.7 Policies for Use 88

6.6.3.16.8 oneM2M Resource Interworking 88

6.6.3.17 getDeviceLogInformation 88

6.6.3.17.1 Description 88

6.6.3.17.2 Pre-Conditions 88

6.6.3.17.3 Signature – getDeviceLogInformation 89

6.6.3.17.4 Service Interactions 89

6.6.3.17.5 Post-Conditions 89

6.6.3.17.6 Exceptions 89

6.6.3.17.7 Policies for Use 89

6.6.3.17.8 oneM2M Resource Interworking 89

6.6.3.18 getSoftwareInformation 90

6.6.3.18.1 Description 90

6.6.3.18.2 Pre-Conditions 90

6.6.3.18.3 Signature – getSoftwareInformation 90

6.6.3.18.4 Service Interactions 90

6.6.3.18.5 Post-Conditions 90

6.6.3.18.6 Exceptions 91

6.6.3.18.7 Policies for Use 91

6.6.3.18.8 oneM2M Resource Interworking 91

6.6.3.19 downloadSoftware 91

6.6.3.19.1 Description 91

6.6.3.19.2 Pre-Conditions 91

6.6.3.19.3 Signature –downloadSoftware 91

6.6.3.19.4 Service Interactions 91

6.6.3.19.5 Post-Conditions 92

6.6.3.19.6 Exceptions 92

6.6.3.19.7 Policies for Use 92

6.6.3.19.8 oneM2M Resource Interworking 92

6.6.3.20 installSoftware 92

6.6.3.20.1 Description 92

6.6.3.20.2 Pre-Conditions 92

6.6.3.20.3 Signature –installSoftware 93

6.6.3.20.4 Service Interactions 93

6.6.3.20.5 Post-Conditions 93

6.6.3.20.6 Exceptions 93

6.6.3.20.7 Policies for Use 93

6.6.3.20.8 oneM2M Resource Interworking 93

6.6.3.21 activateSoftware 94

6.6.3.21.1 Description 94

6.6.3.21.2 Pre-Conditions 94

6.6.3.21.3 Signature –activateSoftware 94

6.6.3.21.4 Service Interactions 94

6.6.3.21.5 Post-Conditions 94

6.6.3.21.6 Exceptions 94

6.6.3.21.7 Policies for Use 95

6.6.3.21.8 oneM2M Resource Interworking 95

6.6.3.22 deactivateSoftware 95

6.6.3.22.1 Description 95

6.6.3.22.2 Pre-Conditions 95

6.6.3.22.3 Signature –deactivateSoftware 95

6.6.3.22.4 Service Interactions 95

6.6.3.22.5 Post-Conditions 96

6.6.3.22.6 Exceptions 96

6.6.3.22.7 Policies for Use 96

6.6.3.22.8 oneM2M Resource Interworking 96

6.6.3.23 removeSoftware 96

6.6.3.23.1 Description 96

6.6.3.23.2 Pre-Conditions 96

6.6.3.23.3 Signature – removeSoftware 97

6.6.3.23.4 Service Interactions 97

6.6.3.23.5 Post-Conditions 97

6.6.3.23.6 Exceptions 97

6.6.3.23.7 Policies for Use 97

6.6.3.23.8 oneM2M Resource Interworking 97

6.7 Management Adapter 98

6.7.1 Overview 98

6.7.2 Service Capabilities 98

6.7.2.1 downloadFirmware 98

6.7.2.1.1 Description 98

6.7.2.1.2 Pre-Conditions 98

6.7.2.1.3 Signature - downloadFirmware 98

6.7.2.1.4 Post-Conditions 98

6.7.2.1.5 Exceptions 98

6.7.2.1.6 Policies for Use 98

6.7.2.1.7 oneM2M Resource Interworking 98

6.7.2.2 installFirmware 98

6.7.2.2.1 Description 98

6.7.2.2.2 Pre-Conditions 99

6.7.2.2.3 Signature –installFirmware 99

6.7.2.2.4 Post-Conditions 99

6.7.2.2.5 Exceptions 99

6.7.2.2.6 Policies for Use 99

6.7.2.2.7 oneM2M Resource Interworking 99

6.7.2.3 getFirmwareInformation 99

6.7.2.3.1 Description 99

6.7.2.3.2 Pre-Conditions 99

6.7.2.3.3 Signature –getFirmwareInformation 100

6.7.2.3.4 Post-Conditions 100

6.7.2.3.5 Exceptions 100

6.7.2.3.6 Policies for Use 100

6.7.2.3.7 oneM2M Resource Interworking 100

6.7.2.4 getFirmwareExecStatus 100

6.7.2.4.1 Pre-Conditions 100

6.7.2.4.2 Pre-Conditions 100

6.7.2.4.3 Signature –getFirmwareExecInstance 100

6.7.2.4.4 Post-Conditions 100

6.7.2.4.5 Exceptions 101

6.7.2.4.6 Policies for Use 101

6.7.2.4.7 oneM2M Resource Interworking 101

6.7.2.5 deviceManagementReport 101

6.7.2.5.1 Description 101

6.7.2.5.2 Pre-Conditions 101

6.7.2.5.3 Signature –deviceManagementReport 101

6.7.2.5.4 Service Interactions 101

6.7.2.5.5 Post-Conditions 102

6.7.2.5.6 Exceptions 102

6.7.2.5.7 Policies for Use 102

6.7.2.5.7 oneM2M Resource Interworking 102

6.7.2.6 getDeviceInformation 102

6.7.2.6.1 Description 102

6.7.2.6.2 Pre-Conditions 102

6.7.2.6.3 Signature –getDeviceInformation 102

6.7.2.6.4 Post-Conditions 103

6.7.2.6.5 Exceptions 103

6.7.2.6.6 Policies for Use 103

6.7.2.6.7 oneM2M Resource Interworking 103

6.7.2.7 getDeviceCapabilities 103

6.7.2.7.1 Description 103

6.7.2.7.2 Pre-Conditions 103

6.7.2.7.3 Signature –getDeviceCapabilities 103

6.7.2.7.4 Post-Conditions 103

6.7.2.7.5 Exceptions 103

6.7.2.7.6 Policies for Use 103

6.7.2.7.7 oneM2M Resource Interworking 103

6.7.2.8 enableDeviceCapability 104

6.7.2.8.1 Description 104

6.7.2.8.2 Pre-Conditions 104

6.7.2.8.3 Signature –enableDeviceCapability 104

6.7.2.8.4 Post-Conditions 104

6.7.2.8.5 Exceptions 104

6.7.2.8.6 Policies for Use 104

6.7.2.8.7 oneM2M Resource Interworking 104

6.7.2.9 disableDeviceCapability 104

6.7.2.9.1 Description 104

6.7.2.9.2 Pre-Conditions 104

6.7.2.9.3 Signature –disableDeviceCapability 105

6.7.2.9.4 Post-Conditions 105

6.7.2.9.5 Exceptions 105

6.7.2.9.6 Policies for Use 105

6.7.2.9.7 oneM2M Resource Interworking 105

6.7.2.10 getAreaNetworks 105

6.7.2.10.1 Description 105

6.7.2.10.2 Pre-Conditions 105

6.7.2.10.3 Signature –getAreaNetworks 105

6.7.2.10.4 Post-Conditions 105

6.7.2.10.5 Exceptions 105

6.7.2.10.6 Policies for Use 105

6.7.2.10.7 oneM2M Resource Interworking 106

6.7.2.11 updateDeviceForAreaNetwork 106

6.7.2.11.1 Description 106

6.7.2.11.2 Pre-Conditions 106

6.7.2.11.3 Signature –updateDeviceForAreaNetwork 106

6.7.2.11.4 Post-Conditions 106

6.7.2.11.5 Exceptions 106

6.7.2.11.6 Policies for Use 106

6.7.2.11.7 oneM2M Resource Interworking 106

6.7.2.12 rebootDevice 106

6.7.2.12.1 Description 106

6.7.2.12.2 Pre-Conditions 106

6.7.2.12.3 Signature – rebootDevice 107

6.7.2.12.4 Post-Conditions 107

6.7.2.12.5 Exceptions 107

6.7.2.12.6 Policies for Use 107

6.7.2.12.7 oneM2M Resource Interworking 107

6.7.2.13 resetDevice 107

6.7.2.13.1 Description 107

6.7.2.13.2 Pre-Conditions 107

6.7.2.13.3 Signature – resetDevice 107

6.7.2.13.4 Post-Conditions 107

6.7.2.13.5 Exceptions 108

6.7.2.13.6 Policies for Use 108

6.7.2.13.7 oneM2M Resource Interworking 108

6.7.2.14 uploadDeviceLog 108

6.7.2.14.1 Description 108

6.7.2.14.2 Pre-Conditions 108

6.7.2.14.3 Signature – uploadDeviceLog 108

6.7.2.14.4 Post-Conditions 108

6.7.2.14.5 Exceptions 108

6.7.2.14.6 Policies for Use 108

6.7.2.14.7 oneM2M Resource Interworking 108

6.7.2.15 getDeviceLogs 108

6.7.2.15.1 Description 108

6.7.2.15.2 Pre-Conditions 109

6.7.2.15.3 Signature –getDeviceLogs 109

6.7.2.15.4 Post-Conditions 109

6.7.2.15.5 Exceptions 109

6.7.2.15.6 Policies for Use 109

6.7.2.15.7 oneM2M Resource Interworking 109

6.7.2.16 getDeviceLogInformation 109

6.7.2.16.1 Description 109

6.7.2.16.2 Pre-Conditions 109

6.7.2.16.3 Signature – getDeviceLogInformation 109

6.7.2.16.4 Post-Conditions 109

6.7.2.16.5 Exceptions 110

6.7.2.16.6 Policies for Use 110

6.7.2.16.7 oneM2M Resource Interworking 110

6.7.2.17 getSoftwareInformation 110

6.7.2.17.1 Description 110

6.7.2.17.2 Pre-Conditions 110

6.7.2.17.3 Signature –getSoftwareInformation 110

6.7.2.17.4 Post-Conditions 110

6.7.2.17.5 Exceptions 110

6.7.2.17.6 Policies for Use 110

6.7.2.17.7 oneM2M Resource Interworking 110

6.7.2.18 downloadSoftware 111

6.7.2.18.1 Description 111

6.7.2.18.2 Pre-Conditions 111

6.7.2.18.3 Signature –downloadSoftware 111

6.7.2.18.4 Post-Conditions 111

6.7.2.18.5 Exceptions 111

6.7.2.18.6 Policies for Use 111

6.7.2.18.7 oneM2M Resource Interworking 111

6.7.2.19 installSoftware 111

6.7.2.19.1 Description 111

6.7.2.19.2 Pre-Conditions 111

6.7.2.19.3 Signature –installSoftware 112

6.7.2.19.4 Post-Conditions 112

6.7.2.19.5 Exceptions 112

6.7.2.19.6 Policies for Use 112

6.7.2.19.7 oneM2M Resource Interworking 112

6.7.2.20 activateSoftware 112

6.7.2.20.1 Description 112

6.7.2.20.2 Pre-Conditions 112

6.7.2.20.3 Signature – activateSoftware 112

6.7.2.20.4 Post-Conditions 112

6.7.2.20.5 Exceptions 113

6.7.2.20.6 Policies for Use 113

6.7.2.20.7 oneM2M Resource Interworking 113

6.7.2.21 deactivateSoftware 113

6.7.2.21.1 Description 113

6.7.2.21.2 Pre-Conditions 113

6.7.2.21.3 Signature –deactivateSoftware 113

6.7.2.21.4 Post-Conditions 113

6.7.2.21.5 Exceptions 113

6.7.2.21.6 Policies for Use 113

6.7.2.21.7 oneM2M Resource Interworking 113

6.7.2.22 removeSoftware 113

6.7.2.22.1 Description 113

6.7.2.22.2 Pre-Conditions 114

6.7.2.22.3 Signature –removeSoftware 114

6.7.2.22.4 Post-Conditions 114

6.7.2.22.5 Exceptions 114

6.7.2.22.6 Policies for Use 114

6.7.2.22.7 oneM2M Resource Interworking 114

6.8 Service Administration 114

6.8.1 Overview 114

6.8.2 Service Administration Entities 114

6.8.2.1 Overview 114

6.8.2.2 M2M Service Entity 115

6.8.2.3 M2M Service Filter Criteria 115

6.8.3 Service Capabilities 115

6.8.3.1 createM2MService 115

6.8.3.1.1 Description 115

6.8.3.1.2 Pre-Conditions 116

6.8.3.1.3 Signature – createM2MService 116

6.8.3.1.4 Service Interactions 116

6.8.3.1.5 Post-Conditions 116

6.8.3.1.6 Exceptions 116

6.8.3.1.7 Policies for Use 116

6.8.3.1.8 oneM2M Resource Interworking 117

6.8.3.2 deleteM2MService 117

6.8.3.2.1 Description 117

6.8.3.2.2 Pre-Conditions 117

6.8.3.2.3 Signature – deleteM2MService 117

6.8.3.2.4 Service Interactions 117

6.8.3.2.5 Post-Conditions 118

6.8.3.2.6 Exceptions 118

6.8.3.2.7 Policies for Use 118

6.8.3.2.8 oneM2M Resource Interworking 118

6.8.3.3 addRoleToM2MService 118

6.8.3.3.1 Description 118

6.8.3.3.2 Pre-Conditions 118

6.8.3.3.3 Signature – addRoleToM2MService 118

6.8.3.3.4 Service Interactions 118

6.8.3.3.5 Post-Conditions 119

6.8.3.3.6 Exceptions 119

6.8.3.3.7 Policies for Use 119

6.8.3.3.8 oneM2M Resource Interworking 119

6.8.3.4 deleteRoleFromM2MService 119

6.8.3.4.1 Description 119

6.8.3.4.2 Pre-Conditions 119

6.8.3.4.3 Signature – deleteRoleFromM2MService 119

6.8.3.4.4 Service Interactions 119

6.8.3.4.5 Post-Conditions 120

6.8.3.4.6 Exceptions 120

6.8.3.4.7 Policies for Use 120

6.8.3.4.8 oneM2M Resource Interworking 120

6.8.3.5 getM2MService 120

6.8.3.5.1 Description 120

6.8.3.5.2 Pre-Conditions 120

6.8.3.5.3 Signature – getM2MService 120

6.8.3.5.4 Service Interactions 120

6.8.3.5.5 Post-Conditions 121

6.8.3.5.6 Exceptions 121

6.8.3.5.7 Policies for Use 121

6.8.3.5.8 oneM2M Resource Interworking 121

6.8.3.6 addServiceCapabilityToRole 121

6.8.3.6.1 Description 121

6.8.3.6.2 Pre-Conditions 121

6.8.3.6.3 Signature – addServiceCapabilityToRole 121

6.8.3.6.4 Service Interactions 121

6.8.3.6.5 Post-Conditions 122

6.8.3.6.6 Exceptions 122

6.8.3.6.7 Policies for Use 122

6.8.3.6.8 oneM2M Resource Interworking 122

6.8.3.7 deleteServiceCapabilityFromRole 122

6.8.3.7.1 Description 122

6.8.3.7.2 Pre-Conditions 122

6.8.3.7.3 Signature – deleteServiceCapabilityFromRole 122

6.8.3.7.4 Service Interactions 122

6.8.3.7.5 Post-Conditions 123

6.8.3.7.6 Exceptions 123

6.8.3.7.7 Policies for Use 123

6.8.3.7.8 oneM2M Resource Interworking 123

6.8.3.8 getServiceCapability 123

6.8.3.8.1 Description 123

6.8.3.8.2 Pre-Conditions 123

6.8.3.8.3 Signature – getServiceCapability 123

6.8.3.8.4 Service Interactions 124

6.8.3.8.5 Post-Conditions 124

6.8.3.8.6 Exceptions 124

6.8.3.8.7 Policies for Use 124

6.8.3.8.8 oneM2M Resource Interworking 124

6.9 Service Subscription Administration 124

6.9.1 Overview 124

6.9.2 Service Subscription Entities 125

6.9.3.1 Service Subscription Entity 125

6.9.2.2 Service Subscription Filter Criteria 125

6.9.2.3 M2M Node Entity for Service Subscription 125

6.9.2.4 M2M Node Filter Criteria 125

6.9.2.5 Application Rule 126

6.9.2.6 Application Rule Filter Criteria 126

6.9.2.7 Supporting Rules 126

6.9.2.7.1 Schedule Type 126

6.9.3 Service Capabilities 127

6.9.3.1 createServiceSubscription 127

6.9.3.1.1 Description 127

6.9.3.1.2 Pre-Conditions 127

6.9.3.1.3 Signature – createServiceSubscription 127

6.9.3.1.4 Service Interactions 127

6.9.3.1.5 Post-Conditions 128

6.9.3.1.6 Exceptions 128

6.9.3.1.7 Policies for Use 128

6.9.3.1.8 oneM2M Resource Interworking 128

6.9.3.2 deleteServiceSubscription 128

6.9.3.2.1 Description 128

6.9.3.2.2 Pre-Conditions 128

6.9.3.2.3 Signature – deleteServiceSubscription 128

6.9.3.2.4 Service Interactions 128

6.9.3.2.5 Post-Conditions 129

6.9.3.2.6 Exceptions 129

6.9.3.2.7 Policies for Use 129

6.9.3.2.8 oneM2M Resource Interworking 129

6.9.3.3 updateServiceSubscription 129

6.9.3.3.1 Description 129

6.9.3.3.2 Pre-Conditions 130

6.9.3.3.3 Signature – updateServiceSubscription 130

6.9.3.3.4 Service Interactions 130

6.9.3.3.5 Post-Conditions 130

6.9.3.3.6 Exceptions 130

6.9.3.3.7 Policies for Use 130

6.9.3.3.8 oneM2M Resource Interworking 131

6.9.3.4 addRoleToServiceSubscription 131

6.9.3.4.1 Description 131

6.9.3.4.2 Pre-Conditions 131

6.9.3.4.3 Signature – addRoleToServiceSubscription 131

6.9.3.4.4 Service Interactions 131

6.9.3.4.5 Post-Conditions 132

6.9.3.4.6 Exceptions 132

6.9.3.4.7 Policies for Use 132

6.9.3.4.8 oneM2M Resource Interworking 132

6.9.3.5 deleteRoleFromServiceSubscription 132

6.9.3.5.1 Description 132

6.9.3.5.2 Pre-Conditions 132

6.9.3.5.3 Signature – deleteRoleFromServiceSubscription 132

6.9.3.5.4 Service Interactions 132

6.9.3.5.5 Post-Conditions 133

6.9.3.5.6 Exceptions 133

6.9.3.5.7 Policies for Use 133

6.9.3.5.8 oneM2M Resource Interworking 133

6.9.3.6 getServiceSubscription 133

6.9.3.6.1 Description 133

6.9.3.6.2 Pre-Conditions 133

6.9.3.6.3 Signature – getServiceSubscription 133

6.9.3.6.4 Service Interactions 133

6.9.3.6.5 Post-Conditions 134

6.9.3.6.6 Exceptions 134

6.9.3.6.7 Policies for Use 134

6.9.3.6.8 oneM2M Resource Interworking 134

6.9.3.7 addNodeToServiceSubscription 134

6.9.3.7.1 Description 134

6.9.3.7.2 Pre-Conditions 134

6.9.3.7.3 Signature – addNodeToServiceSubscription 134

6.9.3.7.4 Service Interactions 134

6.9.3.7.5 Post-Conditions 135

6.9.3.7.6 Exceptions 135

6.9.3.7.7 Policies for Use 135

6.9.3.7.8 oneM2M Resource Interworking 135

6.9.3.8 deleteNodesFromServiceSubscription 135

6.9.3.8.1 Description 135

6.9.3.8.2 Pre-Conditions 135

6.9.3.8.3 Signature – deleteNodesFromServiceSubscription 135

6.9.3.8.4 Service Interactions 136

6.9.3.8.5 Post-Conditions 136

6.9.3.8.6 Exceptions 136

6.9.3.8.7 Policies for Use 136

6.9.3.8.8 oneM2M Resource Interworking 136

6.9.3.9 getNodesForServiceSubscription 136

6.9.3.9.1 Description 136

6.9.3.9.2 Pre-Conditions 136

6.9.3.9.3 Signature – getNodesForServiceSubscription 136

6.9.3.9.4 Service Interactions 137

6.9.3.9.5 Post-Conditions 137

6.9.3.9.6 Exceptions 137

6.9.3.9.7 Policies for Use 137

6.9.3.9.8 oneM2M Resource Interworking 137

6.9.3.10 createApplicationRule 137

6.9.3.10.1 Description 137

6.9.3.10.2 Pre-Conditions 138

6.9.3.10.3 Signature – createApplicationRule 138

6.9.3.10.4 Service Interactions 138

6.9.3.10.5 Post-Conditions 138

6.9.3.10.6 Exceptions 138

6.9.3.10.7 Policies for Use 138

6.9.3.10.8 oneM2M Resource Interworking 139

6.9.3.11 deleteApplicationRules 139

6.9.3.11.1 Description 139

6.9.3.11.2 Pre-Conditions 139

6.9.3.11.3 Signature - deleteApplicationRules 139

6.9.3.11.4 Service Interactions 139

6.9.3.11.5 Post-Conditions 139

6.9.3.11.6 Exceptions 139

6.9.3.11.7 Policies for Use 139

6.9.3.11.8 oneM2M Resource Interworking 140

6.9.3.12 getApplicationRules 140

6.9.3.12.1 Description 140

6.9.3.12.2 Pre-Conditions 140

6.9.3.12.3 Signature – getApplicationRules 140

6.9.3.12.4 Service Interactions 140

6.9.3.12.5 Post-Conditions 140

6.9.3.12.6 Exceptions 140

6.9.3.12.7 Policies for Use 140

6.9.3.12.8 oneM2M Resource Interworking 141

6.9.3.13 updateNodeForServiceSubscription 141

6.9.3.13.1 Description 141

6.9.3.13.2 Pre-Conditions 141

6.9.3.13.3 updateNodeForServiceSubscription 141

6.9.3.13.4 Service Interactions 141

6.9.3.13.5 Post-Conditions 142

6.9.3.13.6 Exceptions 142

6.9.3.13.7 Policies for Use 142

6.9.3.13.8 oneM2M Resource Interworking 142

6.9.3.14 updateApplicationRule 142

6.9.3.14.1 Description 142

6.9.3.14.2 Pre-Conditions 142

6.9.3.14.3 Signature – updateApplicationRule 142

6.9.3.14.4 Service Interactions 142

6.9.3.14.5 Post-Conditions 143

6.9.3.14.6 Exceptions 143

6.9.3.14.7 Policies for Use 143

6.9.3.14.8 oneM2M Resource Interworking 143

6.9.3.15 addReachabilitySchedule 143

6.9.3.15.1 Description 143

6.9.3.15.2 Pre-Conditions 143

6.9.3.15.3 Signature – addReachabilitySchedule 143

6.9.3.15.4 Service Interactions 143

6.9.3.15.5 Post-Conditions 144

6.9.3.15.6 Exceptions 144

6.9.3.15.7 Policies for Use 144

6.9.3.15.8 oneM2M Resource Interworking 144

6.9.3.16 updateReachabilitySchedule 144

6.9.3.16.1 Description 144

6.9.3.16.2 Pre-Conditions 144

6.9.3.16.3 Signature –updateReachabilitySchedule 144

6.9.3.16.4 Service Interactions 145

6.9.3.16.5 Post-Conditions 145

6.9.3.16.6 Exceptions 145

6.9.3.16.7 Policies for Use 145

6.9.3.16.8 oneM2M Resource Interworking 145

6.9.3.17 getReachabilitySchedule 145

6.9.3.17.1 Description 145

6.9.3.17.2 Pre-Conditions 146

6.9.3.17.3 Signature – getReachabilitySchedule 146

6.9.3.17.4 Service Interactions 146

6.9.3.17.5 Post-Conditions 146

6.9.3.17.6 Exceptions 146

6.9.3.17.7 Policies for Use 146

6.9.3.17.8 oneM2M Resource Interworking 146

6.9.3.18 deleteReachabilitySchedule 147

6.9.3.18.1 Description 147

6.9.3.18.2 Pre-Conditions 147

6.9.3.18.3 Signature – deleteReachabilitySchedule 147

6.9.3.18.4 Service Interactions 147

6.9.3.18.5 Post-Conditions 147

6.9.3.18.6 Exceptions 147

6.9.3.18.7 Policies for Use 147

6.9.3.18.8 oneM2M Resource Interworking 147

6.10 Event Collection 148

6.10.1 Overview 148

6.10.2 Event Collection Entities 148

6.10.2.1 Event Collection Types 148

6.10.2.1.1 Event Collection Record 148

6.10.2.1.2 Event Configuration Type 148

6.10.2.1.3 getEventCollectionPolicy Filter Criteria 148

6.10.2.1.4 getEventCollectionTriggers Filter Criteria 149

6.10.2.1.5 getEventRecords Filter Criteria 149

6.10.3 Service Capabilities 149

6.10.3.1 setEventCollectionPolicy 149

6.10.3.1.1 Description 149

6.10.3.1.2 Pre-Conditions 149

6.10.3.1.3 Signature – setEventCollectionPolicy 149

6.10.3.1.4 Post-Conditions 150

6.10.3.1.5 Exceptions 150

6.10.3.1.6 Policies for Use 150

6.10.3.1.7 Service Interactions 150

6.10.3.1.8 oneM2M Resource Interworking 150

6.10.3.2 getEventCollectionPolicy 150

6.10.3.2.1 Description 150

6.10.3.2.2 Pre-Conditions 151

6.10.3.2.3 Signature – getEventCollectionPolicy 151

6.10.3.2.4 Post-Conditions 151

6.10.3.2.5 Exceptions 151

6.10.3.2.6 Policies for Use 151

6.10.3.2.7 Service Interactions 151

6.10.3.2.8 oneM2M Resource Interworking 152

6.10.3.3 setEventCollectionTriggers 152

6.10.3.3.1 Description 152

6.10.3.3.2 Pre-Conditions 153

6.10.3.3.3 Signature - setEventCollectionTriggers 153

6.10.3.3.4 Post-Conditions 153

6.10.3.3.5 Exceptions 153

6.10.3.3.6 Policies for Use 153

6.10.3.3.7 Service Interactions 153

6.10.3.3.8 oneM2M Resource Interworking 154

6.10.3.4 getEventCollectionTriggers 154

6.10.3.4.1 Description 154

6.10.3.4.2 Pre-Conditions 154

6.10.3.4.3 Signature – getEventCollectionTriggers 154

6.10.3.4.4 Post-Conditions 154

6.10.3.4.5 Exceptions 154

6.10.3.4.6 Policies for Use 155

6.10.3.4.7 Service Interactions 155

6.10.3.4.8 oneM2M Resource Interworking 155

6.10.3.5 recordEvent 155

6.10.3.5.1 Description 155

6.10.3.5.2 Pre-Conditions 156

6.10.3.5.3 Signature - recordEvent 156

6.10.3.5.4 Post-Conditions 156

6.10.3.5.5 Exceptions 156

6.10.3.5.6 Policies for Use 156

6.10.3.5.7 Service Interactions 156

6.10.3.5.8 oneM2M Resource Interworking 157

6.10.3.6 getEventRecords 157

6.10.3.6.1 Description 157

6.10.3.6.2 Pre-Conditions 157

6.10.3.6.3 Signature – getEventRecords 157

6.10.3.6.4 Post-Conditions 157

6.10.3.6.5 Exceptions 157

6.10.3.6.6 Policies for Use 157

6.10.3.6.7 Service Interactions 157

6.10.3.6.8 oneM2M Resource Interworking 158

6.11 Registration 158

6.11.1 Overview 158

6.11.2 Service Capabilities 159

6.11.2.1 registerAE 159

6.11.2.1.1 Description 159

6.11.2.1.2 Pre-Conditions 159

6.11.2.1.3 Signature – registerAE 159

6.11.2.1.4 Services Interaction 159

6.11.2.1.5 Post-Conditions 160

6.11.2.1.6 Exceptions 160

6.11.2.1.7 Policies for Use 160

6.11.2.1.8 oneM2M Resource Interworking 160

6.11.2.2 refreshAERegistration 161

6.11.2.2.1 Description 161

6.11.2.2.2 Pre-Conditions 161

6.11.2.2.3 Signature – refreshAERegistration 161

6.11.2.2.4 Service Interactions 161

6.11.2.2.5 Post-Conditions 162

6.11.2.2.6 Exceptions 162

6.11.2.2.7 Policies for Use 162

6.11.2.2.8 oneM2M Resource Interworking 162

6.11.2.3 deregisterAE 162

6.11.2.3.1 Description 162

6.11.2.3.2 Pre-Conditions 162

6.11.2.3.3 Signature - deregisterAE 162

6.11.2.3.4 Service Interactions 162

6.11.2.3.5 Post-Conditions 163

6.11.2.3.6 Exceptions 163

6.11.2.3.7 oneM2M Resource Interworking 163

6.12 Registration Administration 163

6.12.1 Overview 163

6.12.2 Service Capabilities 164

6.12.2.1 getRegistrationStatus 164

6.12.2.1.1 Description 164

6.12.2.1.2 Pre-Conditions 164

6.12.2.1.2 Signature - getRegistrationStatus 164

6.12.2.1.4 Service Interaction 164

6.12.2.1.5 Post-Conditions 164

6.12.2.1.6 Exceptions 164

6.12.2.1.7 Policies for Use 164

6.12.2.1.8 oneM2M Resource Interworking 165

6.12.2.2 revokeAERegistration 165

6.12.2.2.1 Description 165

6.12.2.2.2 Pre-Conditions 165

6.12.2.2.3 Signature - revokeAERegistration 165

6.12.2.2.4 Service Interaction 165

6.12.2.2.5 Post-Conditions 166

6.12.2.2.6 Exceptions 166

6.12.2.2.7 Policies for Use 166

6.12.2.2.8 oneM2M Resource Interworking 166

6.12.2.3 subscribeInitialAERegistrationEvent 166

6.12.2.3.1 Description 166

6.12.2.3.2 Pre-Conditions 166

6.12.2.3.3 Signature - subscribeInitialAERegistrationEvent 166

6.12.2.3.4 Service Interaction 166

6.12.2.3.5 Post-Conditions 167

6.12.2.3.6 Exceptions 167

6.12.2.3.7 Policies for Use 167

6.12.2.3.8 oneM2M Resource Interworking 167

6.12.2.4 unsubscribeInitialAERegistrationEvent 167

6.12.2.4.1 Description 167

6.12.2.4.2 Pre-Conditions 167

6.12.2.4.3 Signature – unsubcribeInitialAERegistrationEvent 167

6.12.2.4.4 Service Interaction 168

6.12.2.4.5 Post-Conditions 168

6.12.2.4.6 Exceptions 168

6.12.2.4.7 Policies for Use 168

6.12.2.4.8 oneM2M Resource Interworking 168

7 M2M Service Components 169

7.1 Introduction 169

7.2 Service Component Interaction Cross Reference 169

7.3 Infrastructure Component (INF) 169

7.3.1 introduction 169

7.3.2 INF to Service Cross Reference 169

7.4 Service Subscription Component (SSUB) 169

7.4.1 Introduction 169

7.4.2 SSUB to Service Cross Reference 170

7.5 Transport Adapter (TRA) 170

7.5.1 Introduction 170

7.5.2 TRA to Service Cross Reference 170

7.6 Accounting (ACC) 170

7.6.1 Introduction 170

7.6.2 Accounting to Service Cross Reference 170

7.7 Service Exposure (SE) 170

7.7.1 Introduction 170

7.7.2 Service Exposure to Service Cross Reference 170

7.8 Management Adapter (MA) 171

7.8.1 Introduction 171

7.8.2 Management Adapter to Service Cross Reference 171

7.9 Device Management (DM) 171

7.9.1 Introduction 171

7.9.2 Device Management to Service Cross Reference 171

Annex A (informative): Common Request Processing 172

A.1 Overview 172

A.2 Mca Common Request Processing 172

A.2.1 Introduction 172

A.2.2 Mca Common Request Parameters (normative) 172

A.2.3 Authentication and Authorization of Requests 172

A.2.3.1 Description 172

A.2.3.2 Pre-Conditions 173

A.2.3.2 Common M2M Service Capability Parameters for Request Authentication and Authorization 173

A.2.3.3 Service Interactions 173

A.2.3.4 Post-Conditions 174

A.2.3.5 Exceptions 174

A.2.3.6 Policies for Use 174

A.3 Msc Common Request Processing 174

A.3.1 Introduction 174

A.3.2 Msc Common Request Data Types (normative) 174

A.4 Common Entity Attributes 175

A.4.1 Introduction 175

A.4.2 System Generated Attributes (normative) 175

A.4.3 User Defined Discovery Attributes (normative) 175

A.5 Using Filter Criteria 175

Annex B (informative): Data Exchange Services 176

B.1 Overview 176

B.2 Supporting Services 176

B.2.1 Subscribe-Publish-Notify Message Exchange 176

B.2.1.1 Overview 176

B.2.1.2 Service Capabilities 176

B.2.1.2.1 subscribeRequest 176

B.2.1.2.1.1 Description 176

B.2.1.2.1.2 Pre-Conditions 176

B.2.1.2.1.3 Signature – subscribeRequest 176

B.2.1.2.1.4 Service Interactions 176

B.2.1.2.1.5 Post-Conditions 177

B.2.1.2.1.6 Exceptions 177

B.2.1.2.1.7 Policies for Use 177

B.2.1.2.2 subscribeComplete 177

B.2.1.2.2.1 Description 177

B.2.1.2.2.2 Pre-Conditions 178

B.2.1.2.2.3 Signature – subscribeComplete 178

B.2.1.2.2.4 Service Interactions 178

B.2.1.2.2.5 Post-Conditions 178

B.2.1.2.2.6 Exceptions 178

B.2.1.2.2.7 Policies for Use 178

B.2.1.2.3 publishRequest 178

B.2.1.2.3.1 Description 178

B.2.1.2.3.2 Pre-Conditions 179

B.2.1.2.3.3 Signature – publishRequest 179

B.2.1.2.3.4 Service Interactions 179

B.2.1.2.3.5 Post-Conditions 180

B.2.1.2.3.6 Exceptions 180

B.2.1.2.3.7 Policies for Use 180

B.2.1.2.4 publishComplete 180

B.2.1.2.4.1 Description 180

B.2.1.2.4.2 Pre-Conditions 181

B.2.1.2.4.3 Signature – publishComplete 181

B.2.1.2.4.4 Service Interactions 181

B.2.1.2.4.5 Post-Conditions 181

B.2.1.2.4.6 Exceptions 181

B.2.1.2.4.7 Policies for Use 181

B.2.1.2.5 notifyRequest 181

B.2.1.2.5.1 Description 181

B.2.1.2.5.2 Pre-Conditions 182

B.2.1.2.5.3 Signature – notifyRequest 182

B.2.1.2.5.4 Service Interactions 182

B.2.1.2.5.5 Post-Conditions 183

B.2.1.2.5.6 Exceptions 183

B.2.1.2.5.7 Policies for Use 183

B.2.1.2.6 notifyComplete 183

B.2.1.2.6.1 Description 183

B.2.1.2.6.2 Pre-Conditions 183

B.2.1.2.6.3 Signature - notifyComplete 183

B.2.1.2.6.4 Service Interactions 183

B.2.1.2.6.5 Post-Conditions 183

B.2.1.2.6.6 Exceptions 183

B.2.1.2.6.7 Policies for Use 183

B.2.2 Request-Response Message Exchange 184

B.2.2.1 Overview 184

B.2.2.2 Service Capabilities 184

B.2.2.2.1 sendMessageRequest 184

B.2.2.2.1.1 Description 184

B.2.2.2.1.2 Pre-Conditions 184

B.2.2.2.1.3 Signature – sendMessageRequest 184

B.2.2.2.1.4 Service Interactions 184

B.2.2.2.1.5 Post-Conditions 185

B.2.2.2.1.6 Exceptions 185

B.2.2.2.1.7 Policies for Use 185

B.2.2.2.2 sendMessageComplete 185

B.2.2.2.2.1 Description 185

B.2.2.2.2.2 Pre-Conditions 186

B.2.2.2.2.3 Signature - sendMessageComplete 186

B.2.2.2.2.4 Service Interactions 186

B.2.2.2.2.5 Post-Conditions 186

B.2.2.2.2.6 Exceptions 186

B.2.2.2.2.7 Policies for Use 186

Annex C (informative): Service Subscription Administration Services 187

C.1 Overview 187

C.2 Supporting Services 187

C.2.1 Overview 187

C.2.2 Service Capabilities 187

C.2.2.1 getServiceSubscription 187

C.2.2.1.1 Description 187

C.2.2.1.2 Pre-Conditions 187

C.2.2.1.3 Signature – getServiceSubscription 187

C.2.2.1.4 Service Interactions 187

C.2.2.1.5 Post-Conditions 188

C.2.2.1.6 Exceptions 188

C.2.2.1.7 Policies for Use 188

C.2.2.2 addNodeToServiceSubscription 188

C.2.2.2.1 Description 188

C.2.2.2.2 Pre-Conditions 189

C.2.2.2.3 Signature – addNodeToServiceSubscription 189

C.2.2.2.4 Service Interactions 189

C.2.2.2.5 Post-Conditions 190

C.2.2.2.6 Exceptions 190

C.2.2.2.7 Policies for Use 190

C.2.2.3 deleteNodesFromServiceSubscription 190

C.2.2.3.1 Description 190

C.2.2.3.2 Pre-Conditions 190

C.2.2.3.3 Signature – deleteNodesFromServiceSubscription 190

C.2.2.3.4 Service Interactions 190

C.2.2.3.5 Post-Conditions 191

C.2.2.3.6 Exceptions 191

C.2.2.3.7 Policies for Use 191

C.2.2.4 getNodesForServiceSubscription 191

C.2.2.4.1 Description 191

C.2.2.4.2 Pre-Conditions 192

C.2.2.4.3 Signature – getNodesForServiceSubscription 192

C.2.2.4.4 Service Interactions 192

C.2.2.4.5 Post-Conditions 193

C.2.2.4.6 Exceptions 193

C.2.2.4.7 Policies for Use 193

C.2.2.5 createApplicationRule 193

C.2.2.5.1 Description 193

C.2.2.5.2 Pre-Conditions 193

C.2.2.5.3 Signature – createApplicationRule 193

C.2.2.5.4 Service Interactions 193

C.2.2.5.5 Post-Conditions 194

C.2.2.5.6 Exceptions 194

C.2.2.5.7 Policies for Use 194

C.2.2.6 deleteApplicationRules 194

C.2.2.6.1 Description 194

C.2.2.6.2 Pre-Conditions 195

C.2.2.6.3 Signature – deleteApplicationRules 195

C.2.2.6.4 Service Interactions 195

C.2.2.6.5 Post-Conditions 196

C.2.2.6.6 Exceptions 196

C.2. 2.6.7 Policies for Use 196

C.2.2.7 getApplicationRules 196

C.2.2.7.1 Description 196

C.2.2.7.2 Pre-Conditions 196

C.2.2.7.3 Signature – getApplicationRules 196

C.2.2.7.4 Service Interactions 196

C.2.2.7.5 Post-Conditions 197

C.2.2.7.6 Exceptions 197

C.2.2.7.7 Policies for Use 197

C.2.2.8 updateApplicationRule 197

C.2.2.8.1 Description 197

C.2.2.8.2 Pre-Conditions 198

C.2.2.8.3 Signature – updateApplicationRule 198

C.2.2.8.4 Service Interactions 198

C.2.2.8.5 Post-Conditions 199

C.2.2.8.6 Exceptions 199

C.2.2.8.7 Policies for Use 199

C.2.2.9 updateNodeForServiceSubscription 199

C.2.2.9.1 Description 199

C.2.2.9.2 Pre-Conditions 200

C.2.2.9.3 Signature – updateNodeForServiceSubscription 200

C.2.2.9.4 Service Interactions 200

C.2.2.9.5 Post-Conditions 201

C.2.2.9.6 Exceptions 201

C.2.2.9.7 Policies for Use 201

Annex D (informative): Device Management Services 202

D.1 Overview 202

D.2 Supporting Services 202

D.2.1 Overview 202

D.2.2 Service Capabilities 202

D.2.2.1 downloadFirmware 202

D.2.2.1.1 Description 202

D.2.2.1.2 Pre-Conditions 202

D.2.2.1.3 Signature – downloadFirmware 202

D.2.2.1.4 Service Interactions 202

D.2.2.1.5 Post-Conditions 203

D.2.2.1.6 Exceptions 203

D.2.2.1.7 Policies for Use 203

D.2.2.2 installFirmware 203

D.2.2.2.1 Description 203

D.2.2.2.2 Pre-Conditions 203

D.2.2.2.3 Signature – installFirmware 204

D.2.2.2.4 Service Interactions 204

D.2.2.2.5 Post-Conditions 204

D.2.2.2.6 Exceptions 204

D.2.2.2.7 Policies for Use 204

D.2.2.3 getFirmwareInformation 205

D.2.2.3.1 Description 205

D.2.2.3.2 Pre-Conditions 205

D.2.2.3.3 Signature – getFirmwareInformation 205

D.2.2.3.4 Service Interactions 205

D.2.2.3.5 Post-Conditions 206

D.2.2.3.6 Exceptions 206

D.2.2.3.7 Policies for Use 206

D.2.2.4 getFirmwareExecStatus 206

D.2.2.4.1 Description 206

D.2.2.4.2 Pre-Conditions 206

D.2.2.4.3 Signature – getFirmwareExecStatus 206

D.2.2.4.4 Service Interactions 206

D.2.2.4.5 Post-Conditions 207

D.2.2.4.6 Exceptions 207

D.2.2.4.7 Policies for Use 207

D.2.2.5 deviceManagementReport 207

D.2.2.5.1 Description 207

D.2.2.5.2 Pre-Conditions 207

D.2.2.5.3 Signature –deviceManagementReport 208

D.2.2.5.4 Service Interactions 208

D.2.2.5.5 Post-Conditions 208

D.2.2.5.6 Exceptions 209

D.2.2.5.7 Policies for Use 209

D.2.2.6 upgradeFirmware 209

D.2.2.6.1 Description 209

D.2.2.6.2 Pre-Conditions 209

D.2.2.6.3 Signature – upgradeFirmware 209

D.2.2.6.4 Service Interactions 209

D.2.2.6.5 Post-Conditions 210

D.2.2.6.6 Exceptions 210

D.2.2.6.7 Policies for Use 210

D.2.2.7 getDeviceInformation 210

D.2.2.7.1 Description 210

D.2.2.7.2 Pre-Conditions 211

D.2.2.7.3 Signature – getDeviceInformation 211

D.2.2.7.4 Service Interactions 211

D.2.2.7.5 Post-Conditions 211

D.2.2.7.6 Exceptions 212

D.2.2.7.7 Policies for Use 212

D.2.2.8 getDeviceCapabilities 212

D.2.2.8.1 Description 212

D.2.2.8.2 Pre-Conditions 212

D.2.2.8.3 Signature – getDeviceCapabilities 212

D.2.2.8.4 Service Interactions 212

D.2.2.8.5 Post-Conditions 213

D.2.2.8.6 Exceptions 213

D.2.2.8.7 Policies for Use 213

D.2.2.9 enableDeviceCapability 213

D.2.2.9.1 Description 213

D.2.2.9.2 Pre-Conditions 213

D.2.2.9.3 Signature – enableDeviceCapability 214

D.2.2.9.4 Service Interactions 214

D.2.2.9.5 Post-Conditions 214

D.2.2.9.6 Exceptions 214

D.2.2.9.7 Policies for Use 214

D.2.2.10 disableDeviceCapability 215

D.2.2.10.1 Description 215

D.2.2.10.2 Pre-Conditions 215

D.2.2.10.3 Signature – disableDeviceCapability 215

D.2.2.10.4 Service Interactions 215

D.2.2.10.5 Post-Conditions 216

D.2.2.10.6 Exceptions 216

D.2.2.10.7 Policies for Use 216

D.2.2.11 getAreaNetworks 216

D.2.2.11.1 Description 216

D.2.2.11.2 Pre-Conditions 216

D.2.2.11.3 Signature – getAreaNetworks 216

D.2.2.11.4 Service Interactions 216

D.2.2.11.5 Post-Conditions 217

D.2.2.11.6 Exceptions 217

D.2.2.11.7 Policies for Use 217

D.2.2.12 updateDeviceForAreaNetwork 217

D.2.2.12.1 Description 217

D.2.2.12.2 Pre-Conditions 217

D.2.2.12.3 Signature –updateDeviceForAreaNetwork 218

D.2.2.12.4 Service Interactions 218

D.2.2.12.5 Post-Conditions 218

D.2.2.12.6 Exceptions 218

D.2.2.12.7 Policies for Use 219

D.2.2.13 rebootDevice 219

D.2.2.13.1 Description 219

D.2.2.13.2 Pre-Conditions 219

D.2.2.13.3 Signature – rebootDevice 219

D.2.2.13.4 Service Interactions 219

D.2.2.13.5 Post-Conditions 220

D.2.2.13.6 Exceptions 220

D.2.2.13.7 Policies for Use 220

D.2.2.14 resetDevice 220

D.2.2.14.1 Description 220

D.2.2.14.2 Pre-Conditions 220

D.2.2.14.3 Signature –resetDevice 220

D.2.2.14.4 Service Interactions 221

D.2.2.14.5 Post-Conditions 221

D.2.2.14.6 Exceptions 221

D.2.2.14.7 Policies for Use 221

D.2.2.15 uploadDeviceLog 221

D.2.2.15.1 Description 221

D.2.2.15.2 Pre-Conditions 221

D.2.2.15.3 Signature –uploadDeviceLog 222

D.2.2.15.4 Service Interactions 222

D.2.2.15.5 Post-Conditions 222

D.2.2.15.6 Exceptions 222

D.2.2.15.7 Policies for Use 222

D.2.2.16 getDeviceLogs 223

D.2.2.16.1 Description 223

D.2.2.16.2 Pre-Conditions 223

D.2.2.16.3 Signature – getDeviceLogs 223

D.2.2.16.4 Service Interactions 223

D.2.2.16.5 Post-Conditions 224

D.2.2.16.6 Exceptions 224

D.2.2.16.7 Policies for Use 224

D.2.2.17 getDeviceLogInformation 224

D.2.2.17.1 Description 224

D.2.2.17.2 Pre-Conditions 224

D.2.2.17.3 Signature – getDeviceLogInformation 224

D.2.2.17.4 Service Interactions 224

D.2.2.17.5 Post-Conditions 225

D.2.2.17.6 Exceptions 225

D.2.2.17.7 Policies for Use 225

D.2.2.18 getSoftwareInformation 225

D.2.2.18.1 Description 225

D.2.2.18.2 Pre-Conditions 225

D.2.2.18.3 Signature – getSoftwareInformation 226

D.2.2.18.4 Service Interactions 226

D.2.2.18.5 Post-Conditions 226

D.2.2.18.6 Exceptions 226

D.2.2.18.7 Policies for Use 227

D.2.2.19 downloadSoftware 227

D.2.2.19.1 Description 227

D.2.2.19.2 Pre-Conditions 227

D.2.2.19.3 Signature – downloadSoftware 227

D.2.2.19.4 Service Interactions 227

D.2.2.19.5 Post-Conditions 228

D.2.2.19.6 Exceptions 228

D.2.2.19.7 Policies for Use 228

D.2.2.20 installSoftware 228

D.2.2.20.1 Description 228

D.2.2.20.2 Pre-Conditions 228

D.2.2.20.3 Signature –installSoftware 229

D.2.2.20.4 Service Interactions 229

D.2.2.20.5 Post-Conditions 229

D.2.2.20.6 Exceptions 229

D.2.2.20.7 Policies for Use 229

D.2.2.21 activateSoftware 230

D.2.2.21.1 Description 230

D.2.2.21.2 Pre-Conditions 230

D.2.2.21.3 Signature – activateSoftware 230

D.2.2.21.4 Service Interactions 230

D.2.2.21.5 Post-Conditions 231

D.2.2.21.6 Exceptions 231

D.2.2.21.7 Policies for Use 231

D.2.2.22 deactivateSoftware 231

D.2.2.22.1 Description 231

D.2.2.22.2 Pre-Conditions 231

D.2.2.22.3 Signature – deactivateSoftware 231

D.2.2.22.4 Service Interactions 231

D.2.2.22.5 Post-Conditions 232

D.2.2.22.6 Exceptions 232

D.2.2.22.7 Policies for Use 232

D.2.2.23 removeSoftware 232

D.2.2.23.1 Description 232

D.2.2.23.2 Pre-Conditions 232

D.2.2.23.3 Signature – removeSoftware 233

D.2.2.23.4 Service Interactions 233

D.2.2.23.5 Post-Conditions 233

D.2.2.23.6 Exceptions 233

D.2.2.23.7 Policies for Use 233

Annex E (informative): Device On-boarding Service 235

E.1 Overview 235

E.2 Supporting Services 235

E.2.1 Remote Administration 235

E.2.1.1 Overview 235

E.2.1.2 Service Capabilities 235

E.2.1.1.1 notifyRegistrationContact 235

E.2.1.1.1.1 Description 235

E.2.1.1.1.2 Pre-Conditions 235

E.2.1.1.1.3 Signature – notifyRegistrationContact 235

E.2.1.1.1.4 Service Interactions 235

E.2.1.1.1.5 Post-Conditions 236

E.2.1.1.1.6 Exceptions 236

E.2.1.1.1.7 Policies for Use 236

Annex F (informative): Registration Services 237

F.1 Overview 237

F.2 Mca Registration Service Processing and Supporting Services 237

F.2.1 Overview 237

F.2.2 Service Capabilities 237

F.2.2.1 registerAE 237

F.2.2.1.1 Description 237

F.2.2.1.2 Pre-Conditions 237

F.2.2.1.3 Signature – registerAE 237

F.2.2.1.4 Service Interactions 237

F.2.2.1.4 Post-Conditions 238

F.2.2.1.5 Exceptions 238

F.2.2.1.6 Policies for Use 238

F.2.2.2 refreshAERegistration 238

F.2.2.2.1 Description 238

F.2.2.2.2 Pre-Conditions 239

F.2.2.2.3 Signature – refreshAERegsitration 239

F.2.2.2.4 Service Interactions 239

F.2.2.2.5 Post-Conditions 240

F.2.2.2.6 Exceptions 240

F.2.2.2.7 Policies for Use 240

F.2.2.3 deregisterAE 240

F.2.2.3.1 Description 240

F.2.2.3.2 Pre-Conditions 240

F.2.2.3.3 Signature – deregisterAE 240

F.2.2.3.4 Service Interactions 240

F.2.2.3.5 Post-Conditions 241

F.2.2.3.6 Exceptions 241

F.2.2.3.6 Policies for Use 241

Annex G (informative): M2M Service Capability Template 242

G.1 Introduction 242

G.2 <serviceCapabilityName> 242

G.2.1 Description 242

G.2.2 Pre-Conditions 242

G.2.3 Signature 242

G.2.4 Service Interactions 242

G.2.5 Post-Conditions 242

G.2.6 Exceptions 243

G.2.7 Policies for Use 243

G.2.8 oneM2M Resource Interworking 243

Annex H (informative): oneM2M Service Requirements 244

History 245

# 1 Scope

The present document describes the M2M Services provided by the oneM2M Services Platform, the integration and interworking of the M2M Services functional architecture of the oneM2M Services Platform and informatively illustrates the use of the M2M Services within the context of complex business services.

# 2 References

## 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non‑specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

The following referenced documents are necessary for the application of the present document.

[1] oneM2M TS-0002: "oneM2M Requirements".

[2] oneM2M TS-0001: "oneM2M Functional Architecture".

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non‑specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] oneM2M Drafting Rules.

NOTE: Available at <http://member.onem2m.org/Static_pages/Others/Rules_Pages/oneM2M-Drafting-Rules-V1_0.doc>.

[i.2] W3C [WD-wsdl20-patterns-20040326](http://www.w3.org/TR/2004/WD-wsdl20-patterns-20040326):"Web Services Description Language (WSDL) Version 2.0 Part 2: Message Exchange Patterns".

[i.3] OASIS [soa-rm](http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf): "Reference Model for Service Oriented Architecture 1.0".

[i.4] oneM2M TS-0003: "oneM2M Security Solutions".

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions apply:

**M2M Service:** A Service that creates added-value to the providing M2M Service Platform and is consumed by one or more Supporting Services.

NOTE: The Data Exchange Service is an example of a M2M Service.

**M2M Service Capability:** Service Capability that is identified within the M2M Service Platform

**M2M Service Registration:** when a Service is deployed into a SOA environment; the SOA environment's Service Registry is updated so that the Service can be accessed by other Services

**Proprietary Reference Point:** Reference Point as defined in Functional Architecture [2] where the realization of the communication flows are implementation specific

**Service:** mechanism to enable access to one or more Service Capabilities, where the access is provided using a prescribed interface and is exercised consistent with constraints and policies as specified by the service description **[**i.3**]**

**Service Capability:** real-world effect that a service provider is able to provide to a service consumer [i.3]

**Service Cluster:** collection of distributed and related Services that are gathered to solve a business problem

**Service Component:** entity of the M2M Services Architecture which may contain one or more M2M Services

**Service Execution Environment:** Execution Environment is a logical entity that represents an environment capable of running Services

**Service Exposure Component:** Service Component that provides an enforcement point for specific oneM2M Reference Points (e.g. Mca, Mcn, Mcc')

**Service Registry:** component of an underlying SOA environment that maintains information about Services and provides facilities to publish and discover Services to entities that would utilize the Service

**Supporting Service:** A Service that creates added-value to an organization and is relevant to the business process of the organization that consumes Services from the M2M Services Platform.

NOTE: Supporting Services are typically complex, orchestrated Services which consume M2M Services among other Services. A Device Onboarding Service is an example of a Supporting Service.

## 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACC Accounting

AE Application Entity

AE-ID Application Entity Identifier

AMQP Advanced Message Queuing Protocol

ASP Application Service Provider

BSS Business Support System

CDMA Code Division Mupltiple Access

CSE Common Service Entity

DM Device Management

EDGE Enhanced Data Rates for Global Evolution

ESB Enterprise Service Bus

GPS Global Positioning System

GNSS Global Navigation Satellite System

INF Infrastructure

JMS Java Message Service

LAN Local Area Network

MA Management Agent

M2M Machine-to-Machine

M2M-Serv-Cap-ID M2M Service Capability Identifier

MEP Message Exchange Pattern

MQTT Message Queuing Telemetry Transport

NFC Near Field Communication

NMS Network Management System

NSE Network Service Exposure

OSS Operational Support System

POA Point of Attachment

SEE Service Execution Environment

SE Service Exposure

SEA Security Association Endpoint

SOA Service Oriented Architecture

SP Service Provider

SSUB Service Subscription

TRA Transport Adapter

UPA Universal Powerline Association

URL Universal Resource Language

USB Universal Serial Bus

WCDMA Wideband Code Division Mupltiple Access

WLAN Wireless Local Area Network

WSDL Web Service Description Language

XMPP Extensible Messaging and Presence Protocol

# 4 Conventions

The keywords "Shall", "Shall not", "May", "Need not", "Should", "Should not" in the present document are to be interpreted as described in the oneM2M Drafting Rules [i.1].

## 5 M2M Services Architecture5.1 Introduction

This clause describes the architecture the M2M Services within the context of the M2M Services Platform.

The architecture of the M2M Service Platform as defined in the oneM2M Functional Architecture [2] includes an entity described as the Common Service Entity (CSE). The CSE comprises a set of service functions that are common to the M2M environment and are exposed through the Mca and Mcc' Reference Points. These Reference Points are described in the oneM2M Functional Architecture [2]. The M2M Service Architecture described in this specification is primarily suitable for the Infrastructure Domain where the CSE is viewed as a set of Service Components.

The M2M Service Architecture augments the oneM2M Functional Architecture by specifying M2M Services provided to M2M Application and M2M Service Providers.

These M2M Services are consumed by:

* AEs across the Mca Reference Point via the Service Exposure Component
* Other Infrastructure CSEs across the Mcc' Reference Point via the Remote Service Exposure Component
* Other Service Components across the Msc Reference Point

These M2M Services utilize services of the:

* Underlying Network across the Mcn Reference Point via the Network Service Utilization Component



Figure 5.1-1: oneM2M Services Architecture

The oneM2M Services architecture in Figure 5.1-1 comprises of the following entities:

1. **Application Entity (AE):** Defined by the oneM2M Functional Architecture [2], the Application Entity provides Application logic for the end-to-end M2M solutions.
2. **Common Services Entity (CSE):** Defined by the oneM2M Functional Architecture [2], a Common Services Entity comprises the set of "service functions" that are common to the M2M environments and specified by oneM2M. For oneM2M Services, this definition of a CSE is a logical representation where "service functions" that are exposed through the Mca and Mcc' Reference Points via the corresponding Service Exposure and Remote Service Exposure Components and the Network Service Utilization Component utilizes services of the Underlying Network through the Mcn referent point. In addition Service Components consume and provide M2M Services with other Service Components.

As a logical representation of loosely coupled Service Components, the CSE is entity that in itself is identifiable but not directly addressable. Instead the addressable entities are the corresponding M2M Service Capabilities within the Service Exposure Components of the Reference Points.

* **Service Exposure Component**: The Service Exposure Component exposes M2M Service Capabilities to AEs.
* **Network Service Utilization Component**: The Network Service Utilization Component consumes Service Capabilities from the NSE.
* **Remote Service Exposure Component**: The Remote Service Exposure connects M2M Service Capabilities from different M2M environments.

The Service Exposure, Network Service Utilization and Remote Service Exposure Components follow the CSE Public Domain Names convention described in clause 6.5.1.1 of the Functional Architecture [2] but are extended as a sub-domain of the Infrastructure Node public domain name.

## 5.2 Reference Points

### 5.2.1 Introduction

The M2M Service Architecture exposes M2M Services across the Mca and Msc Reference Points. The enhancement of the Mcc and Mcc' Reference Point to expose M2M Services through the Remote Service Exposure Component is FFS. Likewise the Service Capabilities consumed from the NSE are FFS.

### 5.2.2 Mca Reference Point

The Mca Reference Point is defined within the oneM2M Functional Architecture [2]. This specification defines a set of service oriented capabilities that is used for the communication flow between the M2M Service Platform and the AE.

NOTE: In this specification, when an AE uses the Data Exchange M2M Service Capabilities defined in this specification across the Mca Reference Point, the CSE transmits the payload through the M2M Service Platform; offering additional M2M Services (e.g. Authorization, Event Collection) associated with the transmittal of the payload.

### 5.2.3 Msc Reference Point

The Msc Reference Point is a Proprietary Reference Point that specifies set of interactions between the Service Capabilities of different Service Components.

### 5.2.3.1 Message Exchange Patterns

Communication between M2M Service Components which pass over the Msc Reference Point utilizes a web services approach, e.g. Web Services Message Exchange Patterns (MEP) defined by WSDL []:

* In-Only
* Robust In-Only
* In-Out
* In-Optional-Out
* Out-Only
* Robust Out-Only
* Out-In
* Out-Optional-In



Figure 5.2.3.1-1: Message Exchange Patterns

The MEP(s) utilized by a M2M Service Capability is documented within the Service Capabilities Policy clause.

NOTE: A subset of the MEPs provided by a M2M Service Capability would be exposed by the Service Exposure Component or the Remote Service Exposure Component.

#### 5.2.3.2 M2M Identifiers

##### 5.2.3.2.1 M2M Service Capability Identifier (M2M-Serv-Cap-ID)

Service Components contain multiple M2M Services (M2M-Serv-ID). Each M2M Service contains multiple M2M Service Capabilities. The M2M Service Capability Identifier is assigned to each M2M Service Capability.

Table 5.2.3.2.1-1: M2M Service Capability Identifier

| Identifier | Assigned by | Assigned to | Assigned during | Lifetime | Uniqueness | Used during | Remarks |
| --- | --- | --- | --- | --- | --- | --- | --- |
| M2M Service Capability Identifier | M2M SP | M2M Service Capability | M2M Service Registration.  This is the identifier from the Services Registry. | Life of the M2M Service Registration. | Global | Message exchange between Service Components across the Msc and Mcc'.  Message exchange across the Mca. |  |

### 5.2.4 Mcc' Reference Point

The Mcc' Reference Point is defined within the oneM2M Functional Architecture [2]. The oneM2M Service Architecture utilizes communications over the Mcc' Reference Point to construct a Service Cluster for service sharing and capacity expansion. A messaging exchange protocol (e.g. AMQP, XMPP, JMS) between two service execution environments (SEE) (e.g. ESB, Apache Service Mix) accommodates the SEEs with same and different ownership.

NOTE: The M2M Service Capabilities that are exposed across the Mcc' Reference Point is FFS. Likewise, the protocol used for communication between SEEs with different ownership may require additional security capabilities and is FFS.

### 5.2.5 Mcn Reference Point

The Mcn Reference Point is defined within the oneM2M Functional Architecture [2].

NOTE: The Service Capabilities that are consumed across the Mcn Reference Point is FFS.

## 5.3 Configurations support by M2M Service Architecture

M2M Services exposed across the Mca, Mcn, Mcc' and Msc reference are supported for Infrastructure Nodes as defined in the oneM2M Functional Architecture [2].

## 6 M2M Services6.1 Introduction

This clause describes the M2M Services provided by the M2M Services Platform.. The M2M Services defined in this clause are utilized by the Supporting Services described in the Annexes of the present document.



Figure 6.1-1: M2M Services

## 6.2 Service Subscription

### 6.2.1 Overview

The Service Subscription service provides the ability to:

* Validate the M2M Service Capabilities (e.g. requests, notifications) that go across the Mca Reference Point by ensuring M2M Service requested by the originator is permitted within the context of the M2M Service Subscription
* Retrieve the Application Entity and associated M2M Service Subscription for the Application Entity
* Assist in returning the Broker and Transport Adapter service instances needed to exchange data for data exchange service capabilities
* Assist in returning the Management Adapter service instance needed to manage the device

### 6.2.2 M2M Service Subscription Entities

#### 6.2.2.1 Overview

The following diagram describes the associations between the AE, Service Roles and the M2M Service Capabilities to obtain an Application Entity and validate the M2M Service Subscription:

* The M2M Service Subscription(s) for a specified M2M Service Capability is validated through the associations the Service Role has to the M2M Service Capability and M2M Service Subscription
* The Application Entity and associated M2M Service Subscription is obtained through the Application Entity's to the M2M Service Subscription that is created during registration of the Application Entity



Figure 6.2.2.1-1: Service Subscription Entity Relationships

#### 6.2.2.2 M2M Service Subscription Broker Entities

In the present document. Brokers are used to exchange data between AEs where the AEs use the publish-subscribe data exchange pattern. Brokers are typically implemented using types of Message Queue technologies (e.g. MQTT, XMPP).

The following diagram describes the associations between the AE, M2M Service Subscription, M2M Service Capability and the Broker resource in order to obtain the Broker used to exchange the data:

* The Broker is obtained through the association of the Broker Resource and the M2M Service Capability.
* The Broker Resource is associated with Applications which are themselves associated with the Application Entity in the context of a M2M Service Subscription.



Figure 6.2.2.2-1: M2M Service Subscription for Broker Entity Relationships

#### 6.2.2.3 M2M Service Subscription Management Adapter Entities

The following diagram describes the associations between the M2M Service Subscription, M2M Nodes associated with the M2M Service Subscription and M2M Service Capability in order to obtain the Management Adapter.

* The Management Adapter is obtained through the association of the M2M Node and the M2M Service Capability.
* The M2M Node is associated with the M2M Service Subscription.



Figure 6.2.2.3-1: M2M Service Subscription For Management Adapter Entity Relationships

#### 6.2.2.4 M2M Service Subscription Transport Adapter Entities

In the present document. Transport Adapters for request-reply message exchange patterns. Transport Adapters are typically implemented using types of Message technologies (e.g. WSDL, REST).

The following diagram describes the associations between the M2M Service Subscription, AE and M2M Service Capability in order to obtain the Transport Adapter.

* The Transport Adapter is obtained through the association of the Application and the M2M Service Capability
* The Application is associated with the M2M Service Subscription
* The AE is associated with an Application and M2M Service Subscription AE registration



Figure 6.2.2.4-1: M2M Service Subscription For Transport Adapter Entity Relationships

### 6.2.3 Service Capabilities

#### 6.2.3.1 validateServiceSubscription

##### 6.2.3.1.1 Description

This service capability ensures that a valid M2M Service Subscription exists for the requested M2M Service Capability requested that is either received by the M2M Service Platform from an AE or is transmitted to the AE from the M2M Service Platform.

##### 6.2.3.1.2 Pre-Conditions

A correlation between the M2M Service Capability, M2M Service Role(s) and the M2M Service Subscription has been defined in order to validate the M2M Service Subscription.

##### 6.2.3.1.3 Signature - validateServiceSubscription

Table 6.2.3.1.3-1: Service Subscription - validateServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| serviceCapId | IN | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID) |
| responseType | OUT | NO | Response types:   * M2M Service Capability does not exist for requested M2M Service Subscription * M2M Service Capability does exist for the requested M2M Service Subscription |

##### 6.2.3.1.4 Post-Conditions

Not Applicable.

##### 6.2.3.1.5 Exceptions

Not Applicable.

##### 6.2.3.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.3.1.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

RETRIEVE <m2MServiceSubscriptionProfile> resource retrieves the associated Service Roles. A M2M Service Capability is associated with the M2M Service Roles. The M2M Service Subscription is validated through the Service Roles associated with the M2M Service Capability.

#### 6.2.3.2 getAE

##### 6.2.3.2.1 Description

This service capability provides the ability to retrieve the Application Entity information and associated M2M Service Subscription Identifier associated with the Application Entity Identifier.

##### 6.2.3.2.2 Pre-Conditions

Not Applicable.

##### 6.2.3.2.3 Signature – getAE

Table 6.2.3.2.3-1: Service Subscription – getAE capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Id (AE-ID) |
| applicationId | OUT | NO | The Application Identifier (App-ID) for the AE |
| serviceSubscriptionId | OUT | YES | The M2M Service Subscription (M2M-Service-Profile-ID) for the AE |
| externalIds | OUT | YES | The external identifiers of the device that hosts the AE |
| reachabilitySchedule | OUT | YES | The contact reachability schedule information of the AE associated with the device node. The absence of this parameter implies the AE associated with the device node is always contact reachable. Type Schedule, see 6.9.2.7.1. |
| responseType | OUT | YES | Unique response types for this service.   * AE does not exist |

##### 6.2.3.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the service capability



Figure 6.2.3.2.4-1: Service Subscription – getAE Diagram

##### 6.2.3.2.5 Post-Conditions

Not Applicable.

##### 6.2.3.2.6 Exceptions

Not Applicable.

##### 6.2.3.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.3.2.8 oneM2M Resource Interworking

When an AE is registered using a CREATE operation on the <AE> resource, the AE is associated with the M2M Service Subscription which is returned along with the correlated AE information (e.g. Application, Device).

#### 6.2.3.3 getBroker

##### 6.2.3.3.1 Description

This service capability obtains the Broker instance that will be used to subscribe and publish requests based on the requested M2M Service Capability (e.g. publishRequest, subscribeRequest), AE, Resource and M2M Service Subscription.

For the publishRequest service capability the AE is the from AE-ID and the resource is the toResource representing a leaf node from the publication resource.

For the subscribeRequest service capability the AE is the from AE-ID and the resource is the publication resource.

##### 6.2.3.3.2 Pre-Conditions

A correlation between a M2M Service Subscription, AE, Service Capability, Resource and Broker exist.

##### 6.2.3.3.3 Signature – getBroker

Table 6.2.3.3.3-1: Service Subscription - getBroker capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| serviceCapId | IN | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID). |
| aeId | IN | NO | The identifier of the AE |
| resource | IN | NO | The identifier of the resource that is associated with the AE and M2M Service Subscription |
| broker | OUT | NO | The returned instance of the Broker service associated with the M2M Service Subscription. |
| responseType | OUT | NO | Response types:   * Broker does not exist for requested M2M Service Capability, M2M Service Subscription and Resource |

##### 6.2.3.3.4 Post-Conditions

Not Applicable.

##### 6.2.3.3.5 Exceptions

Not Applicable.

##### 6.2.3.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.3.3.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable.

#### 6.2.3.4 getManagementAdapter

##### 6.2.3.4.1 Description

This service capability obtains the Management Adapter instance that will be used to manage device based on the requested M2M Service Capability (e.g. downloadFirmware, installFirmware) and device.

##### 6.2.3.4.2 Pre-Conditions

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.2.3.4.3 Signature - getManagementAdapter

Table 6.2.3.4.3-1: Service Subscription – getManagementAdapter capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | YES | The M2M Service Subscription Identifier (M2M-Service-Profile-ID), is optional when the deviceId is unique across M2M Service Subscription. |
| serviceCapId | IN | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID). |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| managementAdapter | OUT | NO | The returned instance of the Management Adapter service associated with the subscription. |
| responseType | OUT | NO | Response types:   * Management Adapter does not exist |

##### 6.2.3.4.4 Post-Conditions

Not Applicable.

##### 6.2.3.4.5 Exceptions

Not Applicable.

##### 6.2.3.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.3.4.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable.

#### 6.2.3.5 getTransportAdapter

##### 6.2.3.5.1 Description

This service capability obtains the Transport adapter instance that will be used to send requests based on the requested M2M Service Capability, AE and M2M Service Subscription.

##### 6.2.3.5.2 Pre-Conditions

A correlation between a M2M Service Subscription, AE and type of transport adapter (e.g. Broker) service exist.

##### 6.2.3.5.3 Signature - getTransportAdapter

Table 6.2.3.5.3-1: Service Subscription – getTransportAdapter capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID)' |
| serviceCapId | IN | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID). |
| aeId | IN | NO | The identifier of the AE that is to target of the request ("to") (AE-ID) |
| transportAdapter | OUT | NO | The returned instance of the service (e.g. Broker) associated with the M2M Service Subscription. |
| responseType | OUT | NO | Response types:   * Transport Adapter does not exist for requested M2M Service Capability, M2M Service Subscription and target |

##### 6.2.3.5.4 Post-Conditions

Not Applicable.

##### 6.2.3.5.5 Exceptions

Not Applicable.

##### 6.2.3.5.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.3.5.7 oneM2M Resource Interworking

Not Applicable.

#### 6.2.3.6 associateAEWithServiceSubscription

##### 6.2.3.6.1 Description

This service capability provides the ability to associate an AE with a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.2.3.6.2 Pre-Conditions

One of the following combinations has to be unique within the M2M System for the AE to be associated with an M2M Service Subscription:

* Identifier of Application Entity (AE-ID); or
* Identifier of the M2M Application (App-ID) and the credential identifier for the M2M Application.

The M2M System is pre-provisioned with the Application Rule (clause 6.9.2.5) that includes one of the above combinations in order for a M2M Service Subscription to the returned.

##### 6.2.3.6.3 Signature – associateAEWithServiceSubscription

Table 6.2.3.6.3-1: Service Subscription – associateAEWithServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Identifier (AE-ID). |
| credentialId | IN | YES | The Application Credential Identifier |
| applicationId | IN | YES | The Application Identifier (App-ID) |
| serviceSubscriptionId | OUT | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist. * Application Entity Identifier is not unique within the context of the M2M System. |

##### 6.2.3.6.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.2.3.6.4-1: Service Subscription - associateAEWithServiceSubscription Diagram

##### 6.2.3.6.5 Post-Conditions

The Application Entity Identifier (AE-ID) provided as the input parameter is associated with the M2M Service Subscription.

##### 6.2.3.6.6 Exceptions

Not Applicable.

##### 6.2.3.6.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.3.6.8 oneM2M Resource Interworking

This service capability associates the AE-ID with the M2M Service Subscription Profile. Currently TS-0001 [2] does not define how an AE is associated with a M2M Service Subscription Profile as part of a registration flow.

#### 6.2.3.7 disassociateAEFromServiceSubscription

##### 6.2.3.7.1 Description

This service capability provides the ability to remove the association of an AE from a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.2.3.7.2 Pre-Conditions

An AE has successfully registered with the M2M system.

##### 6.2.3.7.3 Signature - disassociateAEFromServiceSubscription

Table 6.2.3.7.3-1: Service Subscription - disassociateAEFromServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Identifier (AE-ID). |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist. * Application Entity Identifier is not associated with the M2M Service Subscription. |

##### 6.2.3.7.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.2.3.7.4-1: Service Subscription - disassociateAEFromServiceSubscription Diagram

##### 6.2.3.7.5 Post-Conditions

The Application Entity registration association is removed from the M2M Service Subscription.

##### 6.2.3.7.6 Exceptions

Not Applicable.

##### 6.2.3.7.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.3.7.8 oneM2M Resource Interworking

This service capability removes the association of the AE-ID from the M2M Service Subscription Profile. Currently TS-0001 [2] does not define how an AE is disassociated from a M2M Service Subscription Profile as part of a AE lifecycle flow.

#### 6.2.3.8 refreshAEAssociationWithServiceSubscription

##### 6.2.3.8.1 Description

This service capability provides the ability to refresh an existing registration association between an Application Entity and a M2M Service Subscription. This service capability shall be restricted to the Mca and Msc Reference Points.

##### 6.2.3.8.2 Pre-Conditions

An AE has successfully registered with the M2M system

##### 6.2.3.8.3 Signature – refreshAEAssociationWithServiceSubscription

Table 6.2.3.8.3-1: Service Subscription – refreshAEAssociationFWithServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Identifier (AE-ID). |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist. * Application Entity Identifier is not associated with the M2M Service Subscription. |

##### 6.2.3.8.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.2.3.8.4-1: Service Subscription - refreshAEAssociationWithServiceSubscription Diagram

##### 6.2.3.8.5 Post-Conditions

Not Applicable.

##### 6.2.3.8.6 Exceptions

Not Applicable.

##### 6.2.3.8.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.2.3.8.8 oneM2M Resource Interworking

This service capability refreshes the association of the Application Entity (AE-ID) with the M2M Service Subscription Profile. Currently TS-0001 [2] does not define how an AE registration association is refreshed with a M2M Service Subscription Profile as part of a AE lifecycle flow.

## 6.3 Authorization

### 6.3.1 Overview

The Authorization service provides the ability to:

* Authorize the Originator for the service capability

NOTE: The determination of how the entity instance based access management is configured in order to ensure no cross ASP access to other ASPs data is FFS.

### 6.3.2 Service Capabilities

#### 6.3.2.1 authorizeServiceCapability

##### 6.3.2.1.1 Description

This service capability authenticates an Originator is a valid Originator of the request and then authorizes the M2M Service Capability within the context of a M2M Service Subscription between the from AE-ID and to AE-ID.

##### 6.3.2.1.2 Pre-Conditions

The M2M Identifiers for the request Originator, M2M Service Subscription from AE-ID and to AE-ID are assigned to the M2M Service Subscription.

A correlation between the M2M Service Capability, M2M Service and the M2M authorization event has been defined in order to authorize the M2M Service Capability.

##### 6.3.2.1.3 Common M2M Service Capability Parameters for Request Authentication and Authorization

Table 6.3.2.1.3-1: Common M2M Service Capability Parameters for   
Request Authentication and Authorization

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| originator | IN | NO | The identifier of the Originator that is issuing the request. |
| from | IN | NO | The identifier of the Originator of the request (AE-ID) |
| to | IN | NO | The identifier of the AE that is to target of the request (AE-ID) |
| serviceCapId | IN | NO | The identifier of the M2M Service Capability (M2M-Serv-Cap-ID) |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) |
| responseType | OUT | YES | Response types that are relevant to the Authentication and Authorizations of requests from AEs across the Mca Reference Point.   * Originator is not authenticated * Originator does not have a M2M Service Subscription * Originator not authorized for the M2M Service Capability |

##### 6.3.2.1.4 Service Interactions

Not Applicable.

##### 6.3.2.1.5 Post-Conditions

Not Applicable.

##### 6.3.2.1.6 Exceptions

Not Applicable.

##### 6.3.2.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.3.2.1.8 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

* FFS – The End-to-End Security Framework is expected to develop APIs that can be issued for this purposed.

## 6.4 Data Exchange

### 6.4.1 Overview

The Data Exchange service provides the ability to exchange payloads between AEs across the Mca Reference Point using supported data exchange patterns. This service utilizes an underlying transport adapter to provide the transportation functions.

The supported data exchange patterns are:

* Subscribe-Publish-Notify
* Request-Response

### 6.4.2 Data Exchange Entities

#### 6.4.2.1 Subscribe-Publish-Notify Data Exchange

##### 6.4.2.1.1 Overview

This data exchange pattern permits AEs to subscribe to publication resources. When an AE publishes data to a specific publication resource, the AEs that have subscribed to the publication resource are notified of the publication by receiving the published data.

##### 6.4.2.1.2 Supporting Rules

###### 6.4.2.1.2.1 Overview

A publication resource is an entity that represents the mechanism used by underlying publish and subscribe protocols which represent one or more queues in the underlying protocol. A publication resource in the data exchange service provides capabilities to reference one or more queues in the underlying protocol using a tree mechanism where wildcards are placed to represent all elements of the tree branch or leaf.

###### 6.4.2.1.1.2 Publication Resources

When a AE publishes a payload to a publication resource, the publication resource is evaluated to obtain the leaf node of the tree. The AEs that have subscribed to leaf nodes of the tree receive the message via the notify M2M Service Capability.

###### 6.4.2.1.1.3 Delivery Policy

As part of the notify M2M Service Capability the Service Layer attempts to honour the delivery policy of the subscriber and publisher. The delivery policy is the attempt by the Service Layer to provide a reliable delivery of the payload that was published using the mechanisms of the underlying Broker. The reliable delivery of a payload is defined in the deliveryPolicy type.

Table 6.4.2.1.1.3-1: Type: deliveryPolicy

| Attribute | Description |
| --- | --- |
| retryLimit | The number of retries by the Broker to connected subscribers before assuming failure of the notification. |

###### 6.4.2.1.1.4 Message Retainment Policy

When a message is published, the M2M Service Layer, using the resources of the underlying Broker, attempts to retain messages according to a retainment policy. Retainment of messages permits AEs that are subscribed to the publication resource but not connected to the underlying Broker to receive messages, up to the retainLimit once the AE connects to the Broker. The message retainment policy is defined in the retainmentPolicy type.

Table 6.4.2.1.1.4-1: Type: retainmentPolicy

| Attribute | Description |
| --- | --- |
| retainLimit | The maximum number of messages retained by the Broker for a subscriber that is not connected to the underlying Broker. |

###### 6.4.2.1.1.5 Service Subscription Integration

In order for the Data Exchange Service to take advantage of the underlying transport, there shall be an association between the AE Resource and the identifier of the underlying transport within the context of the M2M Service Subscription.

#### 6.4.2.2 Request-Response Data Exchange

##### 6.4.2.2.1 Overview

This data exchange pattern permits AEs to synchronously send messages to other AEs utilizing the underlying transport.

##### 6.4.2.2.2 Supporting Rules

###### 6.4.2.2.2.1 Overview

Messages are sent to from an AE to another AE via the Service Layer. When sending a message the originating AE can provide a delivery policy to be used by the transport adapter when sending the message to the target AE.

###### 6.4.2.2.2.2 Delivery Policy

As part of the message sending capability the Service Layer attempts to honour the delivery policy of the message Originator. The delivery policy is the attempt by the Service Layer to provide a reliable delivery of the payload that was sent using the mechanisms of the transport adapter. The reliable delivery of a payload is defined in the deliveryPolicy type.

Table 6.4.2.2.2.2-1: Type: deliveryPolicy

| Attribute | Description |
| --- | --- |
| retryLimit | The number of retries by the transport adapter to target AEs before assuming failure of the notification. |

###### 6.4.2.2.2.3 Service Subscription Integration

In order for the Data Exchange Service to take advantage of the underlying transport, there shall be an association between the target AE and the identifier of the underlying transport within the context of the M2M Service Subscription.

### 6.4.3 Service Capabilities

#### 6.4.3.1 subscribe

##### 6.4.3.1.1 Description

This service capability provides the ability for AEs to subscribe to receive payloads based on a publication resource.

As part of the subscription, the subscribing AE can provide delivery and retainment policies to enhance the robustness of the notification to AEs that have subscribed to the publication resource identified in the request.

##### 6.4.3.1.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, publication resource, subscribing AE and Broker exist.

##### 6.4.3.1.3 Signature – subscribe

Table 6.4.3.1.3-1: Data Exchange Service – subscribe capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| publicationResource | IN | NO | The publication resource. See 6.4.2.1.1.2 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.3 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.2.1.1.4 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.4.3.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the subscribe request to the Supporting Service to validate the request and obtain the Broker instance for the subscription request.
2. Issue the request to the broker to subscribe the AE-ID for the publication resource
3. Issue the subscribe complete subscription request to the Supporting Service



Figure 6.4.3.1.4-1: Data Exchange Service – subscribe capability

##### 6.4.3.1.5 Post-Conditions

Not Applicable.

##### 6.4.3.1.6 Exceptions

Not Applicable.

##### 6.4.3.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.4.3.1.8 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable.

#### 6.4.3.2 publish

##### 6.4.3.2.1 Description

This service capability provides the ability for AEs to publish payloads to a leaf node of a publication resource.

As part of the publication, the publishing AE can provide a delivery policy to enhance the robustness of the publication to AEs that have subscribed to the Resource identified in the request.

##### 6.4.3.2.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, resource to publish the payload, publishing AE and Broker exist.

##### 6.4.3.2.3 Signature - publish

Table 6.4.3.2.3-1: Data Exchange Service – publish capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| toResource | IN | NO | The leaf node of a publication resource. See 6.4.2.1.1.2 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.3 |
| payload | IN | NO | The payload to published. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.4.3.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the publish request to the Supporting Service to validate the request
2. Issue the request to the broker to publish the payload from the publishing AE to the resource in the request
3. Issue the complete publication request to the Supporting Service



Figure 6.4.3.2.4-1: Data Exchange Service –publish (In-Out) capability

##### 6.4.3.2.5 Post-Conditions

Not Applicable.

##### 6.4.3.2.6 Exceptions

Not Applicable.

##### 6.4.3.2.7 Policies for Use

Message Exchange Patterns: In-Out, In-Only

The In-Only message exchange pattern would return a transport layer acknowledgement if supported by the underlying transport layer protocol. Response types or Exceptions are not returned in this message exchange pattern.

Transaction Pattern: Participation allowed

##### 6.4.3.2.8 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable.

#### 6.4.3.3 notify

##### 6.4.3.3.1 Description

This service capability provides the ability to notify AEs that have subscribed to the publication resource identified in a publish request.

##### 6.4.3.3.2 Pre-Conditions

A correlation between a M2M Service Subscription, subscribed AE, publication resource and Broker exist.

##### 6.4.3.3.3 Signature - notify

Table 6.4.3.33-1: Data Exchange Service – notify capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| fromResource | IN | NO | The leaf node of a publication resource. See 6.4.2.1.1.2 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.3 |
| payload | IN | NO | The Payload of the message to notify to the AE |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.4.3.3.4 Post-Conditions

Not Applicable.

##### 6.4.3.3.5 Exceptions

Not Applicable.

##### 6.4.3.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.4.3.3.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable.

#### 6.4.3.4 sendMessage

##### 6.4.3.4.1 Desription

This service capability provides the ability for AEs to send messages to a target AE.

As part of the message send request, the originating AE can provide a delivery policy to enhance the robustness of the message to the AE.

##### 6.4.3.4.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, Originating AE and Transport Adapter exist.

##### 6.4.3.4.3 Signature - sendMessage

Table 6.4.3.4.3-1: Data Exchange Service – sendMessage capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deliveryPolicy | IN | YES | The delivery policy when sending to the target AE. See 6.4.2.2.2.2 |
| payload | IN | NO | The payload to be sent. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.4.3.4.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the sendMessage request to the Supporting Service to validate the request
2. Issue the request to the transport adapter (in this case the Broker service) to send the payload from the Originator to the target AE.
3. Issue the complete sendMessage request to the Supporting Service



Figure 6.4.3.4.4-1: Data Exchange Service –sendMessage capability

##### 6.4.3.4.5 Post-Conditions

Not Applicable.

##### 6.4.3.4.6 Exceptions

Not Applicable.

##### 6.4.3.4.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.4.3.4.8 oneM2M Resource Interworking

Not Applicable.

## 6.5 Broker

### 6.5.1 Overview

The Broker service provides the ability to adapt the Publish-Subscribe-Notify and Request Response data exchange patterns to the underlying transport protocol and deployment configuration.

The Broker maintains the subscriptions to the publication resources

### 6.5.2 Service Capabilities

#### 6.5.2.1 subscribe

##### 6.5.2.1.1 Description

This service capability provides the ability for AEs to subscribe to receive payloads based on a publication resource.

As part of the publication, the publishing AE can provide delivery and retainment policies to enhance the robustness of the notification to AEs that have subscribed to the Resource identified in the request.

##### 6.5.2.1.2 Pre-Conditions

Not Applicable.

##### 6.5.2.1.3 Signature - subscribe

Table 6.5.2.1.3-1: Broker - subscribe capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| publicationResource | IN | NO | The publication resource. See 6.4.2.1.1.2 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.3 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.2.1.1.3 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.5.2.1.4 Post-Conditions

Not Applicable.

##### 6.5.2.1.5 Exceptions

Not Applicable.

##### 6.5.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

The In-Only message exchange pattern would return a transport layer acknowledgement if supported by the underlying Transaction Pattern: Participation allowed

#### 6.5.2.2 publish

##### 6.5.2.2.1 Description

This service capability provides the ability for AEs to publish payloads to a leaf node of a publication resource.

As part of the publication, the publishing AE can provide a delivery policy to enhance the robustness of the publication to AEs that have subscribed to the Resource identified in the request.

##### 6.5.2.2.2 Pre-Conditions

Not Applicable.

##### 6.5.2.2.3 Signature - publish

Table 6.5.2.2.3-1: Broker - publish capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| toResource | IN | NO | The leaf node of a publication resource. See 6.4.2.1.1.2. |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.3. |
| payload | IN | NO | Payload to be published. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.5.2.3.4 Post-Conditions

Not Applicable.

##### 6.5.2.3.5 Exceptions

Not Applicable.

##### 6.5.2.3.6 Policies for Use

Message Exchange Patterns: In-Out

The In-Only message exchange pattern would return a transport layer acknowledgement if supported by the underlying Transaction Pattern: Participation allowed

##### 6.5.2.3.7 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable.

#### 6.5.2.3 notify

##### 6.5.2.3.1 Description

This service capability provides the ability for the Broker to notify AEs that have subscribed to the publication resource identified in the request.

##### 6.5.2.3.2 Pre-Conditions

The Broker maintains the AEs (to AE-ID, clientId) that have subscribed to publicationResources.

The Broker maintains the M2M Service Subscription (serviceSubscriptionId) for AE subscriptions to publicationResources.

##### 6.5.2.3.3 Signature - notify

Table 6.5.2.3.3-1: Broker – notify capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| payload | IN | NO | The payload to be transferred |
| fromResource | IN | NO | The leaf node of a publication resource. See 6.4.2.1.1.2 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.3 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Originator does not have a Broker for the requested resource * Originator has requested an invalid delivery policy * Exception: Request may not have been completed |

##### 6.5.2.3.4 Service Interactions

For each AE subscribed to the resource perform the interactions of service capabilities required for this service capability:

1. Issue the notify request to the Supporting Service to validate the request
2. Issue the request to the SE: Data Exchange
3. Issue the complete request to the Supporting Service



Figure 6.5.2.3.4-1: Broker –notify (In-Out) capability

##### 6.5.2.3.5 Post-Conditions

Not Applicable.

##### 6.5.2.3.6 Exceptions

Not Applicable.

##### 6.5.2.3.7 Policies for Use

Message Exchange Patterns: In-Out, In-Only

The In-Only message exchange pattern would return a transport layer acknowledgement if supported by the underlying transport layer protocol. Response types or Exceptions are not returned in this message exchange pattern.

Transaction Pattern: Participation allowed

##### 6.5.2.3.8 oneM2M Resource Interworking

This service capability interworks with the following oneM2M Resource operations that are interworked are:

Not Applicable.

#### 6.5.2.4 sendMessage

##### 6.5.2.4.1 Description

This service capability provides the ability for AEs to send message payloads to a target AE.

As part of the send message, the originating AE can provide delivery to enhance the robustness of the publication to AEs that have subscribed to the Resource identified in the request.

##### 6.5.2.4.2 Pre-Conditions

The Broker service has connectivity to the target AE where the target AE has subscribed to the Broker to receive send message requests from the Broker.

##### 6.5.2.4.3 Signature - sendMessage

Table 6.5.2.4.3-1: Broker - sendMessage capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.1.1.2.2 |
| payload | IN | NO | Payload to be published. |
| responseType | OUT | YES | Unique response types for this service.   * Target AE is not subscribed with the Broker to receive messages * Originator has requested an invalid delivery policy   NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.5.2.4.4 Post-Conditions

Not Applicable.

##### 6.5.2.4.5 Exceptions

Not Applicable.

##### 6.5.2.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.5.2.4.6 oneM2M Resource Interworking

Not Applicable.

## 6.6 Device Management

### 6.6.1 Overview

The Device Management service provides for the capability for an AE to manage devices across the Mca Reference Point using supported device management message exchange patterns. This service utilizes management adapters to provide the management functions.

The supported device management message exchanges patterns are:

* Request-Response
* Request- Asynchronous Report

### 6.6.2 Device Management Entities

#### 6.6.2.1 Overview

The Device Management service permits AEs to request management operations (e.g. device configuration operations, device troubleshooting operations, device firmware management operations, and application software management operations) and provide the result or report/retrieve the status of the operations to the originating AE.

AEs have the option to request to manage a targeted set of devices that include:

* Individual device
* Multiple devices through the use of lists of devices
* A group that designates as list of devices using the groupId

AEs have option to request management operations to be performed based on a schedule.

AEs have the option to request that responses to requests be delivered synchronous (the request is held until all responses are received) or asynchronously (Reports of the operation are transmitted to the AE when an operation has completed) to the request submission. For asynchronous requests, reports are transmitted based on a report policy configured as part of the original request.

AEs also have the capability to request to manage devices by complex operations (e.g. upgradefirmware), where the M2M service platform can orchestrate management operations (e.g. installfirmware, downloadware) according to the business process.

#### 6.6.2.2 Supporting Rules

##### 6.6.2.2.1 Report Policy Type

The report policy is used to determine how a report is sent by the M2M System to the AE. There is a choice of parameters used for batchReport, pendingReport, latestReport.

Table 6.6.2.2.1-1: Type:ReportPolicy

| Parameter | Optional | Description |
| --- | --- | --- |
| groupId | YES | The group identifier. |
| operationMonitorList | YES | List of monitored operations. Enum OperationMonitor, see 6.6.2.2.29. |
| batchReport | YES | This parameter indicates that AE wants to receive batches of reports rather than receiving them one at a time. This attribute e may include two values: the number of reports to be batched for delivery and a duration. If batchReport is used simultaneously with latestReport, only the latest report shall be sent.  Type BatchReport, see 6.6.2.2.2. |
| pendingReport | YES | This parameter indicates how missed reports due to a period of connectivity.  Enum PendingReport, see 6.6.2.2.28. |
| latestReport | YES | This parameter indicates if AE wants only the latest report. |

##### 6.6.2.2.2 Batch Report Type

The BatchReport is complex type that defines the batch for reports.

Table 6.6.2.2.2-1: Type: BatchReport

| Parameter | Optional | Description |
| --- | --- | --- |
| number | YES | The number of reports to be batched. |
| duration | YES | The duration in which all the reports to be batched. |

##### 6.6.2.2.3 Firmware Report Type

The FirmwareReport is complex type that defines the current state of a firmware management operation for a specific device.

Table 6.6.2.2.3-1: Type: FirmwareReport

| Parameter | Optional | Description |
| --- | --- | --- |
| groupId | YES | The group identifier. |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| operation | YES | The firmware management operation.(e.g. installFirmware, downloadFirmware) |
| operationResult | YES | The firmware management operation execution result. |
| operationStatus | YES | The firmware management operation execution status. It can be Initiated, Started, Finished, Cancelled or Deleted. |

##### 6.6.2.2.4 Orchestration Rule Type

The OrchestrationRule is a complex type that describes the target and associated schedule of the request for the execution of the management operation.

Table 6.6.2.2.4-1: Type: OrchestrationRule

| Parameter | Optional | Description |
| --- | --- | --- |
| groupId | YES | The group identifier. |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| operation | NO | The orchestrated operation. (e.g. installFirmware, downloadFirmware) |
| schedule | YES | The time when to execute firmware operation. If it is not provided, the operation shall be executed immediately. |

##### 6.6.2.2.5 Firmware Info Type

The FirmwareInfo is a complex type that describes the version, name, URL of the device firmware.

Table 6.6.2.2.5-1: Type: FirmwareInfo

| Parameter | Optional | Description |
| --- | --- | --- |
| version | YES | The version of the firmware. |
| name | YES | The name of the firmware to be used on the device. |
| url | YES | The URL from which the firmware image can be downloaded. |

##### 6.6.2.2.6 Service Subscription Integration

In order for the Device Management Service to take advantage of the Management Adapter, there shall be association between the device associated with a Service Subscription and the service capability to the Management Adapter.

##### 6.6.2.2.7 Device Info Type

The DeviceInfo is a complex type that describes the device label, manufacturer, model, device type, firmware version, software version, hardware version.

Table 6.6.2.2.7-1: Type: DeviceInfo

| Parameter | Optional | Description |
| --- | --- | --- |
| deviceLabel | YES | Unique device label assigned by the manufacturer. The uniqueness may be global or only valid within a certain domain (e.g. vendor-wise or for a certain deviceType). |
| manufacturer | YES | The name/identifier of the device manufacturer. |
| model | YES | The name/identifier of the device mode assigned by the manufacturer. |
| deviceType | YES | The type (e.g. cell phone, photo frame, smart meter) or product class (e.g. X-series) of the device. |
| fwVersion | YES | The firmware version of the device.  NOTE: If the device only supports one kind of Software this is identical to softwareVersion. |
| swVersion | YES | The software version of the device. |
| hwVersion | YES | The hardware version of the device. |

##### 6.6.2.2.8 Memory Type

The Memory is a complex type that describes the current available amount of memory and the total amount of memory.

Table 6.6.2.2.8-1: Type: Memory

| Parameter | Optional | Description |
| --- | --- | --- |
| memAvailable | YES | The current available amount of memory in bytes. |
| memTotal | YES | The total amount of memory in bytes. |

##### 6.6.2.2.9 Battery Type

The Battery is a complex type that describes the current battery level and the status of the battery.

Table 6.6.2.2.9-1: Type: Battery

| Parameter | Optional | Description |
| --- | --- | --- |
| level | YES | The current battery level as a percent of the battery capacity |
| status | YES | Indicates the status of the battery. Enum BatteryStatus, see 6.6.2.2.11. |

##### 6.6.2.2.10 DeviceCapability Type

The DeviceCapability is a complex type that describes the name of the capability, attach label, capability action status.

Table 6.6.2.2.10-1: Type: DeviceCapability

| Parameter | Optional | Description |
| --- | --- | --- |
| name | YES | The name of the capability. Enum DeviceCapabilityName, see 6.6.2.2.12. |
| attached | YES | Indicates whether the capability is attached to the device or not. |
| state | NO | Indicates if the capability is enabled or disabled |

##### 6.6.2.2.11 BatteryStatus Enum

Table 6.6.2.2.11-1: Enum: BatteryStatus

| Battery Status | Description |
| --- | --- |
| Normal | The battery is operating normally and not on power. |
| Charging | The battery is currently charging. |
| Charge Complete | The battery is fully charged and still on power. |
| Damaged | The battery has some problem. |
| Low Battery | The battery is low on charge. |
| Not Installed | The battery is not installed. |
| Unknown | The battery information is not available. |

##### 6.6.2.2.12 DeviceCapabilityName Enum

Table 6.6.2.2.11-1: Enum: DeviceCapabilityName

| Device Capability Name | Description |
| --- | --- |
| Hardware: ExternalMemory | Used to enable/disable the removable card memory or storage disk. |
| Hardware: Display | Used to enable/disable the display screen. |
| Hardware: Camera | Used to enable/disable the camera. |
| Hardware: Speaker | Used to enable/disable the speaker. |
| I/O: Tethering | Used to enable/disable the device to be attached to other devices. |
| I/O: AudioInputEncoder | Used to enable/disable the audio input encoder. |
| I/O: AttachedDevice | Used to enable/disable the capability to allow other devices to be attached to this device. |
| I/O: Keyboard | Used to enable/disable the keyboard |
| I/O: InputPeripheral | Used to enable/disable the input peripheral. |
| I/O: OutputPeripheral | Used to enable/disable the output peripheral. |
| I/O: USB | Used to enable/disable the USB port. |
| I/O: SerialPort | Used to enable/disable the serial port. |
| I/O: ParallelPort | Used to enable/disable the Parallel port. |
| I/O: GPS | Used to enable/disable GPS capability |
| I/O: GNSS | Used to enable/disable GNSS capability |
| Connectivity: Bluetooth | Used to enable/disable the Bluetooth connectivity. |
| Connectivity: WLAN | Used to enable/disable the WLAN connectivity. |
| Connectivity: Infrared | Used to enable/disable the Infrared connectivity. |
| Connectivity: WCDMA | Used to enable/disable the WCDMA connectivity |
| Connectivity: GPRS | Used to enable/disable the GPRS connectivity |
| Connectivity: EDGE | Used to enable/disable the EDGE connectivity |
| Connectivity: CDMA | Used to enable/disable the CDMA connectivity |
| Connectivity: WiMAX | Used to enable/disable the WiMAX connectivity |
| Connectivity: LTE | Used to enable/disable the LTE connectivity |
| Connectivity: NFC | Used to enable/disable the NFC connectivity |
| Connectivity: TD-SCDMA | Used to enable/disable the TD-SCDMA connectivity |
| LAN Interfaces: USB | Used to enable/disable the USB Interface |
| LAN Interfaces: Wi-Fi | Used to enable/disable the Wi-Fi Radio |
| LAN Interfaces: HomePlug | Used to enable/disable the HomePlug Interface |
| LAN Interfaces: MoCA | Used to enable/disable the MoCA Interface |
| LAN Interfaces: UPA | Used to enable/disable the UPA Interface |
| Hardware: SmartCardReader | Used to enable/disable the SmartCardReader |

##### 6.6.2.2.13 LockStatus Enum

Table 6.6.2.2.13-1: Enum: LockedStatus

| Lock Status | Description |
| --- | --- |
| locked | The device is locked. |
| unlocked | The device is unlocked. |

##### 6.6.2.2.14 Area Network Info Type

The AreaNwkInfo is a complex type that describes the information about a M2M area network. Information includes the area network identifier, area network name, area network type, and the list of devices in the M2M Area Network.

Table 6.6.2.2.14-1: Type: AreaNwkInfo

| Parameter | Optional | Description |
| --- | --- | --- |
| areaNwkId | NO | The unique area network identifier. |
| areaNwkName | YES | The Area Network name. |
| areaNwkType | YES | The areaNwkType is an implementation-chosen string that indicates the type of M2M Area Network. |
| listOfDevices | YES | Indicates the list of devices in the M2M Area Network. Type AreaNwkDevice, see 6.6.2.2.15. From listOfDevices, the topology of the area network can be discovered and retrieved. |

##### 6.6.2.2.15 Area Network Device Type

The AreaNwkDevice is a complex type that describes the device information for a device in the context of a M2M Area Network. Information includes the device identifier, area network identifier and the area network device specific information.

Table 6.6.2.2.15-1: Type: AreaNwkDevice

| Parameter | Optional | Description |
| --- | --- | --- |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| areaNwkDeviceInfo | YES | The area network device information. Type AreaNwkDeviceInfo, see 6.6.2.2.16. |

##### 6.6.2.2.16 Area Network Device Info Type

The AreaNwkDeviceInfo is a complex type that describes information about the device in the context of the M2M Area Network. Information includes the type of device, the interval of time between two sleep cycles, the time duration of each sleep cycle, the status of the device and any neighbor devices.

Table 6.6.2.2.16-1: Type: AreaNwkDeviceInfo

| Parameter | Optional | Description |
| --- | --- | --- |
| deviceType | YES | The type (e.g. cell phone, photo frame, smart meter) or product class (e.g. X-series) of the device. |
| sleepInterval | YES | The interval between two sleep cycles. |
| sleepDuration | YES | The time duration of each sleep cycle. |
| status | YES | The status of the device (sleeping or waked up). |
| listOfNeighbors | YES | Indicates the neighbour devices of the same area network. When modified, the connection relationship of the devices shall be modified accordingly. |

##### 6.6.2.2.17 LogTypeId Enum

Table 6.6.2.2.17-1: Enum: LogTypeId

| LogTypeId | Description |
| --- | --- |
| system | System log |
| security | Security log |
| event | Event log |
| trace | Trace log |
| panic | Panic log |

##### 6.6.2.2.18 LogStatus Enum

Table 6.6.2.2.18-1: Enum: LogStatus

| LogStatus | Description |
| --- | --- |
| Started | the logging activity is started |
| Stopped | the logging activity is stopped |
| Unknown | the current status of the logging activity is unknown. |
| NotPresent | the log data is not present and the logData attribute shall be ignored. |
| Error | error conditions for the logging activities, and the logging is stopped. |

##### 6.6.2.2.19 LogInfo Type

The LogInfo is a complex type that describes the log type, diagnostic data, log action status.

Table 6.6.2.2.19-1: Type: LogInfo

| Parameter | Optional | Description |
| --- | --- | --- |
| logTypeId | NO | The type of the log. E.g. security log, system log.  Enum LogTypeId, see 6.6.2.2.17. |
| logData | NO | Diagnostic data logged upon event of interests defined by the diagnostic function. |
| logActionStatus | NO | Indicates the status of the Action. E.g. Started, Stopped.  Enum LogStatus, see 6.6.2.2.18. |

##### 6.6.2.2.20 TroubleshootingReport Type

The TroubleshootingReport is complex type that defines the current state of a troubleshooting operation for a specific device.

Table 6.6.2.2.20-1: Type: TroubleshootingReport

| Parameter | Optional | Description |
| --- | --- | --- |
| groupId | YES | The group identifier. |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| operation | YES | The troubleshooting operation.(e.g. rebootDevice, resetDevice, uploadDeviceLog) |
| operationResult | YES | The troubleshooting operation execution result. |
| operationStatus | YES | The troubleshooting operation execution status. It can be Initiated, Started, Finished, Cancelling, or Cancelled. |

##### 6.6.2.2.21 Log Type

The Log is a complex type that describes the log information, log URL.

Table 6.6.2.2.21-1: Type: Log

| Parameter | Optional | Description |
| --- | --- | --- |
| logInfo | NO | The log information. Type LogInfo, see 6.6.2.2.19. |
| logURL | NO | The URL from which the log can be accessed. |

##### 6.6.2.2.22 Log Filter Criteria

Table 6.6.2.2.22-1: Log Filter Criteria

| Criterion name | Description |
| --- | --- |
| logTypeId | The type of the log. E.g. security log, system log.  Enum LogTypeId, see 6.6.2.2.17. |
| startTime | The start time of log. |
| endTime | The end time of log. |

##### 6.6.2.2.23 Action Enum

Table 6.6.2.2.23-1: Enum: Action

| Software Action | Description |
| --- | --- |
| Install | The action that installs the software. |
| Uninstall | The action that un-installs the software. |
| Activate | The action that activates software previously installed. |
| Deactivate | The action that deactivates software. |

##### 6.6.2.2.24 Status Enum

Table 6.6.2.2.24-1: Enum: Status

| Status | Description |
| --- | --- |
| Successful | The status is successful. |
| Failure | The status is failure. |
| In-Process | The status is in process. |

##### 6.6.2.2.25 ActionStatus Type

The ActionStatus is a complex type that describes the action and related status.

Table 6.6.2.2.25-1: Type: ActionStatus

| Parameter | Optional | Description |
| --- | --- | --- |
| action | NO | The action being performed  Enum Action, see 6.6.2.2.24. |
| status | NO | Indicates the status of the operation is successful, failure or in process. Enum Status, see 6.6.2.2.25. |

##### 6.6.2.2.26 SoftwareReport Type

The SoftwareReport is complex type that defines the current state of an application software management operation for a specific device.

Table 6.6.2.2.26-1: Type: SoftwareReport

| Parameter | Optional | Description |
| --- | --- | --- |
| groupId | YES | The group identifier. |
| deviceId | NO | The unique device identifier in the context of the M2M Service Subscription. |
| operation | YES | The application software management operation.(e.g. downloadSoftware, installSoftware, activateSoftware, deactivateSoftware, removeSoftware) |
| operationResult | YES | The application software management operation execution result. |
| installStatus | YES | Indicates the status of the install.  Enum ActionStatus, see 6.6.2.2.26. |
| activeStatus | YES | The status of active or deactivate action.  Enum ActionStatus, see 6.6.2.2.26. |

##### 6.6.2.2.27 PendingReport Enum

Table 6.6.2.2.27-1: Enum: PendingReport

| PendingReport | Description |
| --- | --- |
| SendLatest | Send the latest report. |
| SendAllPending | Send all pending report. |

##### 6.6.2.2.28 OperationMonitor Enum

Table 6.6.2.2.28-1: Enum: OperationMonitor

| Monitored Operation | Description |
| --- | --- |
| DownloadFirmware | The downloadFirmware operation. |
| InstallFirmware | The installFirmware operation. |
| RebootDevice | The rebootDevice operation. |
| ResetDevice | The resetDevice operation. |
| UploadDeviceLog | The uploadDeviceLog operation. |
| DownloadSoftware | The downloadSoftware operation. |
| InstallSoftware | The installSoftware operation. |
| ActiveSoftware | The activeSoftware operation. |
| DeactivateSoftware | The deactivateSoftware operation. |
| RemoveSoftware | The removeSoftware operation. |

### 6.6.3 Service Capabilities

#### 6.6.3.1 downloadFirmware

##### 6.6.3.1.1 Description

This service capability provides the ability for AEs to download device firmware.

##### 6.6.3.1.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the service capability and device exist.

##### 6.6.3.1.3 Signature - downloadFirmware

Table 6.6.3.1.3-1: Device Management Service –downloadFirmware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.2.2.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. Type ReportPolicy, see 6.6.2.2.1. |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * Report policy does not supported by the Management Adapter * Firmware download failure,e.g. firmware miss dependency, firmware is too large for available program or data memory |

##### 6.6.3.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.1.4-1: downloadFirmware Diagram

##### 6.6.3.1.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download firmware.

##### 6.6.3.1.6 Exceptions

Not Applicable.

##### 6.6.3.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.1.8 oneM2M Resource Interworking

This service capability is used to download firmware. The service capability aligns with the <firmware> resource and maps to the UPDATE procedure for the attribute update of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.3.2 installFirmware

##### 6.6.3.2.1 Description

This service capability provides the ability for AEs to install firmware on the device.

##### 6.6.3.2.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the service capability and device exist.

The firmware to be installed exists on the device.

##### 6.6.3.2.3 Signature - installFirmware

Table 6.6.3.2.3-1: Device Management Service –installFirmware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.2.2.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. Type ReportPolicy, see 6.6.2.2.1. |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * Report policy does not supported by the Management Adapter * Firmware install failure, e.g. firmware is missing dependency on the device, firmware is too large for available program or data memory |

##### 6.6.3.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.2.4-1: installFirmware Diagram

##### 6.6.3.2.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install firmware.

##### 6.6.3.2.6 Exceptions

Not Applicable.

##### 6.6.3.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.2.8 oneM2M Resource Interworking

This service capability is used to install firmware. The service capability aligns with the <firmware> resource and maps to the UPDATE procedure for the attribute update of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.3.3 getFirmwareInformation

##### 6.6.3.3.1 Description

This service capability provides the ability for AEs to get device firmware information.

##### 6.6.3.3.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the service capability and device exist.

##### 6.6.3.3.3 Signature - getFirmwareInformation

Table 6.6.3.3.3-1: Device Management Service –getFirmwareInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareInfo | OUT | YES | The device firmware information.  Type FirmwareInfo, see 6.6.2.2.5 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.3.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.3.4-1: getFirmwareInformation Diagram

##### 6.6.3.3.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get firmware information.

##### 6.6.3.3.6 Exceptions

Not Applicable.

##### 6.6.3.3.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.3.8 oneM2M Resource Interworking

This service capability is used to get firmware information. The service capability aligns with the <firmware> resource and maps to the RETRIEVE procedure for the attribute version, name, URL of the resource.

#### 6.6.3.4 getFirmwareExecStatus

##### 6.6.3.4.1 Description

This service capability provides the ability for AEs to get state of firmware management operation for a specific device.

##### 6.6.3.4.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and previously submitted firmware request exist.

##### 6.6.3.4.3 Signature – getFirmwareExecStatus

Table 6.6.3.4.3-1: Device Management Service –getFirmwareExecStatus capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| operationRequestId | IN | NO | The M2M Request Identifier of previously submitted firmware request (M2M-Request-ID) |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.2.2.3. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * The previously submitted firmware request does not exist |

##### 6.6.3.4.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.4.4-1: getFirmwareExecStatus Diagram

##### 6.6.3.4.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get firmware state of management operation.

##### 6.6.3.4.6 Exceptions

Not Applicable.

##### 6.6.3.4.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.4.8 oneM2M Resource Interworking

This service capability is used to get state of firmware management operation. The service capability aligns with the <firmware> resource and maps to the RETRIEVE procedure for the attribute updateStatus of the resource. The service capability also aligns with the <execInstance> resource and maps to the RETRIEVE procedure for the attribute execStatus, execResult of the resource.

#### 6.6.3.5 deviceManagementReport

##### 6.6.3.5.1 Description

This service capability provides the ability to report the device management operation execution result or status information to the AE.

##### 6.6.3.5.2 Pre-Conditions

A correlation between a Management Adapter, the M2M Service Capability and previously submitted request exist.

##### 6.6.3.5.3 Signature – deviceManagementReport

Table 6.6.3.5.3-1: Device Management Service –deviceManagementReport capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| firmwareReportList | IN | YES | Array of firmwareReport.  Type FirmwareReport, see 6.6.2.2.3. |
| troubleshootingReportList | IN | YES | Array of troubleshootingReport.  Type TroubleshootingReport, see 6.6.2.2.20. |
| softwareReportList | IN | YES | Array of softwareReport.  Type SoftwareReport, see 6.6.2.2.27. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * The target AE does not exist. |

##### 6.6.3.5.4 Post-Conditions

The AE has received a report of firmware operation execution status or result. The M2M System shall maintain the state of the report (i.e. sequence number) according to the report policy.

##### 6.6.3.5.5 Exceptions

Not Applicable.

##### 6.6.3.5.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.57 oneM2M Resource Interworking

Not Applicable.

#### 6.6.3.6 upgradeFirmware

##### 6.6.3.6.1 Description

This service capability is a complex operation for AEs to upgrade firmware on one or more devices. The service capability utilizes orchestration rules for the related management operations such as downloadFirmware, installFirmware, getFirmwareInformation, getFirmwareExecInstance and reportFirmwareStatus according to the business process.

This service capability permits AEs to upgrade the firmware on individual device, multiple devices or a group of devices. In addition the upgrade of the firmware is permitted based on a schedule for each of the operations.

##### 6.6.3.6.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between Management Adapter, the service capability and devices or device group exist.

##### 6.6.3.6.3 Signature - upgradeFirmware

Table 6.6.3.6.3-1: Device Management Service –upgradeFirmware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| orchestrationRuleList | IN | NO | List of OrchestrationRule. Type OrchestrationRule, see clause 6.6.2.2.4. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. Type ReportPolicy, see 6.6.2.2.1. |
| requestId | OUT | NO | The M2M Request Identifier (M2M-Request-ID) |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Report policy is not supported by the Management Adapter * The Orchestration Rules are not supported by the Management Adapter * Operation exception: The device's reachability schedule is inconsistent with the schedule of the Orchestration rule. |

##### 6.6.3.6.4 Service Interactions

The interactions of service capabilities required for this service capability:

1) Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.6.4-1: upgradeFirmware Diagram

##### 6.6.3.6.5 Post-Conditions

The Management Adapter has submitted a set of requests to the Management Server to manage firmware.

##### 6.6.3.6.6 Exceptions

Not Applicable.

##### 6.6.3.6.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.6.8 oneM2M Resource Interworking

Not Applicable.

#### 6.6.3.7 getDeviceInformation

##### 6.6.3.7.1 Description

This service capability provides the ability for AEs to get device information.

##### 6.6.3.7.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.7.3 Signature - getDeviceInformation

Table 6.6.3.7.3-1: Device Management Service – getDeviceInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| deviceInfo | OUT | NO | The device information. Type DeviceInfo, see 6.6.2.2.7. |
| memory | OUT | YES | The memory information. Type Memory, see 6.6.2.2.8. |
| battery | OUT | YES | The battery information. Type Battery, see 6.6.2.2.9. |
| lockStatus | OUT | YES | The device lock status. Enum LockStatus, see 6.6.2.2.13. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.7.4 Service Interactions

The interactions of service capabilities required for this service capability:

1) Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.7.4-1: getDeviceInformation Diagram

##### 6.6.3.7.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device information.

Based on the capabilities supported by the device, the memory, battery and lock status information may or may not be returned.

##### 6.6.3.7.6 Exceptions

Not Applicable.

##### 6.6.3.7.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.7.8 oneM2M Resource Interworking

This service capability is used to get device information. The service capability aligns with the <deviceInfo> resource and maps to the Retrieve procedure for the resource. The service capability aligns with the <memory> resource and maps to the Retrieve procedure for the resource. The service capability aligns with the <battery> resource and maps to the Retrieve procedure for the resource.

#### 6.6.3.8 getDeviceCapabilities

##### 6.6.3.8.1 Description

This service capability provides the ability for AEs to get the device capabilities.

##### 6.6.3.8.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.8.3 Signature – getDeviceCapabilities

Table 6.6.3.8.3-1: Device Management Service – getDeviceCapabilities capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| deviceCapabilities | OUT | YES | List of deviceCapability. Type DeviceCapability, see 6.6.2.2.10. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.8.4 Service Interactions

The interactions of service capabilities required for this service capability:

1) Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.8.4-1: getDeviceCapabilities Diagram

##### 6.6.3.8.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device capabilities.

##### 6.6.3.8.6 Exceptions

Not Applicable.

##### 6.6.3.8.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.8.8 oneM2M Resource Interworking

This service capability is used to get device capabilities. The service capability aligns with the<deviceCapability> resource and maps to the RETRIEVE procedure for the resource.

#### 6.6.3.9 enableDeviceCapability

##### 6.6.3.9.1 Description

This service capability provides the ability for AEs to enable device capability.

##### 6.6.3.9.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.9.3 Signature –enableDeviceCapability

Table 6.6.3.9.3-1: Device Management Service –enableDeviceCapability capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| Name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.2.2.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.9.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.9.4-1: enableDeviceCapability Diagram

##### 6.6.3.9.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to enable device capability.

##### 6.6.3.9.6 Exceptions

Not Applicable.

##### 6.6.3.9.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.9.8 oneM2M Resource Interworking

This service capability is used to enable device capability. The service capability aligns with the <deviceCapability> resource and maps to the UPDATE procedure for the attribute enable of the resource.

#### 6.6.3.10 disableDeviceCapability

##### 6.6.3.10.1 Description

This service capability provides the ability for AEs to disable device capability.

##### 6.6.3.10.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the service capability and device exist.

##### 6.6.3.10.3 Signature –disableDeviceCapability

Table 6.6.3.10.3-1: Device Management Service –disableDeviceCapability capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.2.2.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.10.4 Service Interactions

The interactions of service capabilities required for this service capability:

1) Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.10.4-1: disableDeviceCapability Diagram

##### 6.6.3.10.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to disable device capability.

##### 6.6.3.10.6 Exceptions

Not Applicable.

##### 6.6.3.10.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.10.8 oneM2M Resource Interworking

This service capability is used to disable device capability. The service capability aligns with the <deviceCapability> resource and maps to the UPDATE procedure for the attribute disable of the resource.

#### 6.6.3.11 getAreaNetworks

##### 6.6.3.11.1 Description

This service capability provides the ability for AEs to get area networks information.

##### 6.6.3.11.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and area network exist.

##### 6.6.3.11.3 Signature - getAreaNetworks

Table 6.6.3.11.3-1: Device Management Service –getAreaNetworks capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| areaNwks | OUT | YES | Array of area network. Type AreaNwkInfo, see 6.6.2.2.14. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.11.4 Service Interactions

The interactions of service capabilities required for this service capability:

1) Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.11.4-1: getAreaNetworks Diagram

##### 6.6.3.11.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get area networks information.

##### 6.6.3.11.6 Exceptions

Not Applicable.

##### 6.6.3.11.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.11.8 oneM2M Resource Interworking

This service capability is used to get area networks information. The service capability aligns with the <areaNwkInfo> resource and maps to the RETRIEVE procedure for the resource. The service capability aligns with the <areaNwkDeviceInfo> resource and maps to the Retrieve procedure for the resource.

#### 6.6.3.12 updateDeviceForAreaNetwork

##### 6.6.3.12.1 Description

This service capability provides the ability for AEs to update device information for area network.

##### 6.6.3.12.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability, the device and area network exist.

##### 6.6.3.12.3 Signature – updateDeviceForAreaNetwork

Table 6.6.3.12.3-1: Device Management Service – updateDeviceForAreaNetwork capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| areaNwkId | IN | NO | The unique area network identifier. |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| areaNwkDeviceInfo | IN | YES | The existing areaNwkDeviceInfo are replaced with the information in this parameter. Type AreaNwkDeviceInfo, see 6.6.2.2.16. |
| lastModifiedTime | OUT | NO | The modified time. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.12.4 Service Interactions

The interactions of service capabilities required for this service capability:

1) Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.12.4-1: updateDeviceForAreaNetwork Diagram

##### 6.6.3.12.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to update device information for area network.

##### 6.6.3.12.6 Exceptions

Not Applicable.

##### 6.6.3.12.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.12.8 oneM2M Resource Interworking

The service capability aligns with the <areaNwkDeviceInfo> resource and maps to the Update procedure for attribute devType, sleepInterval, sleepDuration, status, listOfNeighbors of the resource.

#### 6.6.3.13 rebootDevice

##### 6.6.3.13.1 Description

This service capability provides the ability for AEs to reboot device.

##### 6.6.3.13.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.13.3 Signature - rebootDevice

Table 6.6.3.13.3-1: Device Management Service –rebootDevice capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. Type ReportPolicy, see 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

##### 6.6.3.13.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.13.4-1: rebootDevice Diagram

##### 6.6.3.13.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reboot device.

##### 6.6.3.13.6 Exceptions

Not Applicable.

##### 6.6.3.13.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.13.8 oneM2M Resource Interworking

This service capability is used to reboot device. The service capability aligns with the <reboot> resource and maps to the Execute procedure for the attribute reboot of the resource.

#### 6.6.3.14 resetDevice

##### 6.6.3.14.1 Description

This service capability provides the ability for AEs to reset device.

##### 6.6.3.14.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.14.3 Signature - resetDevice

Table 6.6.3.14.3-1: Device Management Service –resetDevice capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. Type ReportPolicy, see 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

##### 6.6.3.14.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.14.4-1: resetDevice Diagram

##### 6.6.3.14.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reset device.

##### 6.6.3.14.6 Exceptions

Not Applicable.

##### 6.6.3.14.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.14.8 oneM2M Resource Interworking

This service capability is used to reset device. The service capability aligns with the <reboot> resource and maps to the Execute procedure for the attribute factoryReset of the resource.

#### 6.6.3.15 uploadDeviceLog

##### 6.6.3.15.1 Description

This service capability provides the ability for AEs to upload device log.

##### 6.6.3.15.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.15.3 Signature – uploadDeviceLog

Table 6.6.3.15.3-1: Device Management Service – uploadDeviceLog capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| logInfo | IN | NO | The log information. Type LogInfo, see 6.6.2.2.19. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| logURL | OUT | YES | The URL from which the log can be uploaded. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

##### 6.6.3.15.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.15.4-1: uploadDeviceLog Diagram

##### 6.6.3.15.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to upload device log.

##### 6.6.3.15.6 Exceptions

Not Applicable.

##### 6.6.3.15.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.15.8 oneM2M Resource Interworking

This service capability is used to upload device log. The service capability aligns with the <eventLog> resource and maps to the Update procedure for the resource.

#### 6.6.3.16 getDeviceLogs

##### 6.6.3.16.1 Description

This service capability provides the ability for AEs to get all logs of a device.

##### 6.6.3.16.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.16.3 Signature - getDeviceLogs

Table 6.6.3.16.3-1: Device Management Service – getDeviceLogs capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| logList | OUT | YES | Array of log. Type Log, see 6.6.2.2.21. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.16.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.16.4-1: getDeviceLogs Diagram

##### 6.6.3.16.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get all logs of a device.

##### 6.6.3.16.6 Exceptions

Not Applicable.

##### 6.6.3.16.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.16.8 oneM2M Resource Interworking

This service capability is used to get all logs of a device. The service capability aligns with the <eventLog> resource and maps to the Retrieve procedure for the resource.

#### 6.6.3.17 getDeviceLogInformation

##### 6.6.3.17.1 Description

This service capability provides the ability for AEs to get a device log information.

##### 6.6.3.17.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.17.3 Signature – getDeviceLogInformation

Table 6.6.3.17.3-1: Device Management Service – getDeviceLogInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| filterCriteria | IN | YES | See Table 6.6.2.2.22 |
| logURL | IN | YES | The URL from which the log can be accessed. |
| log | OUT | YES | Type Log, see 6.6.2.2.21. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.17.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.17.4-1: getDeviceLogInformation Diagram

##### 6.6.3.17.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get a device log information.

##### 6.6.3.17.6 Exceptions

Not Applicable.

##### 6.6.3.17.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.17.8 oneM2M Resource Interworking

This service capability is used to a device log information. The service capability aligns with the <eventLog> resource and maps to the Retrieve procedure for the resource.

#### 6.6.3.18 getSoftwareInformation

##### 6.6.3.18.1 Description

This service capability provides the ability for AEs to get application software information.

##### 6.6.3.18.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.18.3 Signature – getSoftwareInformation

Table 6.6.3.18.3-1: Device Management Service –getSoftwareInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | OUT | YES | The version of the software. |
| name | OUT | YES | The name of the software. |
| URL | OUT | YES | The URL from which the software package can be downloaded. |
| installStatus | OUT | YES | Indicates the status of the install.  Enum ActionStatus, see 6.6.2.2.26. |
| activeStatus | OUT | YES | The status of active or deactivate action.  Enum ActionStatus, see 6.6.2.2.26. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation |

##### 6.6.3.18.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.18.4-1: getSoftwareInformation Diagram

##### 6.6.3.18.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get application software information.

##### 6.6.3.18.6 Exceptions

Not Applicable.

##### 6.6.3.18.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.18.8 oneM2M Resource Interworking

This service capability is used to get application software information. The service capability aligns with the <software> resource and maps to the Retrieve procedure for the resource.

#### 6.6.3.19 downloadSoftware

##### 6.6.3.19.1 Description

This service capability provides the ability for AEs to download application software.

##### 6.6.3.19.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.19.3 Signature –downloadSoftware

Table 6.6.3.19.3-1: Device Management Service –downloadSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| URL | IN | NO | The URL from which the software package can be downloaded. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

##### 6.6.3.19.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.19.4-1: downloadSoftware Diagram

##### 6.6.3.19.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download application software.

##### 6.6.3.19.6 Exceptions

Not Applicable.

##### 6.6.3.19.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.19.8 oneM2M Resource Interworking

This service capability is used to download application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute install of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.3.20 installSoftware

##### 6.6.3.20.1 Description

This service capability provides the ability for AEs to install application software.

##### 6.6.3.20.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.20.3 Signature –installSoftware

Table 6.6.3.20.3-1: Device Management Service –installSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

##### 6.6.3.20.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.20.4-1: installSoftware Diagram

##### 6.6.3.20.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install application software.

##### 6.6.3.20.6 Exceptions

Not Applicable.

##### 6.6.3.20.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.20.8 oneM2M Resource Interworking

This service capability is used to install application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute install of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.3.21 activateSoftware

##### 6.6.3.21.1 Description

This service capability provides the ability for AEs to activate software previously installed.

##### 6.6.3.21.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### 6.6.3.21.3 Signature –activateSoftware

Table 6.6.3.21.3-1: activateSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

##### 6.6.3.21.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.21.4-1: activateSoftware Diagram

##### 6.6.3.21.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to activate software previously installed.

##### 6.6.3.21.6 Exceptions

Not Applicable.

##### 6.6.3.21.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.21.8 oneM2M Resource Interworking

This service capability is used to activate software previously installed. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute activate of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.3.22 deactivateSoftware

##### 6.6.3.22.1 Description

This service capability provides the ability for AEs to deactivates software.

##### 6.6.3.22.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and the device exist.

##### 6.6.3.22.3 Signature –deactivateSoftware

Table 6.6.3.22.3-1: deactivateSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

##### 6.6.3.22.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.22.4-1: deactivateSoftware Diagram

##### 6.6.3.22.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to deactivates software.

##### 6.6.3.22.6 Exceptions

Not Applicable.

##### 6.6.3.22.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.22.8 oneM2M Resource Interworking

This service capability is used to deactivates software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute deactivate of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.6.3.23 removeSoftware

##### 6.6.3.23.1 Description

This service capability provides the ability for AEs to uninstall the software.

##### 6.6.3.23.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and the device exist.

##### 6.6.3.23.3 Signature – removeSoftware

Table 6.6.3.23.3-1: Device Management Service –removeSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Issuer does not have a Management Adapter for the requested operation * report policy does not supported by the Management Adapter |

##### 6.6.3.23.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.6.3.23.4-1: removeSoftware Diagram

##### 6.6.3.23.5 Post-Conditions

The Management Adapter has submitted a set of requests to the Management Server to uninstall the software.

##### 6.6.3.23.6 Exceptions

Not Applicable.

##### 6.6.3.23.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.6.3.23.8 oneM2M Resource Interworking

This service capability is used to install application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute uninstall of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

## 6.7 Management Adapter

### 6.7.1 Overview

The Management Adapter service provides the ability to adapt the M2M Service Layer operations to the technology specific operations of the Management Server.

### 6.7.2 Service Capabilities

#### 6.7.2.1 downloadFirmware

##### 6.7.2.1.1 Description

This service capability provides the ability to download the specific device firmware.

##### 6.7.2.1.2 Pre-Conditions

A correlation between a Management Server, the service capability and device exist.

##### 6.7.2.1.3 Signature - downloadFirmware

Table 6.7.2.1.3-1: Management Adapter –downloadFirmware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.2.2.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| requestId | IN | NO | The M2M Request Identifier (M2M-Request-ID) |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Report policy is not supported by the Management Adapter * Firmware download failure, e.g. firmware is missing dependency on the device, firmware is too large for available program or data memory |

##### 6.7.2.1.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download the firmware.

##### 6.7.2.1.5 Exceptions

Not Applicable.

##### 6.7.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.1.7 oneM2M Resource Interworking

This service capability is used to download firmware. The service capability aligns with the <firmware> resource and maps to the UPDATE procedure for the attribute update of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.2 installFirmware

##### 6.7.2.2.1 Description

This service capability provides the ability to install firmware on a device.

##### 6.7.2.2.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.2.3 Signature –installFirmware

Table 6.7.2.2.3-1: Management Adapter –installFirmware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.2.2.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. |
| requestId | IN | NO | The M2M Request Identifier (M2M-Request-ID) |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Report policy does not supported by the Management Adapter * Firmware install failure, e.g. firmware is missing dependency on the device, firmware is too large for available program or data memory |

##### 6.7.2.2.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install firmware.

##### 6.7.2.2.5 Exceptions

Not Applicable.

##### 6.7.2.2.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.2.7 oneM2M Resource Interworking

This service capability is used to install firmware. The service capability aligns with the <firmware> resource and maps to the UPDATE procedure for the attribute update of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.3 getFirmwareInformation

##### 6.7.2.3.1 Description

This service capability provides the ability to retrieve the information related to the firmware on a device.

##### 6.7.2.3.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.3.3 Signature –getFirmwareInformation

Table 6.7.2.3.3-1: Management Adapter –getFirmwareInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| requestId | IN | NO | The M2M Request Identifier (M2M-Request-ID) |
| firmwareInfo | OUT | YES | The device firmware information.  Type FirmwareInfo, see 6.6.2.2.5 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.3.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get the firmware information.

##### 6.7.2.3.5 Exceptions

Not Applicable.

##### 6.7.2.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.3.7 oneM2M Resource Interworking

This service capability is used to get firmware information. The service capability aligns with the <firmware> resource and maps to the RETRIEVE procedure for the attribute version, name, URL of the resource.

#### 6.7.2.4 getFirmwareExecStatus

##### 6.7.2.4.1 Pre-Conditions

This service capability provides the ability to get state of firmware management operation for a specific device.

##### 6.7.2.4.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and previously submitted firmware request exist.

##### 6.7.2.4.3 Signature –getFirmwareExecInstance

Table 6.7.2.4.3-1: Management Adapter –getFirmwareExecStatus capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| operationRequestId | IN | NO | The M2M Request Identifier of previously submitted firmware request (M2M-Request-ID) |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. When provided the FirmwareReport type is generated for only the specified device. |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.2.2.3. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * The previously submitted firmware request does not exist |

##### 6.7.2.4.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get the firmware operation execution status or result for each device in the operation request.

##### 6.7.2.4.5 Exceptions

Not Applicable.

##### 6.7.2.4.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.4.7 oneM2M Resource Interworking

This service capability is used to get state of firmware management operation. The service capability aligns with the <firmware> resource and maps to the RETRIEVE procedure for the attribute updateStatus of the resource. The service capability also aligns with the <execInstance> resource and maps to the RETRIEVE procedure for the attribute execStatus, execResult of the resource.

#### 6.7.2.5 deviceManagementReport

##### 6.7.2.5.1 Description

This service capability provides the ability for the Management Adapter to report the device management operation execution result or status information. The Management Adapter can send one or multiple reports according to the report policy.

##### 6.7.2.5.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and previously submitted requests exist.

##### 6.7.2.5.3 Signature –deviceManagementReport

Table 6.7.2.5.3-1: Management Adapter –deviceManagementReport capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| to | IN | NO | The identifier of the AE that is to receive the data(M2M-AppInst-ID) |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| firmwareReportList | IN | YES | Array of firmwareReport.  Type FirmwareReport, see 6.6.2.2.3. |
| troubleshootingReportList | IN | YES | Array of troubleshootingReport.  Type TroubleshootingReport, see 6.6.2.2.20. |
| softwareReportList | IN | YES | Array of softwareReport.  Type SoftwareReport, see 6.6.2.2.27. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * The target AE does not exist. |

##### 6.7.2.5.4 Service Interactions

The interactions of service capabilities required for this service capability:

1) Issue the request to the Supporting Service to perform the operation



Figure 6.7.2.5.4-1: deviceManagementReport Diagram

##### 6.7.2.5.5 Post-Conditions

The M2M System maintains the state of the report (i.e. sequence number) according to the report policy.

##### 6.7.2.5.6 Exceptions

Not Applicable.

##### 6.7.2.5.7 Policies for Use

Message Exchange Patterns: Not Applicable

Transaction Pattern: Not Applicable

##### 6.7.2.5.7 oneM2M Resource Interworking

Not Applicable.

#### 6.7.2.6 getDeviceInformation

##### 6.7.2.6.1 Description

This service capability provides the ability to get the specific device information.

##### 6.7.2.6.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.6.3 Signature –getDeviceInformation

Table 6.7.2.6.3-1: Management Adapter –getDeviceInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| deviceInfo | OUT | YES | The device information. Type DeviceInfo, see 6.6.2.2.7. |
| memory | OUT | YES | The memory information. Type Memory, see 6.6.2.2.8. |
| battery | OUT | YES | The battery information. Type Battery, see 6.6.2.2.9. |
| lockStatus | OUT | YES | The device lock status. Enum LockStatus, see 6.6.2.2.13. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.6.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get the device information.

##### 6.7.2.6.5 Exceptions

Not Applicable.

##### 6.7.2.6.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.6.7 oneM2M Resource Interworking

This service capability is used to get device information. The service capability aligns with the <deviceInfo> resource and maps to the RETRIEVE procedure for the resource. The service capability aligns with the <memory> resource and maps to the Retrieve procedure for the resource. The service capability aligns with the <battery> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.7 getDeviceCapabilities

##### 6.7.2.7.1 Description

This service capability provides the ability to get device capabilities.

##### 6.7.2.7.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.7.3 Signature –getDeviceCapabilities

Table 6.7.2.7.3-1: Management Adapter –getDeviceCapabilities capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| deviceCapabilities | OUT | YES | Array of deviceCapability. Type DeviceCapability, see 6.6.2.2.10. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.7.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device capabilities.

##### 6.7.2.7.5 Exceptions

Not Applicable.

##### 6.7.2.7.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.7.7 oneM2M Resource Interworking

This service capability is used to get device capabilities. The service capability aligns with the<deviceCapability> resource and maps to the RETRIEVE procedure for the resource.

#### 6.7.2.8 enableDeviceCapability

##### 6.7.2.8.1 Description

This service capability provides the ability to enable device capability.

##### 6.7.2.8.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.8.3 Signature –enableDeviceCapability

Table 6.7.2.8.3-1: Management Adapter –enableDeviceCapability capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.2.2.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.8.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to enable device capability.

##### 6.7.2.8.5 Exceptions

Not Applicable.

##### 6.7.2.8.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.8.7 oneM2M Resource Interworking

This service capability is used to enable device capability. The service capability aligns with the <deviceCapability> resource and maps to the UPDATE procedure for the attribute enable of the resource.

#### 6.7.2.9 disableDeviceCapability

##### 6.7.2.9.1 Description

This service capability provides the ability to disable device capability.

##### 6.7.2.9.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.9.3 Signature –disableDeviceCapability

Table 6.7.2.9.3-1: Management Adapter –disableDeviceCapability capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.2.2.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.9.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to disable device capability.

##### 6.7.2.9.5 Exceptions

Not Applicable.

##### 6.7.2.9.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.9.7 oneM2M Resource Interworking

This service capability is used to disable device capability. The service capability aligns with the <deviceCapability> resource and maps to the UPDATE procedure for the attribute disable of the resource.

#### 6.7.2.10 getAreaNetworks

##### 6.7.2.10.1 Description

This service capability provides the ability to get area networks information.

##### 6.7.2.10.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and area network exist.

##### 6.7.2.10.3 Signature –getAreaNetworks

Table 6.7.2.10.3-1: Management Adapter –getAreaNetworks capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| AreaNwks | OUT | YES | Array of area network. Type AreaNwkInfo, see 6.6.2.2.13. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.10.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get area networks information.

##### 6.7.2.10.5 Exceptions

Not Applicable.

##### 6.7.2.10.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.10.7 oneM2M Resource Interworking

This service capability is used to get area networks information. The service capability aligns with the <areaNwkInfo> resource and maps to the RETRIEVE procedure for the resource. The service capability aligns with the <areaNwkDeviceInfo> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.11 updateDeviceForAreaNetwork

##### 6.7.2.11.1 Description

This service capability provides the ability for the Management Adapter to update device information for area network.

##### 6.7.2.11.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability, the device and area network exists.

##### 6.7.2.11.3 Signature –updateDeviceForAreaNetwork

Table 6.7.2.11.3-1: Management Adapter –updateDeviceForAreaNetwork capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| areaNwkId | IN | NO | The unique area network identifier. |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| areaNwkDeviceInfo | IN | YES | The existing areaNwkDeviceInfo are replaced with the information in this parameter. Type AreaNwkDeviceInfo, see 6.6.2.2.15. |
| lastModifiedTime | OUT | NO | The modified time. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.11.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to update device information for area network.

##### 6.7.2.11.5 Exceptions

Not Applicable.

##### 6.7.2.11.6 Policies for Use

Message Exchange Patterns: Not Applicable

Transaction Pattern: Not Applicable

##### 6.7.2.11.7 oneM2M Resource Interworking

The service capability aligns with the <areaNwkDeviceInfo> resource and maps to the Update procedure for attribute devType, sleepInterval , sleepDuration , status , listOfNeighbors of the resource.

#### 6.7.2.12 rebootDevice

##### 6.7.2.12.1 Description

This service capability provides the ability to reboot the specific device.

##### 6.7.2.12.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.12.3 Signature – rebootDevice

Table 6.7.2.12.3-1: Management Adapter – rebootDevice capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.12.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reboot the device.

##### 6.7.2.12.5 Exceptions

Not Applicable.

##### 6.7.2.12.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.12.7 oneM2M Resource Interworking

This service capability is used to reboot device. The service capability aligns with the <reboot> resource and maps to the Execute procedure for the attribute reboot of the resource.

#### 6.7.2.13 resetDevice

##### 6.7.2.13.1 Description

This service capability provides the ability to reset device.

##### 6.7.2.13.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.13.3 Signature – resetDevice

Table 6.7.2.13.3-1: Management Adapter – resetDevice capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.13.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reset device.

##### 6.7.2.13.5 Exceptions

Not Applicable.

##### 6.7.2.13.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.13.7 oneM2M Resource Interworking

This service capability is used to reset device. The service capability aligns with the <reboot> resource and maps to the Execute procedure for the attribute factoryReset of the resource.

#### 6.7.2.14 uploadDeviceLog

##### 6.7.2.14.1 Description

This service capability provides the ability to upload device log.

##### 6.7.2.14.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.14.3 Signature – uploadDeviceLog

Table 6.7.2.14.3-1: Management Adapter – uploadDeviceLog capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| logInfo | IN | NO | The log information. Type LogInfo, see 6.6.2.2.19. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| logURL | OUT | YES | The URL from which the log can be uploaded. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.14.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to upload device log.

##### 6.7.2.14.5 Exceptions

Not Applicable.

##### 6.7.2.14.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.14.7 oneM2M Resource Interworking

This service capability is used to upload device log. The service capability aligns with the <eventLog> resource and maps to the Update procedure for the resource.

#### 6.7.2.15 getDeviceLogs

##### 6.7.2.15.1 Description

This service capability provides the ability to get all logs of a device.

##### 6.7.2.15.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.15.3 Signature –getDeviceLogs

Table 6.7.2.15.3-1: Management Adapter –getDeviceLogs capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| logList | OUT | YES | Array of log. Type Log, see 6.6.2.2.21. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.15.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get all logs of a device.

##### 6.7.2.15.5 Exceptions

Not Applicable.

##### 6.7.2.15.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.15.7 oneM2M Resource Interworking

This service capability is used to get all logs of a device. The service capability aligns with the <eventLog> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.16 getDeviceLogInformation

##### 6.7.2.16.1 Description

This service capability provides the ability to get a device log information.

##### 6.7.2.16.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.16.3 Signature – getDeviceLogInformation

Table 6.7.2.16.3-1: Management Adapter – getDeviceLogInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| filterCriteria | IN | YES | See Table 6.6.2.2.22 |
| logURL | IN | YES | The URL from which the log can be accessed. |
| log | OUT | YES | Type Log, see 6.6.2.2.21. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.16.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get a device log information.

##### 6.7.2.16.5 Exceptions

Not Applicable.

##### 6.7.2.16.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.16.7 oneM2M Resource Interworking

This service capability is used to get device log information. The service capability aligns with the <eventLog> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.17 getSoftwareInformation

##### 6.7.2.17.1 Description

This service capability provides the ability to get application software information.

##### 6.7.2.17.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.17.3 Signature –getSoftwareInformation

Table 6.7.2.17.3-1: Management Adapter –getSoftwareInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | OUT | YES | The version of the software. |
| name | OUT | YES | The name of the software. |
| url | OUT | YES | The URL from which the software package can be downloaded. |
| installStatus | OUT | YES | Indicates the status of the install.  Enum ActionStatus, see 6.6.2.2.26. |
| activeStatus | OUT | YES | The status of active or deactivate action.  Enum ActionStatus, see 6.6.2.2.26. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.17.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get application software information.

##### 6.7.2.17.5 Exceptions

Not Applicable.

##### 6.7.2.17.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.17.7 oneM2M Resource Interworking

This service capability is used to get application software information. The service capability aligns with the <software> resource and maps to the Retrieve procedure for the resource.

#### 6.7.2.18 downloadSoftware

##### 6.7.2.18.1 Description

This service capability provides the ability to download application software.

##### 6.7.2.18.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.18.3 Signature –downloadSoftware

Table 6.7.2.18.3-1: Management Adapter –downloadSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| url | IN | NO | The URL from which the software package can be downloaded. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.18.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download application software.

##### 6.7.2.18.5 Exceptions

Not Applicable.

##### 6.7.2.18.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.18.7 oneM2M Resource Interworking

This service capability is used to download application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute install of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.19 installSoftware

##### 6.7.2.19.1 Description

This M2M Service Capability provides the ability to install application software.

##### 6.7.2.19.2 Pre-Conditions

A correlation between a Management Server, the service capability and device exist.

##### 6.7.2.19.3 Signature –installSoftware

Table 6.7.2.19.3-1: Management Adapter –installSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.19.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install application software.

##### 6.7.2.19.5 Exceptions

Not Applicable.

##### 6.7.2.19.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.19.7 oneM2M Resource Interworking

This service capability is used to install application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute install of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.20 activateSoftware

##### 6.7.2.20.1 Description

This service capability provides the ability to activate software previously installed.

##### 6.7.2.20.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.20.3 Signature – activateSoftware

Table 6.7.2.20.3-1: Management Adapter – activateSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.20.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to activate software previously installed.

##### 6.7.2.20.5 Exceptions

Not Applicable.

##### 6.7.2.20.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.20.7 oneM2M Resource Interworking

This service capability is used to activate software previously installed. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute activate of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.21 deactivateSoftware

##### 6.7.2.21.1 Description

This service capability provides the ability for the Management Adapter to deactivates software.

##### 6.7.2.21.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.21.3 Signature –deactivateSoftware

Table 6.7.2.21.3-1: Management Adapter –deactivateSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.21.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to deactivates software.

##### 6.7.2.21.5 Exceptions

Not Applicable.

##### 6.7.2.21.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.21.7 oneM2M Resource Interworking

This service capability is used to deactivates software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute deactivate of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

#### 6.7.2.22 removeSoftware

##### 6.7.2.22.1 Description

This service capability provides the ability for the Management Adapter to uninstall the software.

##### 6.7.2.22.2 Pre-Conditions

A correlation between a Management Server, the M2M Service Capability and device exist.

##### 6.7.2.22.3 Signature –removeSoftware

Table 6.7.2.22.3-1: Management Adapter –removeSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| deviceId | IN | NO | The unique device identifier in the context of the M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

##### 6.7.2.22.4 Post-Conditions

The Management Adapter has submitted a request to the Management Server to uninstall the software.

##### 6.7.2.22.5 Exceptions

Not Applicable.

##### 6.7.2.22.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.7.2.22.7 oneM2M Resource Interworking

This service capability is used to install application software. The service capability aligns with the <software> resource and maps to the UPDATE procedure for the attribute uninstall of the resource. The service capability also aligns with the <mgmtCmd> resource and maps to the EXECUTE procedure for the resource.

## 6.8 Service Administration

### 6.8.1 Overview

The Service Administration service provides the capability to administer the following across the Msc Reference Points:

* Administration of M2M Service attributes
* Association of M2M Services to corresponding Service Roles
* Association of Service Roles to M2M Service Capabilities

### 6.8.2 Service Administration Entities

#### 6.8.2.1 Overview

The information elements that relate M2M Services to Service Roles and Service Roles to M2M Service Capabilities is depicted below:

* Each instance of an M2M Service contains zero or instances of a Service Role
* The M2M Service can be obtained from the Service Role. The Service Roles from the M2M Service can be obtained from the M2M Service
* Each instance of a Service Role is associated with zero or more instances of a M2M Service Capability
* The M2M Service can be obtained from the Service Role. The Service Roles associated with the M2M Service can be obtained from the M2M Service
* Each instance of a M2M Service Capability is associated with zero or more instances of a Service Role
* The M2M Service Capabilities that are associated with a Service Role can be obtained from the Service Role. Likewise the Service Roles associated with the M2M Service Capability can be obtained from the M2M Service Capability
* Each operation that is defined within the Service Exposure Component is assigned to exactly one M2M Service Capability



Figure 6.8.1-1: M2M Service Entity Relationships

#### 6.8.2.2 M2M Service Entity

The Service is a primary entity that provides the attributes to identify the M2M Service and associated Service Roles within the oneM2M System. These M2M Services and associated Service Roles shall be maintained by the M2M Service Provider.

Table 6.8.2.2-1: M2M Service Entity

| Attribute name | Description |
| --- | --- |
| serviceId | The M2M Service Identifier (M2M-Serv-ID). |
| serviceRoleIds | List of Service Role Identifiers (SRole-ID) associated with the Service. |

##### 6.8.2.3 M2M Service Filter Criteria

Table 6.8.2.3-1: M2M Service Filter Criteria

| Criterion name | Description |
| --- | --- |
| serviceIds | List of the Service Identifiers (M2M-Serv-ID). |
| serviceRoleIds | One or more Service Role Identifiers (SRole-ID) associated with the M2M Service entity. |

### 6.8.3 Service Capabilities

#### 6.8.3.1 createM2MService

##### 6.8.3.1.1 Description

This service capability provides the ability to create a M2M Service.

##### 6.8.3.1.2 Pre-Conditions

Not Applicable.

##### 6.8.3.1.3 Signature – createM2MService

Table 6.8.3.1.3-1: Service Administration – createM2M Service capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| name | IN | NO | The unique name of the M2M Service. |
| description | IN | YES | The description of the M2M Service. |
| serviceId | OUT | NO | The identifier of the created M2M Service (M2M-Serv-ID) |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service exists for the name parameter * M2M Service Role exists for M2M Service |

##### 6.8.3.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.8.3.1.4-1: Service Administration – createM2MService Diagram

##### 6.8.3.1.5 Post-Conditions

Not Applicable.

##### 6.8.3.1.6 Exceptions

Not Applicable.

##### 6.8.3.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.3.1.8 oneM2M Resource Interworking

This service capability creates the M2M Service. The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2]. The M2M-Serv-ID created using this capability shall map to the M2M-Serv-ID of the oneM2M Functional Architecture [2].

#### 6.8.3.2 deleteM2MService

##### 6.8.3.2.1 Description

This service capability provides the ability to delete a M2M Service. This service capability shall be restricted to the Msc Reference Point.

##### 6.8.3.2.2 Pre-Conditions

The M2M Service's Service Roles are not associated with any M2M Service Subscriptions.

##### 6.8.3.2.3 Signature – deleteM2MService

Table 6.8.3.2.3-1: Service Administration – deleteM2MService capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID). |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service does not exist * M2M Service has Service Roles associated with M2M Service Subscriptions |

##### 6.8.3.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.8.3.2.4-1: Service Administration – deleteM2MService Diagram

##### 6.8.3.2.5 Post-Conditions

The M2M Service is deleted along with any associations has to the Service Roles. The Node information associated with the M2M Service is also deleted.

##### 6.8.3.2.6 Exceptions

Not Applicable.

##### 6.8.3.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.3.2.8 oneM2M Resource Interworking

This service capability deletes the M2M Service. The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2].

#### 6.8.3.3 addRoleToM2MService

##### 6.8.3.3.1 Description

This service capability provides the ability to add new Service Roles to a M2M Service. This service capability shall be restricted to the Msc Reference Point.

##### 6.8.3.3.2 Pre-Conditions

M2M Service exists.

##### 6.8.3.3.3 Signature – addRoleToM2MService

Table 6.8.3.3.3-1: Service Administration – addRoleToM2MService capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be associated with the M2M Service. If a SRole-ID in the parameter is already associated with the M2M Service, nothing is done for the SRole-ID as it already is associated. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service does not exist |

##### 6.8.3.3.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.8.3.3.4-1: Service Administration – addRoleToM2MService Diagram

##### 6.8.3.3.5 Post-Conditions

The associations that M2M Service has to the Service Role(s) are updated.

##### 6.8.3.3.6 Exceptions

Not Applicable.

##### 6.8.3.3.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.3.3.8 oneM2M Resource Interworking

This service capability updates the M2M Service with the respective M2M Service Roles. The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2].

#### 6.8.3.4 deleteRoleFromM2MService

##### 6.8.3.4.1 Description

This service capability provides the ability to delete existing Service Roles from a M2M Service. This service capability shall be restricted to the Msc Reference Point.

##### 6.8.3.4.2 Pre-Conditions

The Service Role is not associated with any M2M Service Subscriptions.

##### 6.8.3.4.3 Signature – deleteRoleFromM2MService

Table 6.8.3.4.3-1: Service Administration – deleteRoleFromM2MService capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be deleted from the association with the M2M Service. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service does not exist * Service Role does not exist * Service Role is associated with a M2M Service Subscription |

##### 6.8.3.4.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.8.3.4.4-1: Service Administration – deleteRoleFromM2MService Diagram

##### 6.8.3.4.5 Post-Conditions

The M2M Service is updated with associations of the identified Service Roles deleted.

##### 6.8.3.4.6 Exceptions

Not Applicable.

##### 6.8.3.4.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.3.4.8 oneM2M Resource Interworking

This service capability updates the M2M Service with the respective Service Roles removed. The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2].

#### 6.8.3.5 getM2MService

##### 6.8.3.5.1 Description

This service capability provides the ability to retrieve the existing M2M Service. This service capability shall be restricted to the Msc Reference Points.

##### 6.8.3.5.2 Pre-Conditions

Not Applicable.

##### 6.8.3.5.3 Signature – getM2MService

Table 6.8.3.5.2-1: Service Administration – getM2MService capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| filterCriteria | IN | NO | See M2M Service Filter Criteria Table 6.8.2.3-1 |
| services | OUT | NO | The resulting M2M Service entities in Table 6.8.2.2-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

##### 6.8.3.5.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.8.3.5.4-1: Service Administration – getM2MService Diagram

##### 6.8.3.5.5 Post-Conditions

Not Applicable.

##### 6.8.3.5.6 Exceptions

Not Applicable.

##### 6.8.3.5.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.3.5.8 oneM2M Resource Interworking

This service capability retrieves the M2M Service. The M2M Service entity is described in the Annex G of the oneM2M Functional Architecture [2].

#### 6.8.3.6 addServiceCapabilityToRole

##### 6.8.3.6.1 Description

This service capability adds a M2M Service Capability to one or more Service Roles.

##### 6.8.3.6.2 Pre-Conditions

Service Roles exist.

##### 6.8.3.6.3 Signature – addServiceCapabilityToRole

Table 6.8.3.6.3-1: Service Administration – addServiceCapabilityToRole capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceCapId | IN | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be associated with the M2M Service Capability. |
| responseType | OUT | YES | Response types:   * Service Role does not exist * M2M Service Capability is not part of the capabilities of M2M Service associated with the Service Role |

##### 6.8.3.6.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.8.3.6.4-1: Service Administration – addServiceCapabilityToRole Diagram

##### 6.8.3.6.5 Post-Conditions

Not Applicable.

##### 6.8.3.6.6 Exceptions

Not Applicable.

##### 6.8.3.6.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.3.6.8 oneM2M Resource Interworking

Not Applicable.

#### 6.8.3.7 deleteServiceCapabilityFromRole

##### 6.8.3.7.1 Description

This service capabilitydelete a M2M Service Capability from one or more Service Roles.

##### 6.8.3.7.2 Pre-Conditions

The association between the M2M Service Capability and Service Role exists.

##### 6.8.3.7.3 Signature – deleteServiceCapabilityFromRole

Table 6.8.3.7.3-1: Service Administration – deleteServiceCapabilityFromRole capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceCapId | IN | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be associated with the M2M Service Capability to be removed |
| responseType | OUT | YES | Response types:   * Service Role does not exist * Service Role is not associated with a M2M Service Capability |

##### 6.8.3.7.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.8.3.7.4-1:Service Administration – deleteServiceCapabilityFromRole Diagram

##### 6.8.3.7.5 Post-Conditions

The association of the M2M Service Capability and Service Role is deleted.

##### 6.8.3.7.6 Exceptions

Not Applicable.

##### 6.8.3.7.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.3.7.8 oneM2M Resource Interworking

Not Applicable.

#### 6.8.3.8 getServiceCapability

##### 6.8.3.8.1 Description

This service capability retrieves the M2M Service Capability and associated Service Roles for a specified requested operation.

##### 6.8.3.8.2 Pre-Conditions

There is a correlation to the service capabilities' operation (signature) and the M2M Service Capability. In many deployments the service capabilities' signature serves as the M2M Service Capability.

##### 6.8.3.8.3 Signature – getServiceCapability

Table 6.8.3.8.3-1: Service Administration – getServiceCapability capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| operation | IN | NO | Request operation – Common to all requests |
| serviceCapId | OUT | NO | The M2M Service Capability Identifier (M2M-Serv-Cap-ID). |
| serviceRoleIds | OUT | NO | List of the M2M Service Roles Identifiers (SRole-ID) associated with the M2M Service Capabilities. |
| responseType | OUT | YES | Response types:   * Unable to determine M2M Service Capability from the operation |

##### 6.8.3.8.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue this capability



Figure 6.8.3.8.4-1: Service Administration – getServiceCapability Diagram

##### 6.8.3.8.5 Post-Conditions

Not Applicable.

##### 6.8.3.8.6 Exceptions

Not Applicable.

##### 6.8.3.8.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.8.3.8.8 oneM2M Resource Interworking

Not Applicable.

## 6.9 Service Subscription Administration

### 6.9.1 Overview

The Service Subscription Administration service provides the capability to administer the following across the Mca and Msc Reference Points:

* Maintenance of M2M Services Subscriptions
* Association of M2M Nodes and Application Rules to the M2M Service Subscription

The M2M Service Subscription defines the technical part of the contract between a M2M Subscriber (typically an M2M Application Service Provider) and a M2M Service Provider. Each M2M Service Subscription has a unique identifier (M2M-Service-Profile-ID).

A M2M Service Subscription establishes an association between one or more M2M Application Rules and one or more M2M Nodes. In addition, the M2M Service Subscription is associated with one or more Service Roles.

A M2M Service Subscription shall be used for the following purposes:

* Serve as a basis for authorization for service capabilities
* Serve as the basis for charging
* Identify which devices and M2M Applications are part of this M2M Service Subscription

### 6.9.2 Service Subscription Entities

#### 6.9.3.1 Service Subscription Entity

Table 6.9.3.1-1: Service Subscription Entity

| Attribute name | Description |
| --- | --- |
| serviceSubscriptionId | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| serviceRoleIds | List of Service Role Identifiers (SRole-ID) associated with the M2M Service Subscription. |

#### 6.9.2.2 Service Subscription Filter Criteria

Table 6.9.3.2-1: Service Subscription Filter Criteria

| Criterion name | Description |
| --- | --- |
| serviceSubscriptionIds | List of the M2M Service Subscription Identifiers (M2M-Service-Profile-ID). |
| serviceRoleIds | List of Service Role Identifiers (SRole-ID) associated with the M2M Service Subscription entity. |

#### 6.9.2.3 M2M Node Entity for Service Subscription

Table 6.9.2.3-1: M2M Node Entity for Service Subscription

| Attribute name | Description |
| --- | --- |
| serviceSubscriptionId | The M2M Service Subscription Identifier (M2M-Service-Profile-ID) for the Device. |
| nodeId | The unique M2M Node identifier in the context of the M2M Service Subscription. |
| externalIds | List of URNs that represent the external identifiers associated with this M2M Node. |
| applicationRuleIds | List of Application Rules Identifiers associated with the M2M Node. |

#### 6.9.2.4 M2M Node Filter Criteria

Table 6.9.2.4-1: M2M Node Filter Criteria

| Criterion name | Description |
| --- | --- |
| serviceSubscriptionIds | List of the M2M Service Subscription Identifier (M2M-Service-Profile-ID) for the Device. |
| nodeIds | List of the unique M2M Node identifier in the context of the M2M Service Subscription. |
| externalIds | List of URNs that represent the external identifiers associated with this M2M Node. |
| applicationRuleIds | List of Application Rule identifiers associated with the M2M Node. |

#### 6.9.2.5 Application Rule

Table 6.9.2.5-1: Application Rule Entity

| Criterion name | Description |
| --- | --- |
| applicationRuleId | The unique Application Rule identifier in the context of the M2M Service Subscription. |
| credentialIds | List of credential identifiers for which this Application Rule is applicable, i.e. for registration requests coming into a CSE via a Security Association Endpoint (SEA) [i.4], that was authenticated using credentials that match with any of these credential identifiers, the current Application Rule applies. This can contain a '\*' for any credential identifier or 'None' for not authenticated case. Also Wildcards within an element of this list are possible (e.g. 'C123\*X' for any credential identifier that starts with 'C123' and ends with 'X') to define sets or ranges of credential identifiers. |
| allowedApplicationIds | List of M2M Application Identifiers (App-ID) that shall be considered to be allowed for AE registration requests received via Security Association Endpoint (SEA) [i.4]. This can contain '\*' for any App-ID. Also Wildcards within an element of this list are possible (e.g. 'C123\*X' for any App-ID that starts with 'C123' and ends with 'X') to define sets or ranges of App-IDs. |
| allowedAEIds | List of M2M Application Entity Identifiers (AE-ID) that shall be considered to be allowed for AE registration requests. This can contain zero or more specific AE identifier values, 'S\*' for any Service Provider AE-ID, 'C\*' for any system assigned AE-ID, or '\*' for any AE-ID. Also Wildcards within an element of this list are possible (e.g. 'C123\*X' for any AE-ID that starts with 'C123' and ends with 'X') to define sets or ranges of AE-ID. |

#### 6.9.2.6 Application Rule Filter Criteria

Table 6.9.2.6-1: Application Rule Filter Criteria

| Criterion name | Description |
| --- | --- |
| applicationRuleIds | List of the unique Application Rule identifier in the context of the M2M Service Subscription. |
| credentialIds | List of credential identifiers for which this Application Rule is applicable, i.e. for registration requests coming into the M2M System via a Security Association Endpoint (SEA) [i.1], that was authenticated using credentials that match with any of these credential identifiers, the current Application Rule applies. This can contain a '\*' for any credential identifier or 'None' for not authenticated case. Also Wildcards within an element of this list are possible (e.g. 'C123\*X' for any credential identifier that starts with 'C123' and ends with 'X') to define sets or ranges of credential identifiers. |
| allowedApplicationIds | List of M2M Application Identifiers (App-ID) that shall be considered to be allowed for AE registration requests received via Security Association Endpoint (SEA) [i.2]. This can contain '\*' for any App-ID. Also Wildcards within an element of this list are possible (e.g. 'C123\*X' for any App-ID that starts with 'C123' and ends with 'X') to define sets or ranges of App-IDs. |
| allowedAEIds | List of M2M Application Entity Identifiers (AE-ID) that shall be considered to be allowed for AE registration requests. This can contain zero or more specific AE identifier values, 'S\*' for any Service Provider AE-ID, 'C\*' for any system assigned AE-ID, or '\*' for any AE-ID. Also Wildcards within an element of this list are possible (e.g. 'C123\*X' for any AE-ID that starts with 'C123' and ends with 'X') to define sets or ranges of AE-ID. |

#### 6.9.2.7 Supporting Rules

##### 6.9.2.7.1 Schedule Type

The Schedule is a simple type that describes the schedule information.

Table 6.9.2.7.1-1: Type: Schedule

| Parameter | Optional | Description |
| --- | --- | --- |
| scheduleElement | NO | Expresses time periods defined by second, minute, hour day of month, month, and year. Supports repeating periods, and wildcards expressed as a list. The definition of a schedule is defined in clause 7.3.9 of TS-0004. |

### 6.9.3 Service Capabilities

#### 6.9.3.1 createServiceSubscription

##### 6.9.3.1.1 Description

This service capability provides the ability to create a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.3.1.2 Pre-Conditions

Not Applicable.

##### 6.9.3.1.3 Signature – createServiceSubscription

Table 6.9.3.1.3-1: Service Subscription Administration - createServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN-OUT | YES | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). If the attribute is not provided on input, the oneM2M System shall assign the M2M-Service-Profile-ID.  The M2M-Service-Profile-ID is unique for the oneM2M System. |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be associated with the M2M Service Subscription. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription exists * Service Role does not exist |

##### 6.9.3.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the createServiceSubscription capability



Figure 6.9.3.1.4-1: Service Subscription Administration – createServiceSubscription Diagram

##### 6.9.3.1.5 Post-Conditions

The M2M Service Subscription is created and any Service Roles are associated with the M2M Service Subscription.

##### 6.9.3.1.6 Exceptions

Not Applicable.

##### 6.9.3.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.1.8 oneM2M Resource Interworking

This service capability creates the M2M Service Subscription with the identifier (M2M-Service-Profile-ID) and maps to the CREATE procedure for the <m2mServiceSubscriptionProfile> resource.

This service capability utilizes the access management services with the privileges associated with the associated Service Role. As such the accessControlPolicyIDs attribute of the <m2mServiceSubscriptionProfile> resource is not used within this service capability.

#### 6.9.3.2 deleteServiceSubscription

##### 6.9.3.2.1 Description

This service capability provides the ability to delete a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.3.2.2 Pre-Conditions

Not Applicable.

##### 6.9.3.2.3 Signature – deleteServiceSubscription

Table 6.9.3.2.3-1: Service Subscription Administration – deleteServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist |

##### 6.9.3.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteServiceSubscription capability



Figure 6.9.3.2.4-1: Service Subscription Administration – deleteServiceSubscription Diagram

##### 6.9.3.2.5 Post-Conditions

The M2M Service Subscription is deleted along with any associations of the M2M Service Subscription has to the Service Roles. The Node information (e.g. devices, M2M Applications) associated with the M2M Service Subscription is also deleted.

##### 6.9.3.2.6 Exceptions

Not Applicable.

##### 6.9.3.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.2.8 oneM2M Resource Interworking

This service capability deletes the M2M Service Subscription with the identifier (M2M-Service-Profile-ID) and maps to the DELETE procedure for the <m2mServiceSubscriptionProfile> resource.

#### 6.9.3.3 updateServiceSubscription

##### 6.9.3.3.1 Description

This service capability provides the ability to update a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.3.3.2 Pre-Conditions

Not Applicable.

##### 6.9.3.3.3 Signature – updateServiceSubscription

Table 6.9.3.3.3-1: Service Subscription Administration – updateServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| serviceRoleIds | IN | YES | List of Service Role Identifiers (SRole-ID) to be associated with the M2M Service Subscription. If supplied, SRole-IDs in the list that are not already associated with the M2M Service Subscription are added. SRole-IDs that are associated with the M2M Service Subscription but not in the list are deleted. |
| roleIdResult | OUT | YES | If the parameter serviceRoleIds is present, this parameter provides the results (added, deleted) for each affected Service Roles. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * Service Role does not exist for a Supporting Service |

##### 6.9.3.3.4 Service Interactions

1. The interactions of service capabilities required for this service capability:
2. Issue the updateServiceSubscription capability



Figure 6.9.3.3.4-1: Service Subscription Administration - updateServiceSubscription Diagram

##### 6.9.3.3.5 Post-Conditions

The M2M Service Subscription is updated along with any associations of the M2M Service Subscription has to the Service Roles.

##### 6.9.3.3.6 Exceptions

Not Applicable.

##### 6.9.3.3.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.3.8 oneM2M Resource Interworking

This service capability updates the M2M Service Subscription with the identifier (M2M-Service-Profile-ID) and maps to the UPDATE procedure for the <m2mServiceSubscriptionProfile> resource.

#### 6.9.3.4 addRoleToServiceSubscription

##### 6.9.3.4.1 Description

This service capability provides the ability to add new Service Roles to a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.3.4.2 Pre-Conditions

Not Applicable.

##### 6.9.3.4.3 Signature – addRoleToServiceSubscription

Table 6.9.3.4.3-1: Service Subscription Administration – addRoleToServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be associated with the M2M Service Subscription. If a SRole-ID in the parameter is already associated with the M2M Service Subscription, nothing is done for the SRole-ID as it already is associated. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * Service Role does not exist for a Supporting Service |

##### 6.9.3.4.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the addRoleToServiceSubscription capability



Figure 6.9.3.4.4-1: Service Subscription Administration – addRoleToServiceSubscription Diagram

##### 6.9.3.4.5 Post-Conditions

The M2M Service Subscription is updated with any associations of the M2M Service Subscription has to the Service Roles.

##### 6.9.3.4.6 Exceptions

Not Applicable.

##### 6.9.3.4.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.4.8 oneM2M Resource Interworking

This service capability updates the M2M Service Subscription with the identifier (M2M-Service-Profile-ID) and maps to the UPDATE procedure for the <m2mServiceSubscriptionProfile> resource for the serviceRoles attribute.

#### 6.9.3.5 deleteRoleFromServiceSubscription

##### 6.9.3.5.1 Description

This service capability provides the ability to delete existing Service Roles from a M2M Service Subscription. This service capability shall be restricted to the Msc Reference Point.

##### 6.9.3.5.2 Pre-Conditions

Not Applicable.

##### 6.9.3.5.3 Signature – deleteRoleFromServiceSubscription

Table 6.9.3.5.3-1: Service Subscription Administration – deleteRoleFromServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription Identifier (M2M-Service-Profile-ID). |
| serviceRoleIds | IN | NO | List of Service Role Identifiers (SRole-ID) to be deleted from the association with the M2M Service Subscription. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * Service Role does not exist for a Supporting Service |

##### 6.9.3.5.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteRoleFromServiceSubscription capability



Figure 6.9.3.5.4-1: Service Subscription Administration – deleteRoleFromServiceSubscription Diagram

##### 6.9.3.5.5 Post-Conditions

The M2M Service Subscription is updated with associations of the identified Service Roles deleted.

##### 6.9.3.5.6 Exceptions

Not Applicable.

##### 6.9.3.5.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.5.8 oneM2M Resource Interworking

This service capability updates the M2M Service Subscription with the identifier (M2M-Service-Profile-ID) and maps to the UPDATE procedure for the <m2mServiceSubscriptionProfile> resource for the serviceRoles attribute.

#### 6.9.3.6 getServiceSubscription

##### 6.9.3.6.1 Description

This service capability provides the ability to retrieve the existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.6.2 Pre-Conditions

Not Applicable.

##### 6.9.3.6.3 Signature – getServiceSubscription

Table 6.9.3.6.3-1: Service Subscription Administration – getServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| filterCriteria | IN | NO | See Table 6.9.2.2-1 |
| serviceSubscriptions | OUT | NO | The resulting M2M Service Subscription entities in Table 6.9.2.3-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

##### 6.9.3.6.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getServiceSubscription capability



Figure 6.9.3.6.4-1: Service Subscription Administration – getServiceSubscription Diagram

##### 6.9.3.6.5 Post-Conditions

Not Applicable.

##### 6.9.3.6.6 Exceptions

Not Applicable.

##### 6.9.3.6.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.6.8 oneM2M Resource Interworking

This service capability retrieves the M2M Service Subscription for the specified filter criteria and maps to the RETRIEVE procedure for the <m2mServiceSubscription> resource.

#### 6.9.3.7 addNodeToServiceSubscription

##### 6.9.3.7.1 Description

This service capability provides the ability to add a M2M Node to the existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.7.2 Pre-Conditions

Not Applicable.

##### 6.9.3.7.3 Signature – addNodeToServiceSubscription

Table 6.9.3.7.3-1: Service Subscription Administration – addNodeToServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) to add the Device |
| externalIds | IN | YES | A List of URNs that represent the external identifiers associated with this M2M Node. |
| applicationRuleIds | IN | YES | A list of Application Rules associated with this Node. |
| nodeId | OUT | NO | The unique M2M Node identifer for this entity. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist. |

##### 6.9.3.7.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the addNodeToServiceSubscription capability



Figure 6.9.3.7.4-1: Service Subscription Administration – addNodeToServiceSubscription Diagram

##### 6.9.3.7.5 Post-Conditions

Not Applicable.

##### 6.9.3.7.6 Exceptions

Not Applicable.

##### 6.9.3.7.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.7.8 oneM2M Resource Interworking

This service capability adds the M2M Node information for the M2M Service Subscription. This capability maps to the CREATE procedure of the <serviceSubscribedNode> resource.

#### 6.9.3.8 deleteNodesFromServiceSubscription

##### 6.9.3.8.1 Description

This service capability provides the ability to delete M2M Nodes from the existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.8.2 Pre-Conditions

Not Applicable.

##### 6.9.3.8.3 Signature – deleteNodesFromServiceSubscription

Table 6.9.3.8.3-1: Service Subscription Administration - deleteNodesFromServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the Devices |
| nodeIds | IN | NO | List of M2M Node identifiers to be deleted from the M2M Service Subscription. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist. * M2M Node does not exist for this M2M Service Subscription |

##### 6.9.3.8.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteNodesFromServiceSubscription capability



Figure 6.9.3.8.4-1: Service Subscription Administration – deleteNodesFromServiceSubscription Diagram

##### 6.9.3.8.5 Post-Conditions

Not Applicable.

##### 6.9.3.8.6 Exceptions

Not Applicable.

##### 6.9.3.8.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.8.8 oneM2M Resource Interworking

This service capability removes the M2M Node from the M2M Service Subscription. This capability maps to the DELETE procedure of the <serviceSubscribedNode> resource.

#### 6.9.3.9 getNodesForServiceSubscription

##### 6.9.3.9.1 Description

This service capability provides the ability to retrieve M2M Nodes for an existing M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.9.2 Pre-Conditions

Not Applicable.

##### 6.9.3.9.3 Signature – getNodesForServiceSubscription

Table 6.9.3.9.3-1: Service Subscription Administration – getNodesForServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| filterCriteria | IN | NO | See Table 6.9.2.4-1 |
| nodes | OUT | NO | The resulting M2M Node entities in Table 6.9.2.3-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

##### 6.9.3.9.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getNodesForServiceSubscription capability



Figure 6.9.3.9.4-1: Service Subscription Administration – getNodesForServiceSubscription Diagram

##### 6.9.3.9.5 Post-Conditions

Not Applicable.

##### 6.9.3.9.6 Exceptions

Not Applicable.

##### 6.9.3.9.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.9.8 oneM2M Resource Interworking

This service capability retrieves the devices for a M2M Service Subscription for the specified filter criteria and maps to the RETRIEVE procedure for the <serviceSubscribedNode> resource.

#### 6.9.3.10 createApplicationRule

##### 6.9.3.10.1 Description

This service capability provides the ability to create a M2M Application Rule to be associated with one or more M2M Nodes. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.10.2 Pre-Conditions

Not Applicable.

##### 6.9.3.10.3 Signature – createApplicationRule

Table 6.9.3.10.3-1: Service Subscription Administration – createApplicationRule capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| credentialIds | IN | YES | List of credential identifiers for which this Application Rule is applicable, i.e. for registration requests coming into the M2M System via a Security Association Endpoint (SEA) [i.3], that was authenticated using credentials that match with any of these credential identifiers, the current Application Rule applies. |
| allowedApplicationIds | IN | YES | List of M2M Application Identifiers (App-ID) that shall be considered to be allowed for AE registration requests received via Security Association Endpoint (SEA) [i.4]. |
| allowedAEIds | IN | YES | List of M2M Application Entity Identifiers (AE-ID) that shall be considered to be allowed for AE registration requests. |
| applicationRuleId | OUT | NO | The unique Application Rule identifier in the context of the M2M Service Subscription. |
| responseType | OUT | YES | Unique response types for this service.   * None |

##### 6.9.3.10.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the createApplicationRule capability



Figure 6.9.3.10.4-1: Service Subscription Administration – createApplicationRule Diagram

##### 6.9.3.10.5 Post-Conditions

Not Applicable.

##### 6.9.3.10.6 Exceptions

Not Applicable.

##### 6.9.3.10.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.10.8 oneM2M Resource Interworking

This service capability adds an Application Rule. This capability maps to the CREATE procedure of the <serviceSubscribedAppRule> resource.

#### 6.9.3.11 deleteApplicationRules

##### 6.9.3.11.1 Description

This service capability provides the ability to delete Application Rules and any references to the Application Rule made by M2M Nodes to the Application Rules. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.11.2 Pre-Conditions

Not Applicable.

##### 6.9.3.11.3 Signature - deleteApplicationRules

Table 6.9.3.11.3-1: Service Subscription Administration – deleteApplicationRules capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| applicationRuleIds | IN | NO | A list of Application Rule identifiers. |
| responseType | OUT | YES | Unique response types for this service.   * Application Rule does not exist |

##### 6.9.3.11.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteApplicationRules capability



Figure 6.9.3.11.4-1: Service Subscription Administration – deleteApplicationRules Diagram

##### 6.9.3.11.5 Post-Conditions

Not Applicable.

##### 6.9.3.11.6 Exceptions

Not Applicable.

##### 6.9.3.11.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.11.8 oneM2M Resource Interworking

This service capability adds Application Rules. This capability maps to the DELETE procedure of the <serviceSubscribedAppRule> resource.

#### 6.9.3.12 getApplicationRules

##### 6.9.3.12.1 Description

This service capability provides the ability to retrieve the Application Rules. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.12.2 Pre-Conditions

Not Applicable.

##### 6.9.3.12.3 Signature – getApplicationRules

Table 6.9.3.12.3-1: Service Subscription Administration – getApplicationRules capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| filterCriteria | IN | NO | See Table 6.9.2.6-1 |
| applicationRules | OUT | NO | The resulting M2M Node entities in Table 6.9.2.5-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

##### 6.9.3.12.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getApplicationRules capability



Figure 6.9.3.12.4-1: Service Subscription Administration – getApplicationRules Diagram

##### 6.9.3.12.5 Post-Conditions

Not Applicable.

##### 6.9.3.12.6 Exceptions

Not Applicable.

##### 6.9.3.12.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.12.8 oneM2M Resource Interworking

This service capability retrieves Application Rules. This capability maps to the RETRIEVE procedure of the <serviceSubscribedAppRule> resource.

#### 6.9.3.13 updateNodeForServiceSubscription

##### 6.9.3.13.1 Description

This service capability provides the ability to update the Application Rules and External Identifiers to be associated to a Node within the context of a M2M Service Subscription. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.13.2 Pre-Conditions

Not Applicable.

##### 6.9.3.13.3 updateNodeForServiceSubscription

Table 6.9.3.13.3-1: Service Subscription Administration – updateNodeForServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceSubscriptionId | IN | NO | The M2M Service Subscription (M2M-Service-Profile-ID) for the device |
| nodeId | IN | NO | The unique M2M Node identifier in the context of the M2M Service Subscription. |
| applicationRuleIds | IN | YES | A list of Application Rule Identifier. When present this list will overlay the list of Applications associated with the Node. |
| externalIds | IN | YES | List of URNs that represent the external identifiers associated with this device. When present this list will overlay the list of external identifiers associated with the Node. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * M2M Node does not exist for the M2M Service Subscription |

##### 6.9.3.13.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the updateNodeForServiceSubscription capability



Figure 6.9.3.13.4-1: Service Subscription Administration – updateNodeForServiceSubscription Diagram

##### 6.9.3.13.5 Post-Conditions

When parameters are present, the M2M Applications and External Identifiers are replaced for the M2M Node.

##### 6.9.3.13.6 Exceptions

Not Applicable.

##### 6.9.3.13.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.13.8 oneM2M Resource Interworking

This service capability updates the M2M Application and/or External Identifier list(s) for the Node in the context of the M2M Service Subscription Profile. This capability maps to the UPDATE procedure of the <serviceSubscribedNode> resource.

#### 6.9.3.14 updateApplicationRule

##### 6.9.3.14.1 Description

This service capability provides the ability to update an Application Rule. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.14.2 Pre-Conditions

Not Applicable.

##### 6.9.3.14.3 Signature – updateApplicationRule

Table 6.9.3.14.3-1: Service Subscription Administration – updateApplicationRule capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| applicationRuleId | IN | NO | The unique Application Rule identifier in the context of the M2M Service Subscription. |
| credentialIds | IN | YES | List of credential identifiers for which this Application Rule is applicable, i.e. for registration requests coming into the M2M System via a Security Association Endpoint (SEA) [i.3], that was authenticated using credentials that match with any of these credential identifiers, the current Application Rule applies.  When present this list will overlay the list of credential identifiers. |
| allowedApplicationIds | IN | YES | List of M2M Application Identifiers (App-ID) that shall be considered to be allowed for AE registration requests received via Security Association Endpoint (SEA) [i.3].  When present this list will overlay the list of allowed App-IDs. |
| allowedAEIds | IN | YES | List of M2M Application Entity Identifiers (AE-ID) that shall be considered to be allowed for AE registration requests.  When present this list will overlay the list of allowed AE-IDs. |
| responseType | OUT | YES | Unique response types for this service.   * Application Rule does not exist. |

##### 6.9.3.14.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the updateApplicationRule capability



Figure 6.9.3.14.4-1: Service Subscription Administration – updateApplicationRule Diagram

##### 6.9.3.14.5 Post-Conditions

When parameters are present, the Allowed Application, AEs and Credentials are replaced for the Application Rule.

##### 6.9.3.14.6 Exceptions

Not Applicable.

##### 6.9.3.14.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.14.8 oneM2M Resource Interworking

This service capability updates an Application Rule. This capability maps to the UPDATE procedure of the <serviceSubscribedAppRule> resource.

#### 6.9.3.15 addReachabilitySchedule

##### 6.9.3.15.1 Description

This service capability provides the ability to add a reachability schedule to an AE. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.15.2 Pre-Conditions

Not Applicable.

##### 6.9.3.15.3 Signature – addReachabilitySchedule

Table 6.9.3.15.3-1: Service Subscription Administration – addReachabilitySchedule capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Identifier (AE-ID). |
| reachabilitySchedule | IN | YES | The contact reachability schedule information of the AE associated with the device node. The absence of this parameter implies the AE associated with the device node is always contact reachable. Type Schedule, see 6.9.2.7.1. |
| responseType | OUT | YES | Unique response types for this service.   * AE successfully added |

##### 6.9.3.15.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the addReachabilitySchedule capability



Figure 6.9.3.15.4-1: addReachabilitySchedule Diagram

##### 6.9.3.15.5 Post-Conditions

When parameters are present, the reachability schedule is added for the AE.

##### 6.9.3.15.6 Exceptions

Not Applicable.

##### 6.9.3.15.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.15.8 oneM2M Resource Interworking

This service capability is used to add AE reachability schedule information. The service capability aligns with the <schedule> resource and maps to the CREATE procedure. However the linkage between the <schedule> resource and the AE does not exist.

#### 6.9.3.16 updateReachabilitySchedule

##### 6.9.3.16.1 Description

This service capability provides the ability to update an AE's reachability schedule information. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.16.2 Pre-Conditions

Not Applicable.

##### 6.9.3.16.3 Signature –updateReachabilitySchedule

Table 6.9.3.16.3-1: Service Subscription Administration –updateReachabilitySchedule capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Identifier (AE-ID). |
| reachabilitySchedule | IN | YES | The contact reachability schedule information of the AE associated with the device node. The absence of this parameter implies the AE associated with the device node is always contact reachable. Type Schedule, see 6.9.2.7.1. |
| responseType | OUT | YES | Unique response types for this service.   * AE successfully updated |

##### 6.9.3.16.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the updateReachabilitySchedule capability



Figure 6.9.3.16.4-1: updateReachabilitySchedule Diagram

##### 6.9.3.16.5 Post-Conditions

When parameters are present, the reachability schedule is updated for the AE.

##### 6.9.3.16.6 Exceptions

Not Applicable.

##### 6.9.3.16.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.16.8 oneM2M Resource Interworking

This service capability is used to update AE's reachability schedule information. The service capability aligns with the <schedule> resource and maps to the UPDATE procedure. The reference between an AE and a <schedule> resource does not exist as an oneM2M Resource attribute.

#### 6.9.3.17 getReachabilitySchedule

##### 6.9.3.17.1 Description

This service capability provides the ability to get an AE's reachability schedule information. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.17.2 Pre-Conditions

Not Applicable.

##### 6.9.3.17.3 Signature – getReachabilitySchedule

Table 6.9.3.17.3-1: Service Subscription Administration – getReachabilitySchedule capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Identifier (AE-ID). |
| reachabilitySchedule | OUT | YES | The contact reachability schedule information of the AE associated with the device node. The absence of this parameter implies the AE associated with the device node is always contact reachable. Type Schedule, see 6.9.2.7.1. |
| responseType | OUT | YES | Unique response types for this service.   * not successfully |

##### 6.9.3.17.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the getReachabilitySchedule capability



Figure 6.9.3.17.4-1: getReachabilitySchedule Diagram

##### 6.9.3.17.5 Post-Conditions

When parameters are present, the reachability schedule is gotten from the AE.

##### 6.9.3.17.6 Exceptions

Not Applicable.

##### 6.9.3.17.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.17.8 oneM2M Resource Interworking

This service capability is used to get an AE's reachability schedule information. The service capability aligns with the <schedule> resource and maps to the RETRIEVE procedure. The reference between an AE and a <schedule> resource does not exist as an oneM2M Resource attribute.

#### 6.9.3.18 deleteReachabilitySchedule

##### 6.9.3.18.1 Description

This service capability provides the ability to delete a reachability schedule for an AE. This service capability shall be restricted to the Msc and Mca Reference Points.

##### 6.9.3.18.2 Pre-Conditions

Not Applicable.

##### 6.9.3.18.3 Signature – deleteReachabilitySchedule

Table 6.9.3.18.3-1: Service Subscription Administration – deleteReachabilitySchedule capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Identifier (AE-ID). |
| responseType | OUT | YES | Unique response types for this service.   * AE successfully deleted |

##### 6.9.3.18.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the deleteReachabilitySchedule capability



Figure 6.9.3.18.4-1: deleteReachabilitySchedule Diagram

##### 6.9.3.18.5 Post-Conditions

When parameters are present, the reachability schedule is deleted from the AE.

##### 6.9.3.18.6 Exceptions

Not Applicable.

##### 6.9.3.18.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.9.3.18.8 oneM2M Resource Interworking

This service capability is used to delete an AE's reachability schedule information. The service capability aligns with the <schedule> resource and maps to the DELETE procedure. The reference between an AE and a <schedule> resource does not exist as an oneM2M Resource attribute.

## 6.10 Event Collection

### 6.10.1 Overview

The Event Collection service provides the capability to record events for accounting purposes.

### 6.10.2 Event Collection Entities

#### 6.10.2.1 Event Collection Types

##### 6.10.2.1.1 Event Collection Record

Table 6.10.1.1-1: Type: Event Record Template

|  |  |  |
| --- | --- | --- |
| Information Element | Optional | Description |
| eventRecordID | NO | It is the unique ID that identifies a specific event record. |
| eventCollectionTriggerID | NO | It is the unique ID that identifies a specific event collection triggering scenario, which triggers information recording for a specific event. |
| collectingEntityID | NO | This is the unique ID of the entity that collects the statistics. It can be an AE-ID or M2M Service Capability Identifier (M2M-Serv-Cap-ID) |
| collectedEntityID | NO | This is the unique ID of the entity whose service layer operation statistics are being collected. It can be an AE-ID or M2M Service Capability Identifier (M2M-Serv-Cap-ID). |
| serviceProfileID | YES | An M2M Service Profile Identifier defines M2M Services and/or M2M Service Roles and AEs applicable to M2M Nodes. |
| eventDescription | NO | Describes the event triggered at the service. It is a subset of the eventConfig data structure. The specific structure depends on the specific event defined by the Event Collection Trigger. |
| Vendor Specific Information | YES | Defines Vendor specific information |

##### 6.10.2.1.2 Event Configuration Type

Table 6.10.2.1.2-1 Type: Event Collection – eventConfig

| Parameter name | Optional | Description |
| --- | --- | --- |
| eventType | NO | This attribute indicates the type of the event, such as "subscribeComplete", "downloadFirmware ", "timer based",, "storage based", etc. The eventType can be a combination of multiple sub-types, for example, it can be based on both "subscribeComplete" and a timer. |
| serviceRoleIds | YES | Defines the specific service role. |
| eventStart | YES | This attribute indicates the start time of the event. It is mandatory if the eventType includes "timer based". |
| eventEnd | YES | This attribute indicates the end time of the event. It is mandatory if the eventType includes "timer based". |
| dataSize | YES | This attribute defines the data size if an event is triggered when the stored data exceeds a certain size. It is mandatory if the eventType is "storage based". |

##### 6.10.2.1.3 getEventCollectionPolicy Filter Criteria

Table 6.10.2.1.3-1: getEventCollectionPolicy Filter Criteria

| Criterion name | Description |
| --- | --- |
| eventType | See Table 6.10.2.1.2-1 |
| eventStart | See Table 6.10.2.1.2-1. This criterion may only be used when the eventType criterion is set to "timer based". |
| eventEnd | See Table 6.10.2.1.2-1. This criterion may only be used when the eventType criterion is set to "timer based". |
| dataSize | See Table 6.10.2.1.2-1. This criterion may only be used when the eventType criterion is set to "storage based". |

##### 6.10.2.1.4 getEventCollectionTriggers Filter Criteria

Table 6.10.2.1.4-1: getEventCollectionTriggers Filter Criteria

| Criterion name | Description |
| --- | --- |
| eventCollectionPolicyID | See Table 6.10.3.3.2-1. |
| collectingEntityID | See Table 6.10.3.3.2-1. |
| collectedEntityID | See Table 6.10.3.3.2-1. |
| eventReceiverID | See Table 6.10.3.3.2-1. |
| serviceID | See Table 6.10.3.3.2-1. |
| triggerStatus | See Table 6.10.3.3.2-1. |

##### 6.10.2.1.5 getEventRecords Filter Criteria

Table 6.10.2.1.5-1: getEventRecords Filter Criteria

|  |  |
| --- | --- |
| Criterion name | Description |
| eventCollectionTriggerID | See Table 6.10.1.1-1. |
| collectingEntityID | See Table 6.10.1.1-1. |
| collectedEntityID | See Table 6.10.1.1-1. |
| serviceProfileID | See Table 6.10.1.1-1. |
| eventDescription | See Table 6.10.1.1-1. In the filterCriteria, the eventDescription can be a string that partially matches the eventDescription parameter in the record. |

### 6.10.3 Service Capabilities

#### 6.10.3.1 setEventCollectionPolicy

##### 6.10.3.1.1 Description

This service capability provides the ability for AEs to configure event collection policies for statistics and charging purposes. This service capability applies to the Mca Reference Point.

##### 6.10.3.1.2 Pre-Conditions

The Originator can be an AE, and the Originator wants to configure event collection policies at a receiving service capability. The receiving service capability conducts event collection according to the policies. The receiving service capability may establish its own event collection policies.

The Originator, if different from the receiving service capability, is subscribed and registered to the receiving service capability.

##### 6.10.3.1.3 Signature – setEventCollectionPolicy

Table 6.10.3.1.3-1: Event Collection – setEventCollectionPolicy capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| serviceId | IN | NO | The M2M Service Identifier (M2M-Serv-ID) |
| eventConfig | IN | NO | The configuration of the event collection policy. Defined in Table 6.10.2.1.2-1. |
| eventCollectionPolicyID | OUT | NO | The receiving service capability generates a unique policy ID for each policy. |
| responseType | OUT | YES | Unique response types for this service. Exception:   * Policy already exists |

##### 6.10.3.1.4 Post-Conditions

Not Applicable.

##### 6.10.3.1.5 Exceptions

The Originator has no access right to create the policy.

##### 6.10.3.1.6 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.3.1.7 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.10.3.1.7-1: setEventCollectionPolicy Diagram

##### 6.10.3.1.8 oneM2M Resource Interworking

The service capability aligns with the <eventConfig> resource and maps to the CREATE procedure for the resource.

#### 6.10.3.2 getEventCollectionPolicy

##### 6.10.3.2.1 Description

This service capability provides the ability for entities, such as an AE or a service capability, to retrieve the existing policies stored at a service capability. This service capability applies to the Mca and Msc Reference Point.

##### 6.10.3.2.2 Pre-Conditions

The Originator can be an AE or a service capability, and the Originator wants to retrieve event collection policies at a receiving service capability.

The Originator, if different from the receiving service capability, is subscribed and registered to the receiving service capability. The Originator is only allowed to retrieve with the proper access right.

##### 6.10.3.2.3 Signature – getEventCollectionPolicy

Table 6.10.3.2.3-1: Event Collection – getEventCollectionPolicy capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| eventCollectionPolicyID | IN | NO | See Table 6.10.3.1.2-2. The eventCollectionPolicyID specifies the specific event collection policy to retrieve, if the Originator has such information. If the Originator does not have the information regarding eventCollectionPolicyID, it indicates eventCollectionPolicyID with a specific value that represents "any IDs", and uses the filterCriteria to filter selected policies. |
| filterCriteria | IN | YES | See Table 6.10.2.1.3-1. |
| responseType | OUT | YES | Unique response types for this service. Exception:   * eventCollectionPolicyID does not exist |

##### 6.10.3.2.4 Post-Conditions

Not Applicable.

##### 6.10.3.2.5 Exceptions

The Originator has no access right to retrieve the policy

##### 6.10.3.2.6 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.3.2.7 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.10.3.2.7-1: getEventCollectionPolicy Diagram

##### 6.10.3.2.8 oneM2M Resource Interworking

The service capability aligns with the <eventConfig> resource and maps to the RETRIEVE procedure for the resource.

#### 6.10.3.3 setEventCollectionTriggers

##### 6.10.3.3.1 Description

This service capability provides the ability for AEs and service capabilities to configure specific triggers for event collection, based on the Event Collection Policy. This service capability applies to the Mca and Msc Reference Point.

##### 6.10.3.3.2 Pre-Conditions

The Originator can be an AE or a service capability, and the Originator wants to configure event collection triggers based on existing event collection policy available at the collecting service capability.

##### 6.10.3.3.3 Signature - setEventCollectionTriggers

Table 6.10.3.3.3-1: Event Collection – setEventCollectionTriggers capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| eventCollectionPolicyID | IN | NO | This attribute specify the policy used to define the specific event collection trigger. |
| collectingEntityID | IN | NO | This is the ID of the entity where the event is being collected. If not specified, the default collecting entity is the receiving service capability. |
| collectedEntityID | IN | NO | This is the ID of the entity that triggered the event collection. If not specified, the default is all entities triggered the event at the collecting entity. |
| eventReceiverID | IN | YES | In cases when there is another entity, other than the collecting entity (such as a service capability), wants to receive the collected event, this attribute provides the unique ID of this entity. |
| serviceRoleIds | IN | YES | Specifies the service roles that trigger the event collection. |
| serviceId | IN | YES | Specifies the services that trigger the event collection. |
| triggerStatus | IN | YES | This attribute indicates if the trigger is activated or not. If not defined, the trigger is activated. |
| eventCollectionTriggerID | OUT | NO | The receiving service capability generates a unique ID for each event collection trigger. |
| responseType | OUT | YES | Unique response types for this service. Exception:   * eventCollectionPolicyID is invalid * collectingEntityID is invalid * collectedEntityID is invalid * eventReceiverID is invalid * triggerStatus is invalid |

##### 6.10.3.3.4 Post-Conditions

After the successful creation of event collection triggers, when the defined event happens at the collectingEntity, and when the event collection trigger status is ACTIVE, the collectingEntity shall collect the event. The supporting service shall send a recordEvent message to the Event Collection entity.

##### 6.10.3.3.5 Exceptions

The Originator has no access right to create the event collection triggers.

##### 6.10.3.3.6 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.3.3.7 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.10.3.3.7-1: setEventCollectionTriggers Diagram

##### 6.10.3.3.8 oneM2M Resource Interworking

The service capability aligns with the <statsCollect> resource and maps to the CREATE procedure for the resource.

#### 6.10.3.4 getEventCollectionTriggers

##### 6.10.3.4.1 Description

This service capability provides the ability for AEs and service capabilities to retrieve event collection triggers at a receiving service capability. This service capability applies to the Mca and Msc Reference Point.

##### 6.10.3.4.2 Pre-Conditions

Originating AEs and service capabilities are subscribed and registered to the receiving service capability. Originator has the access right to retrieve.

##### 6.10.3.4.3 Signature – getEventCollectionTriggers

Table 6.10.3.4.3-1: Event Collection – getEventCollectionTriggers capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| eventCollectionTriggerID | IN | YES | This attribute specifies which event collection triggers to retrieve. If not specified, any event collection trigger matching the filter criteria should be retrieved. If the Originator does not have the information regarding eventCollectionTriggerID, it indicates with a specific value that represents "any IDs", and uses the filterCriteria to filter selected event triggers. |
| filterCriteria | IN | YES | See Table 6.10.2.1.4-1. |
| responseType | OUT | YES | Unique response types for this service. Exception:   * eventCollectionTriggerID does not exist |

##### 6.10.3.4.4 Post-Conditions

Not Applicable.

##### 6.10.3.4.5 Exceptions

The Originator has no access right to retrieve the event collection triggers.

##### 6.10.3.4.6 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.3.4.7 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue the request to the Supporting Service to perform the operation



Figure 6.10.3.4.7-1: getEventCollectionTriggers Diagram

##### 6.10.3.4.8 oneM2M Resource Interworking

The service capability aligns with the <statsCollect> resource and maps to the RETRIEVE procedure for the resource.

#### 6.10.3.5 recordEvent

##### 6.10.3.5.1 Description

This service capability provides the ability for a service (such as Data Exchange service) to trigger the event collection service to record an event. This service applies to the Msc Reference Point.

##### 6.10.3.5.2 Pre-Conditions

Event Collection Triggers have been created by the setEventCollectionTriggers capability.

##### 6.10.3.5.3 Signature - recordEvent

Table 6.10.3.5.3-1: Event Collection – recordEvent capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| eventCollectionPolicyID | IN | YES | This attribute specify the policy used to define the specific event collection trigger. |
| eventCollectionTriggerID | IN | NO | The service where the trigger happens provides the eventCollectionTriggerID being used. |
| eventDescription | IN | NO | This attribute describes the event triggered at the service. It is a subset of the eventConfig data structure. It contains one or more parameters defined in the eventConfig data type. |
| recordID | OUT | NO | The event collection service generates a unique ID. |
| responseType | OUT | YES | Unique response types for this service. Exception:.   * Event recording cannot be completed |

##### 6.10.3.5.4 Post-Conditions

Not Applicable.

##### 6.10.3.5.5 Exceptions

Not Applicable.

##### 6.10.3.5.6 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.3.5.7 Service Interactions

The request comes from the service where the event was triggered to the Event Collection entity.



Figure 6.10.3.5.7-1: recordEvent Diagram

##### 6.10.3.5.8 oneM2M Resource Interworking

Not Applicable.

#### 6.10.3.6 getEventRecords

##### 6.10.3.6.1 Description

This service capability provides the ability for AEs and service capabilities to retrieve the recorded events for statistical or charging purposes. This service capability applies to the Mca and Msc Reference Point.

##### 6.10.3.6.2 Pre-Conditions

Originating AEs and service capabilities are subscribed and registered to the receiving service capability.

##### 6.10.3.6.3 Signature – getEventRecords

Table 6.10.3.6.3-1: Event Collection – getRecords capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| eventRecordID | IN | NO | This attribute specifies which record to retrieve. If not specified, any event records matching the filter criteria should be retrieved. If the Originator does not have the information regarding the eventRecordID, it indicates with a specific value that represents "any IDs", and use the filterCriteria to filter selected records of events. |
| filterCriteria | IN | YES | See Table 6.10.2.1.5-1 |
| responseType | OUT | YES | Unique response types for this service. Exception:   * The eventRecordID |

##### 6.10.3.6.4 Post-Conditions

Not Applicable.

##### 6.10.3.6.5 Exceptions

Not Applicable.

##### 6.10.3.6.6 Policies for Use

Message Exchange Patterns: In-Out

##### 6.10.3.6.7 Service Interactions

The Originator sends the request to the Event Collection entity to obtain the event records that it is

interested in.



Figure 6.10.3.6.7-1: getEventRecords Diagram

##### 6.10.3.6.8 oneM2M Resource Interworking

Not Applicable.

## 6.11 Registration

### 6.11.1 Overview

The Registration service provides the ability for:

* Initial Registration of an AE
* Refresh an existing Registration of an AE
* AE initiated termination of an existing Registration
* Removal of subscriptions to AE Registration events

### 6.11.2 Service Capabilities

#### 6.11.2.1 registerAE

##### 6.11.2.1.1 Description

This service capability enables an AE with the proper authorization to register with the M2M System. This service capability shall be restricted across the Mca Reference Point.

##### 6.11.2.1.2 Pre-Conditions

The AE has not registered with the M2M System. An AE identifier may have been already allocated to the registering AE and acquired by the AE by means outside the scope of this specification.

##### 6.11.2.1.3 Signature – registerAE

Table 6.11.2.1.3-1: Registration – registerAE capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| pointOf Access | IN | NO | The point of Access of the registered AE. |
| applicationId | IN | NO | The Application Identifier (App-ID). |
| credentialId | IN | YES | Application Credential-ID used to identify the Application Entity for the Application. It is used to retrieve the corresponding M2M Service Subscription. |
| expirationTime | IN | NO | The expiration time of the registration as requested by the Originator. |
| reachabilitySchedule | IN | YES | The contact reachability schedule information of the AE associated with the device node. The absence of this parameter implies the AE associated with the device node is always contact reachable. Type Schedule, see 6.9.2.7.1. |
| aeId | IN-OUT | Optional for IN only-Not Optional for OUT | Application Entity (AE-ID) is provided back in the response. |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully registered * AE not successfully registered * M2M Service Subscription does not exist * Invalid Application Credential Identifier. |

##### 6.11.2.1.4 Services Interaction

The interactions of service capabilities required for this service capability:

1. Associate the AE with the M2M Service Subscription
2. Issue the request to the Supporting Service.
3. Send a notification to the Device Onboarding Supporting Service for a first-time application registration in the event there is a subscription of the first contact event by the Supporting Service.



Figure 6.11.2.1.4-1: Registration – registerAE Diagram

##### 6.11.2.1.5 Post-Conditions

AE is registered and can start using service capabilities

The returned AE-ID shall be used in any subsequent operation related to that application

##### 6.11.2.1.6 Exceptions

Not Applicable.

##### 6.11.2.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.11.2.1.8 oneM2M Resource Interworking

This service capability maps to the CREATE procedure of the <AE> resource.

#### 6.11.2.2 refreshAERegistration

##### 6.11.2.2.1 Description

This service capability enables an AE to refresh an existing AE registration with the M2M System. This service capability shall be restricted to the Mca Reference Points.

##### 6.11.2.2.2 Pre-Conditions

The AE has successfully registered with the M2M System.

##### 6.11.2.2.3 Signature – refreshAERegistration

Table 6.11.2.2.3-1: Registration - refreshAERegistration capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Identifier (AE-ID) of the request originator. |
| pointOfAccess | IN | YES | The point of Access of the registered AE. POA is optional only if identical to the one in the refreshed registration |
| expirationTime | IN | NO | The expiration time of the registration as requested by the Originator. |
| reachabilitySchedule | IN | YES | The contact reachability schedule information of the AE associated with the device node. The absence of this parameter implies the AE associated with the device node is always contact reachable. Type Schedule, see 6.9.2.7.1. |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully refreshed * Registration does not exist |

##### 6.11.2.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Issue a request to refresh the AE association with the M2M Service Profile
2. Issue the request to the Supporting Service



Figure 6.11.2.2.4-1: Registration – refreshAERegistration Diagram

##### 6.11.2.2.5 Post-Conditions

The Application Entity registration is refreshed and can continue using service capabilities.

##### 6.11.2.2.6 Exceptions

Not Applicable.

##### 6.11.2.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.11.2.2.8 oneM2M Resource Interworking

This service capability maps to the UPDATE procedure of the <AE> resource.

#### 6.11.2.3 deregisterAE

##### 6.11.2.3.1 Description

This service capability enables an AE to deregister from the M2M System. This service capability shall be restricted to the Mca Reference Points.

##### 6.11.2.3.2 Pre-Conditions

The AE successfully registered with the M2M System.

##### 6.11.2.3.3 Signature - deregisterAE

Table 6.11.2.3.3-1: Registration – deregisterAE capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Identifier (AE-ID) |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully De-registered * Registration does not exist |

##### 6.11.2.3.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Disassociate the AE with Service Subscription
2. Issue the request to Supporting Services.
3. Send a notification to device onboarding service supporting service for application de-registration in the event there is a subscription



Figure 6.11.2.3.4-1: Registration – deregisterAE Diagram

##### 6.11.2.3.5 Post-Conditions

AE is no longer registered and cannot use any services.

##### 6.11.2.3.6 Exceptions

Not Applicable.

Transaction Pattern: Participation allowed

##### 6.11.2.3.7 oneM2M Resource Interworking

This service capability maps to the DELETE procedure of the <AE> resource.

## 6.12 Registration Administration

### 6.12.1 Overview

The Registration administration service provides the ability for:

* Retrieve the AE's Registration status
* Revoke an AE existing Registration
* Permit subscriptions to AE Registration events

### 6.12.2 Service Capabilities

#### 6.12.2.1 getRegistrationStatus

##### 6.12.2.1.1 Description

This service capability enables a Supporting Service authorized for this operation, to retrieve the registration status for an AE. This service capability is restricted to the Msc Reference Point.

##### 6.12.2.1.2 Pre-Conditions

Not Applicable.

##### 6.12.2.1.2 Signature - getRegistrationStatus

Table 6.12.2.1.2-1: Registration Administration – getRegistrationStatus capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | The Application Entity Identifier (AE-ID) |
| responseType | OUT | NO | Unique response types for this service:   * AE is registered * AE registration does not exist |

##### 6.12.2.1.4 Service Interaction

The interactions of service capabilities required for this service capability:

1. Retrieve the Application Entity information



Figure 6.12.2.1.4-1: Registration Administration – getRegistrationStatus Diagram

##### 6.12.2.1.5 Post-Conditions

Not Applicable.

##### 6.12.2.1.6 Exceptions

Not Applicable.

##### 6.12.2.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.12.2.1.8 oneM2M Resource Interworking

This service capability maps to the RETRIEVE procedure of the <AE> resource.

#### 6.12.2.2 revokeAERegistration

##### 6.12.2.2.1 Description

This service capability enables a Supporting Service authorized for this operation to revoke an existing AE registration. This service capability shall be restricted to the Msc Reference Points.

##### 6.12.2.2.2 Pre-Conditions

The AE is successfully registered with the M2M System.

##### 6.12.2.2.3 Signature - revokeAERegistration

Table 6.12.2.2.3-1: Registration Administration – revokeAERegistration capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| aeId | IN | NO | Application Entity Identifier (AE-ID) |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully De-registered * Registration does not exist |

##### 6.12.2.2.4 Service Interaction

The interactions of service capabilities required for this service capability:

1. Issue a request to the Service Subscription Administration to fetch the service profile.
2. Disassociate the AE from the M2M Service Subscription



Figure 6.12.2.2.4-1: Registration Administration – revokeAERegistration Diagram

##### 6.12.2.2.5 Post-Conditions

The Application Entity is no longer registered and cannot use any services

##### 6.12.2.2.6 Exceptions

Not Applicable.

##### 6.12.2.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.12.2.2.8 oneM2M Resource Interworking

This service capability maps to the DELETE procedure of the <AE> resource.

#### 6.12.2.3 subscribeInitialAERegistrationEvent

##### 6.12.2.3.1 Description

This service capability enables subscription to the initial (first time only) registration of an AE. This capability shall be restricted to the Msc Reference Point.

##### 6.12.2.3.2 Pre-Conditions

Not Applicable.

##### 6.12.2.3.3 Signature - subscribeInitialAERegistrationEvent

6.12.2.3.3-1: Registration Administration – subscribeInitialAERegistrationEvent capability

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter name | Direction | | Optional | Description |
| subscriptionId | | OUT | NO | Return subscriptionId in case of a success. |
| responseType | | OUT | NO | Unique response types for this service:   * Successfully subscribed * Not successfully subscribed |

##### 6.12.2.3.4 Service Interaction

The interactions of service capabilities required for this service capability:

1. Subscribe the requesting AE for the initial registration event.



Figure 6.12.2.3.4-1: Registration Administration – subscribeInitialAERegistrationEvent Diagram

##### 6.12.2.3.5 Post-Conditions

A Subscription is created for the Originator to receive initial contact events.

##### 6.12.2.3.6 Exceptions

Not Applicable.

##### 6.12.2.3.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.12.2.3.8 oneM2M Resource Interworking

Not Applicable.

#### 6.12.2.4 unsubscribeInitialAERegistrationEvent

##### 6.12.2.4.1 Description

This service capability enables a Supporting Service for this operation to remove an existing subscription against an AE initial registration. This capability shall be restricted to the Msc Reference Point.

##### 6.12.2.4.2 Pre-Conditions

Not Applicable.

##### 6.12.2.4.3 Signature – unsubcribeInitialAERegistrationEvent

Table 6.12.2.4.3-1: unsubscribeInitialAERegistrationEvent capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| subscriptionId | IN | NO | The subscriptionId for the AE initial registration event. |
| responseType | OUT | NO | Unique response types for this service:   * Successfully unsubscribed * Subscription does not exist |

##### 6.12.2.4.4 Service Interaction

The interactions of service capabilities required for this service capability:

1. Remove the subscription



Figure 6.12.2.4.4-1: Registration Administration – unsubscribeInitialAERegistrationEvent Diagram

##### 6.12.2.4.5 Post-Conditions

Subscription to initial registration event is removed.

##### 6.12.2.4.6 Exceptions

Not applicable.

##### 6.12.2.4.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

##### 6.12.2.4.8 oneM2M Resource Interworking

Not applicable.

# 7 M2M Service Components

## 7.1 Introduction

This clause describes the M2M Service Components provided by the M2M Services Platform.

An M2M Service Component defines the set of M2M Services that are related in the sense that the M2M Services that comprise the M2M Service Component are typically deployed together in order to support one or more Supporting Services.

The M2M Service Architecture augments the oneM2M Functional Architecture by specifying M2M Services provided to M2M Service Providers. These M2M Services are exposed to the AE across the Mca Reference Point as well as other Service Components across the Msc Reference Point.

## 7.2 Service Component Interaction Cross Reference

Table 7.1.1-1: Service Component Cross Reference



## 7.3 Infrastructure Component (INF)

### 7.3.1 introduction

The INF Component provides services that are exposed to other M2M Service Components across the Msc Reference Point. The Services within the INF Component are common and utility type Services needed to enable other M2M Services.

### 7.3.2 INF to Service Cross Reference

Authorization: All Service Capabilities

Registration Services: All Service Capabilities

## 7.4 Service Subscription Component (SSUB)

### 7.4.1 Introduction

The SSUB Component provides services that are necessary to maintain the M2M Service, the associations (e.g. Services Roles) to the M2M Service, M2M Service Subscriptions, the associations (e.g. AE, M2M Nodes) to the M2M Service Subscription and any external identifiers associated with AE and M2M Nodes. In addition the services used to manage devices and AEs are part of this component.

### 7.4.2 SSUB to Service Cross Reference

Service Subscription: All Service Capabilities

Service Administration: All Service Capabilities

Service Subscription Administration: All Service Capabilities

## 7.5 Transport Adapter (TRA)

### 7.5.1 Introduction

The TRA component provides services are used to integrate or adapt Data Exchange requests to the underlying Data Exchange transport (e.g. XMPP or MQTT Broker).

### 7.5.2 TRA to Service Cross Reference

Broker: All Service Capabilities

## 7.6 Accounting (ACC)

### 7.6.1 Introduction

The ACC Component provides services that are record events necessary to charge for the Services provided to AEs.

### 7.6.2 Accounting to Service Cross Reference

Event Collection: All Service Capabilities

## 7.7 Service Exposure (SE)

### 7.7.1 Introduction

The SE Component acts as the primary interface for AEs to interact with the M2M Service Layer across the Mca Reference Point.

### 7.7.2 Service Exposure to Service Cross Reference

Data Exchange: subscribe, publish, sendMessage

Service Subscription Administration: getServiceSubscription, addNodeToServiceSubscription, deleteNodesFromServiceSubscription, getNodesForServiceSubscription, updateNodeForServiceSubscription, addApplicationRule, deleteApplicationRules, getApplicationRules, updateApplicationRule, addReachabilitySchedule, updateReachabilitySchedule, getReachabilitySchedule, deleteReachabilitySchedule

Device Management: downloadFirmware, installFirmware, getFirmwareInformation, getFirmwareExecStatus, upgradeFirmware, getDeviceInformation, getDeviceCapabilities, enableDeviceCapability, disableDeviceCapability, getAreaNetworks, updateDeviceForAreaNetwork, rebootDevice, resetDevice, uploadDeviceLog, getDeviceLogs, getDeviceLogInformation, getSoftwareInformation, downloadSoftware, installSoftware, activateSoftware, deactivateSoftware, removeSoftware

Event Collection: setEventCollectionPolicy, getEventCollectionPolicy, setEventCollectionTriggers, getEventCollectionTriggers, getEventRecords

Registration Services: registerAE, refreshAERegistration, deregisterAE

## 7.8 Management Adapter (MA)

### 7.8.1 Introduction

The Management Adapter component provides services that are used to integrate or adapt Device Management requests to the Management Servers of existing device management technologies(e.g. TR‑069, OMA-DM, and LWM2M).

### 7.8.2 Management Adapter to Service Cross Reference

Management Adapter: All Service Capabilities

Device Management: deviceManagementReport

## 7.9 Device Management (DM)

### 7.9.1 Introduction

The Device Management component provides services to manage devices without consideration of the technology of Underlying Network.

### 7.9.2 Device Management to Service Cross Reference

Device Management: All Service Capabilities

# Annex A (informative): Common Request Processing

## A.1 Overview

This annex illustrates the usage of the common services described in this technical specification for implementation requests received from AEs across the Mca Reference Point.

## A.2 Mca Common Request Processing

### A.2.1 Introduction

AEs communicate with the M2M System over the Mca Reference Point through the SE component. The SE component accepts the request from the AE and provides the request to the Supporting Service in order allow the M2M Service Provider to ensure the request is properly authorized and recorded. In addition, the M2M Service Provider is able to orchestrate other capabilities that have not been specified.

### A.2.2 Mca Common Request Parameters (normative)

Each request that is received by the SE component across the Mca Reference Point shall have a common set of input parameters as described in Table A.2.2-1 Mca: Common Request Input Parameters.

Table A.2.2-1: Mca: Common Request Input Parameters

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| from | IN | NO | The identifier of the Originator of the request (AE-ID) |
| requestId | IN-OUT | YES | The request identifier. When supplied by the Originator, the same value is returned in the response if the response is applicable for the message exchange pattern. If not supplied by the Originator, the M2M System supplied a globally unique value in the response if the response is applicable for the message exchange pattern. |
| operation | IN | NO | The signature of the operation that is received or transmitted across the Mca reference point. |

Service capabilities in the SE component whose message exchange patterns require a response shall have a common set of output parameters as described in Table A.2.2-2 Mca: Common Request Output Parameters.

Table A.2.2-2: Mca: Common Request Output Parameters

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| responseType | OUT | YES | Response types that are relevant to requests from AEs across the Mca Reference Point. |

In addition to the parameters in Table A.2.2-1, each request that addresses a target AE (e.g. Data Exchange) that is received by the SE component across the Mca Reference Point shall have a common set of input parameters as described in Table A.2.2-3 Mca: Common Request Input Parameters For Target AEs.

Table A.2.2-3: Mca: Common Request Input Parameters For Target AEs

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| to | IN | NO | The identifier of the AE that is the target of the request (AE-ID) |

### A.2.3 Authentication and Authorization of Requests

#### A.2.3.1 Description

Upon reception of requests across the Mca reference, the request Originator is authenticated and the requested M2M Service Capability is authorized when the:

* Request Originator has a M2M Service Subscription for the requested operation.
* Request Originator is authorized for the requested operation.

#### A.2.3.2 Pre-Conditions

The external identifiers for the from parameter's AE-ID are assigned to a M2M Service Subscription (M2M-Service-Profile-ID).

A correlation between the service capability and the M2M authorization event has been defined in order to authorize the service capability.

#### A.2.3.2 Common M2M Service Capability Parameters for Request Authentication and Authorization

Table A.2.2.2-1: Common M2M Service Capability Parameters for Request Authentication and Authorization

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca common request input parameters | IN | NO | The Mca common request input parameters defined in Table A.2.2-1. |
| responseType | OUT | YES | Response types that are relevant to the Authentication and Authorizations of requests from AEs across the Mca Reference Point.   * Originator is not authenticated * Originator does not have a M2M Service Subscription * Originator not authorized for the M2M Service Capability |

#### A.2.3.3 Service Interactions

The interactions of service capabilities required to authenticate and authorize a request:

1. Obtain the M2M Service Capability from the requested operation
2. Obtain the Application Entity and associated M2M Service Subscription
3. Validate the M2M Service Subscription for the Service Capability.
4. Authorize the use of the M2M Service Capability



Figure A.2.3.3-1: Mca Common Request Authorization Diagram

#### A.2.3.4 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and an optional response type is transmitted back the request Originator.

#### A.2.3.5 Exceptions

Not Applicable.

#### A.2.3.6 Policies for Use

Message Exchange Patterns: In-Out, In-Only, Robust In-Only, In-Optional-Out

Transaction Pattern: Participation allowed

## A.3 Msc Common Request Processing

### A.3.1 Introduction

Service Components communicate with each other across the Msc Reference Point. Additional input or output parameters are not necessary when invoking service capabilities across the Msc Reference Point. As such signature of the service capability is sufficient for implementing the service capability in clause 6 when the capability is invoked across the Msc Reference Point.

### A.3.2 Msc Common Request Data Types (normative)

Each request that is received by the M2M Component across the Msc Reference Point shall have a common set of input parameters as described in Table A.3.1-1 Msc: Common Request Input Parameters.

Table A.3.2-1: Msc: Common Request Input Parameters

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| from | IN | NO | The identifier of the Originator of the request. This is typically the Service Capability identifier of the M2M System. |
| requestId | IN-OUT | NO | The request identifier. When supplied by the Originator, the same value is returned in the response if the response is applicable for the message exchange pattern. If not supplied by the Originator, the M2M System supplied a globally unique value in the response if the response is applicable for the message exchange pattern. |

## A.4 Common Entity Attributes

### A.4.1 Introduction

Information Entities (e.g. M2M Service Subscription) that are maintained using the M2M Service Capabilities have a set of common attributes that are associated with the entity when the information entity is created, updated and retrieved.

### A.4.2 System Generated Attributes (normative)

When an information entity is created or updated the system shall update the common attributes as described in Table A.4.2-1. When an information entity is retrieved the system shall return the common attributes as described in Table A.4.2-1.

Table A.4.2-1: System Generated Attributes

| Parameter name | Description |
| --- | --- |
| creationTime | The date and time that the system created the information entity. |
| lastModifiedTime | The date and time that the system modified the information entity. The system modifies this attribute when the information entity is created or updated. |

### A.4.3 User Defined Discovery Attributes (normative)

Information entities are retrieved through the system's service capabilities. Some service capabilities allow for discovery of information elements using user defined discovery attributes.

Table A.4.3-1: User Defined Discovery Attributes

| Parameter name | Description |
| --- | --- |
| labels | The list of labels that a user can add or modify in creation and update requests for information entities. When a service capability is used to retrieve a list of information elements, the service capability shall have this attribute as a common request input attribute. |

## A.5 Using Filter Criteria

Service Capabilities have the ability to define a filter criteria entity as part of the Service Capability's input parameters. Filter criteria within the system shall be evaluated using the following rules:

* different elements of the filter criteria entity shall use the "AND" logical operation
* same elements of the filter criteria entity shall use the "OR" logical operation

# Annex B (informative): Data Exchange Services

## B.1 Overview

This annex illustrates the usage of the services for requests to exchange data from AEs across the Mca Reference Point.

## B.2 Supporting Services

### B.2.1 Subscribe-Publish-Notify Message Exchange

#### B.2.1.1 Overview

This service provides the capability to exchange data using the publish and subscribe message patterns where AEs:

* Request to receive payloads from a publication resource by subscribing to the publication resource.
* Request to publish a payload to a resource.

#### B.2.1.2 Service Capabilities

##### B.2.1.2.1 subscribeRequest

###### B.2.1.2.1.1 Description

This service capability provides the ability to validate a subscription request from an AE.

###### B.2.1.2.1.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, subscribing AE, publication resource and Broker exist.

###### B.2.1.2.1.3 Signature – subscribeRequest

Table B.2.1.2.1.3-1: Data Exchange Service – subscribeRequest capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-3 |
| publicationResource | IN | NO | The publication resource. See 6.4.2.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.2 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.2.1.1.3 |
| transportAdapter | OUT | YES | The instance of the transport adapter service (broker) |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Originator does not have a Broker for the requested Resource * Delivery policy not supported by the transport adapter * Retainment policy not supported by the transport adapter |

###### B.2.1.2.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Determine the Broker to be used for the originating AE and publication resource
2. Perform the Common Request Services for requests across the Mca Reference Point
3. Validate the delivery and retainment policies



Figure B.2.1.2.1.4-1: subscribeRequest and subscribeComplete Diagram

###### B.2.1.2.1.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.1.2.1.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.2.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 250 ms

##### B.2.1.2.2 subscribeComplete

###### B.2.1.2.2.1 Description

This service capability provides the ability to complete the actions required once the subscription request has been completed in the Broker.

###### B.2.1.2.2.2 Pre-Conditions

Not Applicable.

###### B.2.1.2.2.3 Signature – subscribeComplete

Table B.2.1.2.2.3-1: Data Exchange Service – subscribeComplete capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-3 |
| publicationResource | IN | NO | The publication resource. See 6.4.2.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.2 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.2.1.1.3 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

###### B.2.1.2.2.4 Service Interactions

The interactions of service capabilities required for this service capability as shown in Figure B.2.1.2.1.4-1:

1. Upon a successful subscribe by the Broker, record the event for accounting purposes

###### B.2.1.2.2.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.1.2.2.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.2.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50 ms

##### B.2.1.2.3 publishRequest

###### B.2.1.2.3.1 Description

This service capability provides the ability to validate a publication request from an AE..

As part of the publication, the publishing AE can provide a delivery policy to enhance the robustness of the publication to AEs that have subscribed to the Resource identified in the request.

###### B.2.1.2.3.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, publishing AE, resource to publish the payload and Broker exist.

###### B.2.1.2.3.3 Signature – publishRequest

Table B.2.1.2.3.3-1: Data Exchange Service – publishRequest capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-3 |
| toResource | IN | NO | The leaf node of a publication resource. See 6.4.2.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.2 |
| transportAdapter | OUT | YES | The instance of the transport adapter service (broker) |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Originator does not have a Broker for the requested resource * Originator has requested an invalid deliveryPolicy * Originator has requested an invalid retainmentPolicy * Delivery policy not supported by the transport adapter * Exception: Request may not have been completed |

###### B.2.1.2.3.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Determine the Broker to be used for the originating AE and resource
2. Perform the Common Request Services for requests across the Mca Reference Point
3. Validate the delivery policy for the Broker
4. Upon a successful publication to the Broker, record the event for accounting purposes



Figure B.2.1.2.3.4-1: publishRequest and publishComplete Diagram

###### B.2.1.2.3.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.1.2.3.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.2.3.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

##### B.2.1.2.4 publishComplete

###### B.2.1.2.4.1 Description

This service capability provides the ability to complete the actions required once the publication request has been completed in the Broker.

###### B.2.1.2.4.2 Pre-Conditions

Not Applicable.

###### B.2.1.2.4.3 Signature – publishComplete

Table B.2.1.2.4.3-1: Data Exchange Service – pubishComplete capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-3 |
| toResource | IN | NO | The leaf node of a publication resource. See 6.4.2.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.2 |
| retainmentPolicy | IN | YES | The retainment policy for unconnected subscribers. See 6.4.2.1.1.3 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

###### B.2.1.2.4.4 Service Interactions

The interactions of service capabilities required for this service capability as shown in Figure B.2.1.2.3.4-1:

1. Upon a successful publish by the Broker, record the event for accounting purposes

###### B.2.1.2.4.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.1.2.4.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.2.4.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50 ms

##### B.2.1.2.5 notifyRequest

###### B.2.1.2.5.1 Description

This service capability provides the ability to validate a notification request to an AE.

As part of the notification, delivery policy that is requested to be used is validated and adjusted if necessary.

###### B.2.1.2.5.2 Pre-Conditions

A correlation between a M2M Service Subscription, subscribing AE, subscribed resource and Broker exist.

The Pre-Conditions for Mca Received Requests are met.

###### B.2.1.2.5.3 Signature – notifyRequest

Table B.2.1.2.5.3-1: Data Exchange Service – notifyRequest capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-1 |
| fromResource | IN | NO | The leaf node of a publication resource. See 6.4.2.1.1.1 |
| deliveryPolicy | IN-OUT | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.2 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Originator does not have a Broker for the requested resource * Originator has requested an invalid delivery policy * Exception: Request may not have been completed |

###### B.2.1.2.5.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Validate that the delivery policy requested by the Broker is allowed for the subscribing AE and M2M Service Subscription



Figure B.2.1.2.5.4-1: notifyRequest and notifyComplete Diagram

###### B.2.1.2.5.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the transport adapter.

###### B.2.1.2.5.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.2.5.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

##### B.2.1.2.6 notifyComplete

###### B.2.1.2.6.1 Description

This service capability provides the ability to complete the actions required once the notification request has been completed in the Data Exchange service.

###### B.2.1.2.6.2 Pre-Conditions

Not Applicable.

###### B.2.1.2.6.3 Signature - notifyComplete

Table B.2.1.2.6.3-1: Data Exchange Service – notifyComplete capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-3 |
| fromResource | IN | NO | The leaf node of a publication resource. See 6.4.2.1.1.1 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.2 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

###### B.2.1.2.6.4 Service Interactions

The interactions of service capabilities required for this service capability as shown in Figure B.2.1.2.5.4-1:

1. Upon a successful notification by the Data Exchange, record the event for accounting purposes

###### B.2.1.2.6.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the transport adapter.

###### B.2.1.2.6.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.1.2.6.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50 ms

### B.2.2 Request-Response Message Exchange

#### B.2.2.1 Overview

This service provides the capability to exchange data using the synchronous request-response message pattern where AEs request to send a message to an AE and wait for a response to the message.

#### B.2.2.2 Service Capabilities

##### B.2.2.2.1 sendMessageRequest

###### B.2.2.2.1.1 Description

This service capability provides the ability to validate a send message request from an AE.

###### B.2.2.2.1.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription, originating AE and Transport Adapter exist.

###### B.2.2.2.1.3 Signature – sendMessageRequest

Table B.2.2.2.1.3-1: Data Exchange Service - sendMessageRequest capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-3 |
| deliveryPolicy | IN | YES | The delivery policy when sending a request. See 6.4.2.1.1.2 |
| transportAdapter | OUT | YES | The instance of the transport adapter service. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Originator does not have a transport adaptor for the requested AE. * Delivery policy not supported by the underlying transport adapter. |

###### B.2.2.2.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Determine the transport adapter to be used for the originating AE and target AE. This example shows the use of the Broker service for the transport adapter.
2. Perform the Common Request Services for requests across the Mca Reference Point
3. Validate the delivery policy



Figure B.2.2.2.1.4-1: sendMessageRequest and sendMessageComplete Diagram

###### B.2.2.2.1.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.2.2.1.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.2.2.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 250 ms

##### B.2.2.2.2 sendMessageComplete

###### B.2.2.2.2.1 Description

This service capability provides the ability to complete the actions required once the request has been completed in the Broker.

###### B.2.2.2.2.2 Pre-Conditions

Not Applicable.

###### B.2.2.2.2.3 Signature - sendMessageComplete

Table B.2.2.2.2.3-1: Data Exchange Service - sendMessageComplete capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-3 |
| deliveryPolicy | IN | YES | The delivery policy when notifying the subscriber. See 6.4.2.1.1.2 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * Exception: Request may not have been completed |

###### B.2.2.2.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Upon a successful message send and received from the transport adapter, record the event for accounting purposes

###### B.2.2.2.2.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE.

###### B.2.2.2.2.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

###### B.2.2.2.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50 ms

# Annex C (informative): Service Subscription Administration Services

## C.1 Overview

This annex illustrates the usage of the services for requests to administer M2M Service Subscriptions from AEs across the Mca Reference Point.

## C.2 Supporting Services

### C.2.1 Overview

This service provides the capability for AEs to administer the M2M Service Subscriptions that have been previously created by the M2M Service Provider. The following capabilities are provided.

* Retrieval of M2M Service Subscriptions based on a set of filter criteria.
* Administration of the M2M Nodes associated with a M2M Service Subscriptions as well as the Application Rules associated with the M2M Node.

### C.2.2 Service Capabilities

#### C.2.2.1 getServiceSubscription

##### C.2.2.1.1 Description

This service capability provides the ability for an AE to retrieve the M2M Service Subscription across the Mca Reference Point.

##### C.2.2.1.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

##### C.2.2.1.3 Signature – getServiceSubscription

Table C.2.2.1.3-1: Service Subscription Administration – getServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca Common request input parameters | - | - | See Table A.2.2-1 |
| filterCriteria | IN | NO | See Table 6.9.2.2-1 |
| serviceSubscriptions | OUT | NO | The resulting M2M Service Subscription entities in Table 6.9.2.3-1. |
| responseType | OUT | YES | Unique response types for this service.  None |

##### C.2.2.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Retrieve the M2M Service Subscriptions for the supplied criteria
3. Account for the event



Figure C.2.2.1.4-1: getServiceSubscription Diagram

##### C.2.2.1.5 Post-Conditions

Not Applicable.

##### C.2.2.1.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### C.2.2.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### C.2.2.2 addNodeToServiceSubscription

##### C.2.2.2.1 Description

This service capability adds a M2M Node to a M2M Service Subscription.

##### C.2.2.2.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

##### C.2.2.2.3 Signature – addNodeToServiceSubscription

Table C.2.2.2.3-1: Service Subscription Administration – addDeviceToServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca Common request input parameters | - | - | See Table A.2.2-1 |
| externalIds | IN | YES | A List of URNs that represent the external identifiers associated with this M2M Node. |
| applicationRuleIds | IN | YES | A list of Application Rules associated with this Node. |
| nodeId | OUT | NO | The unique M2M Node identifer for this entity. |
| responseType | OUT | YES | Unique response types for this service.  M2M Service Subscription does not exist. |
| applicationRuleIds | IN | YES | * A list of Application Rules associated with this Node. |

##### C.2.2.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Add the M2M Nodes to the M2M Service Subscription
3. Account for the event



Figure C.2.2.2.4-1: addNodeToServiceSubscription Diagram

##### C.2.2.2.5 Post-Conditions

The M2M Node is added to the M2M Service Subscription returning the oneM2M System.

##### C.2.2.2.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### C.2.2.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### C.2.2.3 deleteNodesFromServiceSubscription

##### C.2.2.3.1 Description

This service capability deletes M2M Nodes from a M2M Service Subscription.

##### C.2.2.3.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

##### C.2.2.3.3 Signature – deleteNodesFromServiceSubscription

Table C.2.2.3.3-1: Service Subscription Administration – deleteNodesFromServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-1 |
| nodeIds | IN | NO | List of M2M Node identifiers to be deleted from the M2M Service Subscription. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist.   M2M Node does not exist for this M2M Service Subscription |

##### C.2.2.3.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Delete the M2M Nodes from the M2M Service Subscription
3. Account for the event



Figure C.2.2.3.4-1: deleteNodesFromServiceSubscription Diagram

##### C.2.2.3.5 Post-Conditions

The M2M Nodes are deleted from the M2M Service Subscription.

##### C.2.2.3.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### C.2.2.3.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### C.2.2.4 getNodesForServiceSubscription

##### C.2.2.4.1 Description

This service capability retrieves the M2M Nodes for a M2M Service Subscription.

##### C.2.2.4.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

##### C.2.2.4.3 Signature – getNodesForServiceSubscription

Table C.2.2.4.3-1: Service Subscription Administration – getNodesForServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-1 |
| filterCriteria | IN | NO | See Table 6.9.2.4-1 |
| nodes | OUT | NO | The resulting M2M Node entities in Table 6.9.2.3-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

##### C.2.2.4.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Retrieve the M2M Nodes with a filter condition
3. Account for the event



Figure C.2.2.4.4-1: getNodesForServiceSubscription Diagram

##### C.2.2.4.5 Post-Conditions

Not Applicable.

##### C.2.2.4.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### C.2.2.4.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### C.2.2.5 createApplicationRule

##### C.2.2.5.1 Description

This service capability provides the ability to create a M2M Application Rule to be associated with one or more M2M Nodes.

##### C.2.2.5.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

##### C.2.2.5.3 Signature – createApplicationRule

Table C.2.2.5.3-1: Service Subscription Administration – createApplciationRule capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-1 |
| credentialIds | IN | YES | List of credential identifiers for which this Application Rule is applicable, i.e. for registration requests coming into the M2M System via a Security Association Endpoint (SEA) [i.3], that was authenticated using credentials that match with any of these credential identifiers, the current Application Rule applies. |
| allowedApplicationIds | IN | YES | List of M2M Application Identifiers (App-ID) that shall be considered to be allowed for AE registration requests received via Security Association Endpoint (SEA) [i.3]. |
| allowedAEIds | IN | YES | List of M2M Application Entity Identifiers (AE-ID) that shall be considered to be allowed for AE registration requests. |
| applicationRuleId | OUT | NO | The unique Application Rule identifier in the context of the M2M Service Subscription. |
| responseType | OUT | YES | Unique response types for this service.   * None |

##### C.2.2.5.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Create the Application Rule
3. Account for the event



Figure C.2.2.5.4-1: createApplicationRule Diagram

##### C.2.2.5.5 Post-Conditions

The Application Rule is created.

##### C.2.2.5.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### C.2.2.5.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### C.2.2.6 deleteApplicationRules

##### C.2.2.6.1 Description

This service capability provides the ability to delete Application Rules and any references to the Application Rule made by M2M Nodes to the Application Rules.

##### C.2.2.6.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

##### C.2.2.6.3 Signature – deleteApplicationRules

Table C.2.2.6.2-1: Service Subscription Administration – deleteApplicationRules capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-1 |
| applicationRuleIds | IN | NO | A list of Application Rule identifiers. |
| responseType | OUT | YES | Unique response types for this service.  Application Rule does not exist |

##### C.2.2.6.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Delete the Application Rules
3. Account for the event



Figure C.2.2.6.4-1: deleteApplicationRules Diagram

##### C.2.2.6.5 Post-Conditions

Application Rules and any references to the Application Rule made by M2M Nodes to the Application Rules are deleted.

##### C.2.2.6.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### C.2. 2.6.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### C.2.2.7 getApplicationRules

##### C.2.2.7.1 Description

This service capability provides the ability to retrieve the Application Rules.

##### C.2.2.7.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

##### C.2.2.7.3 Signature – getApplicationRules

Table C.2.2.7.3-1: Service Subscription Administration – getApplicationRulescapability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input parameters | - | - | See Table A.2.2-1 |
| filterCriteria | IN | NO | See Table 6.9.2.6-1 |
| applicationRules | OUT | NO | The resulting M2M Node entities in Table 6.9.2.5-1. |
| responseType | OUT | YES | Unique response types for this service.   * None |

##### C.2.2.7.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Retrieve the M2M Applications of the M2M Service Subscription
3. Account for the event



Figure C.2.2.7.4-1: getApplicationRules Diagram

##### C.2.2.7.5 Post-Conditions

Not Applicable.

##### C.2.2.7.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### C.2.2.7.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### C.2.2.8 updateApplicationRule

##### C.2.2.8.1 Description

This service capability provides the ability to update an Application Rule.

##### C.2.2.8.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

##### C.2.2.8.3 Signature – updateApplicationRule

Table C.2.2.8.3-1: Service Subscription Administration – updateApplicationForDevice capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca Common request input parameters | - | - | See Table A.2.2-1 |
| applicationRuleId | IN | NO | The unique Application Rule identifier in the context of the M2M Service Subscription. |
| credentialIds | IN | YES | List of credential identifiers for which this Application Rule is applicable, i.e. for registration requests coming into the M2M System via a Security Association Endpoint (SEA) [i.5], that was authenticated using credentials that match with any of these credential identifiers, the current Application Rule applies.  When present this list will overlay the list of credential identifiers. |
| allowedApplicationIds | IN | YES | List of M2M Application Identifiers (App-ID) that shall be considered to be allowed for AE registration requests received via Security Association Endpoint (SEA) [i.6].  When present this list will overlay the list of allowed App-IDs. |
| responseType | OUT | YES | Unique response types for this service.   * Application Rule does not exist. |

##### C.2.2.8.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Update the Application Rule.
3. Account for the event



Figure C.2.2.8.4-1: updateApplicationRule Diagram

##### C.2.2.8.5 Post-Conditions

The Application Rule is updated.

##### C.2.2.8.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### C.2.2.8.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### C.2.2.9 updateNodeForServiceSubscription

##### C.2.2.9.1 Description

This service capability provides the ability to update the Application Rules and External Identifiers to be associated to a Node within the context of a M2M Service Subscription.

##### C.2.2.9.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

##### C.2.2.9.3 Signature – updateNodeForServiceSubscription

Table C.2.2.9.3-1: Service Subscription Administration – updateNodeForServiceSubscription capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca Common request input parameters | - | - | See Table A.2.2-1 |
| nodeId | IN | NO | The unique M2M Node identifier in the context of the M2M Service Subscription. |
| applicationRuleIds | IN | YES | A list of Application Rule Identifier. When present this list will overlay the list of Applications associated with the Node. |
| externalIds | IN | YES | List of URNs that represent the external identifiers associated with this device. When present this list will overlay the list of external identifiers associated with the Node. |
| responseType | OUT | YES | Unique response types for this service.   * M2M Service Subscription does not exist * M2M Node does not exist for the M2M Service Subscription |

##### C.2.2.9.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the common request authorization
2. Update the M2M Node information for the M2M Service Subscription
3. Account for the event



Figure C.2.2.9.4-1: updateNodeForServiceSubscription Diagram

##### C.2.2.9.5 Post-Conditions

The M2M Node for the M2M Service Subscription is updated.

##### C.2.2.9.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### C.2.2.9.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

# Annex D (informative): Device Management Services

## D.1 Overview

This annex illustrates the usage of the services for requests to manage device from AEs across the Mca Reference Point.

## D.2 Supporting Services

### D.2.1 Overview

This service provides the capability to manage device using the request-response or request-asynchronous report message patterns where AEs:

* Request to manage device using device specific service capabilities or more complex service capabilities that the Support Service will orchestrate into the individual service capabilities according to their business process.
* Request to obtain management operation execution results or status using the reporting capability. Reports can be generated or batched by the report policy.

### D.2.2 Service Capabilities

#### D.2.2.1 downloadFirmware

##### D.2.2.1.1 Description

This service capability provides the ability to execute a downloadFirmware request from an AE.

##### D.2.2.1.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.1.3 Signature – downloadFirmware

Table D.2.2.1.3-1: Device Management Service –downloadFirmware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.2.2.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to download the firmware
4. Records the event



Figure D.2.2.1.4-1: downloadFirmware Diagram

##### D.2.2.1.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download firmware.

The event has been recorded.

##### D.2.2.1.6 Exceptions

Not Applicable.

##### D.2.2.1.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.2 installFirmware

##### D.2.2.2.1 Description

This service capability provides the ability to execute a installFirmware request from an AE.

##### D.2.2.2.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.2.3 Signature – installFirmware

Table D.2.2.2.3-1: Device Management Service –installFirmware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| firmwareInfo | IN | NO | The device firmware information.  Type FirmwareInfo, see 6.6.2.2.5 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to install the firmware
4. Records the event



Figure D.2.2.2.4-1: installFirmware Diagram

##### D.2.2.2.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install firmware.

The event has been recorded.

##### D.2.2.2.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.3 getFirmwareInformation

##### D.2.2.3.1 Description

This service capability provides the ability to execute a getFirmwareInformation request from an AE.

##### D.2.2.3.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.3.3 Signature – getFirmwareInformation

Table D.2.2.3.3-1: Device Management Service – getFirmwareInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | YES | The unique device identifier in the context of the M2M M2M Service Subscription. |
| firmwareInfo | OUT | YES | The device firmware information.  Type FirmwareInfo, see 6.6.2.2.5 |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.3.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get the firmware information
4. Records the event



Figure D.2.2.3.4-1: getFirmwareInformation Diagram

##### D.2.2.3.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get firmware information.

The event is recorded.

##### D.2.2.3.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.3.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.4 getFirmwareExecStatus

##### D.2.2.4.1 Description

This service capability provides the ability to retrieve the execution status or result of a requested firmware operation.

##### D.2.2.4.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and previously submitted firmware request exist.

##### D.2.2.4.3 Signature – getFirmwareExecStatus

Table D.2.2.4.3-1: Device Management Service – getFirmwareExecStatus capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| operationRequestId | IN | NO | The M2M Request Identifier of previously submitted firmware request (M2M-Request-ID) |
| deviceId | IN | YES | The unique device identifier in the context of the M2M M2M Service Subscription. |
| firmwareReport | OUT | YES | The firmware management operation execution result or status. Type FirmwareReport, see 6.6.2.2.3. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types.   * The previously submitted firmware request does not exist |

##### D.2.2.4.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to retrieve the firmware operations execution status or result
4. Records the event



Figure D.2.2.4.4-1: getFirmwareExecStatus Diagram

##### D.2.2.4.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get firmware operation execution status or result.

Record the event.

##### D.2.2.4.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.4.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.5 deviceManagementReport

##### D.2.2.5.1 Description

This service capability provides the ability to report an AE about the status or result of management operations for previously submitted operation requests.

##### D.2.2.5.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and previously submitted management requests exist.

##### D.2.2.5.3 Signature –deviceManagementReport

Table D.2.2.5.3-1: Device Management Service –deviceManagementReport capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| isLastReport | IN | NO | Boolean, whether it is the last report. |
| sequenceNumber | IN | NO | The report sequence number. |
| firmwareReportList | IN | NO | Array of firmwareReport.  Type FirmwareReport, see 6.6.2.2.3. |
| troubleshootingReportList | IN | YES | Array of troubleshootingReport.  Type TroubleshootingReport, see 6.6.2.2.20. |
| softwareReportList | IN | YES | Array of softwareReport.  Type SoftwareReport, see 6.6.2.2.27. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.5.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Record the event



Figure D.2.2.5.4-1: deviceManagementReport Diagram

##### D.2.2.5.5 Post-Conditions

The AE has received a report of management operation execution status or result.

The event is recorded.

##### D.2.2.5.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.5.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.6 upgradeFirmware

##### D.2.2.6.1 Description

This service capability permits AEs to upgrade the firmware on individual device, multiple devices or a group of devices. In addition the upgrade of the firmware is permitted based on a schedule for each of the operations

##### D.2.2.6.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between Management Adapter, the M2M Service Capability and devices or device group exist.

##### D.2.2.6.3 Signature – upgradeFirmware

Table D.2.2.6.3-1: Device Management Service –upgradeFirmware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| orchestrationRuleList | IN | NO | List of OrchestrationRule. Type OrchestrationRule, see clause 6.6.2.2.4. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.6.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues a series of operations to the Management Adapter to upgrade the firmware on a the devices in the orchestration rule list. Each entry in the orchestration rule list contains the operation, the devices and schedule for the operation.
4. Records the event



Figure D.2.2.6.4-1: upgradeFirmware Diagram

##### D.2.2.6.5 Post-Conditions

The Management Adapter has submitted a set of requests to the Management Server to upgrade the firmware.

The event is recorded.

##### D.2.2.6.6 Exceptions

The reachability schedule of the device does not match the schedule of the orchestration rule.

##### D.2.2.6.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.7 getDeviceInformation

##### D.2.2.7.1 Description

This service capability provides the ability for an AE to retrieve the information about a device across the Mca Reference Point.

##### D.2.2.7.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.7.3 Signature – getDeviceInformation

Table D.2.2.7.3-1: Device Management Service –getDeviceInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| deviceInfo | OUT | NO | The device information. Type DeviceInfo, see 6.6.2.2.7. |
| memory | OUT | YES | The memory information. Type Memory, see 6.6.2.2.8. |
| battery | OUT | YES | The battery information. Type Battery, see 6.6.2.2.9. |
| lockStatus | OUT | YES | The device lock status. Enum LockStatus, see 6.6.2.2.13. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.7.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get device information
4. Records the event



Figure D.2.2.7.4-1: getDeviceInformation Diagram

##### D.2.2.7.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device information.

Based on the capabilities supported by the device, the memory, battery and lock status information may or may not be returned.

The event has been recorded.

##### D.2.2.7.6 Exceptions

Not Applicable.

##### D.2.2.7.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.8 getDeviceCapabilities

##### D.2.2.8.1 Description

This service capability provides the ability to execute a getDeviceCapabilities request from an AE.

##### D.2.2.8.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.8.3 Signature – getDeviceCapabilities

Table D.2.2.8.3-1: Device Management Service –getDeviceCapabilities capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| deviceCapabilities | OUT | YES | Array of deviceCapability. Type DeviceCapability, see 6.6.2.2.10. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.8.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get device capabilities
4. Records the event



Figure D.2.2.8.4-1: getDeviceCapabilities Diagram

##### D.2.2.8.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get device capabilities.

The event has been recorded.

##### D.2.2.8.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.8.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.9 enableDeviceCapability

##### D.2.2.9.1 Description

This service capability provides the ability to execute a enableDeviceCapability request from an AE.

##### D.2.2.9.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.9.3 Signature – enableDeviceCapability

Table D.2.2.9.3-1: Device Management Service –enableDeviceCapability capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.2.2.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.9.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to enable device capability
4. Records the event



Figure D.2.2.9.4-1: enableDeviceCapability Diagram

##### D.2.2.9.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to enable device capability.

The event is recorded.

##### D.2.2.9.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.9.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.10 disableDeviceCapability

##### D.2.2.10.1 Description

This service capability provides the ability to execute a disableDeviceCapability request from an AE.

##### D.2.2.10.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.10.3 Signature – disableDeviceCapability

Table D.2.2.10.3-1: Device Management Service – disableDeviceCapability capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| name | IN | NO | The name of the capability. Enum DeviceCapabilityName, see 6.6.2.2.12. |
| state | OUT | NO | Indicates if the capability is enabled or disabled. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.10.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to disable device capability
4. Records the event



Figure D.2.2.10.4-1: disableDeviceCapability Diagram

##### D.2.2.10.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to disable device capability.

Record the event.

##### D.2.2.10.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.10.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.11 getAreaNetworks

##### D.2.2.11.1 Description

This service capability provides the ability to execute a getAreaNetworks request from an AE.

##### D.2.2.11.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and area network exist.

##### D.2.2.11.3 Signature – getAreaNetworks

Table D.2.2.11.3-1: Device Management Service – getAreaNetworks capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| areaNwks | OUT | YES | Array of area network. Type AreaNwkInfo, see 6.6.2.2.13. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.11.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get area networks information
4. Records the event



Figure D.2.2.11.4-1: getAreaNetworks Diagram

##### D.2.2.11.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get area networks information.

The event has been recorded.

##### D.2.2.11.6 Exceptions

Not Applicable.

##### D.2.2.11.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.12 updateDeviceForAreaNetwork

##### D.2.2.12.1 Description

This service capability provides the ability to execute a updateDeviceForAreaNetwork request from an AE.

##### D.2.2.12.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability, the device and area network exist.

##### D.2.2.12.3 Signature –updateDeviceForAreaNetwork

Table D.2.2.12.3-1: Device Management Service – updateDeviceForAreaNetwork capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| areaNwkId | IN | NO | The unique area network identifier. |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| areaNwkDeviceInfo | IN | YES | The existing areaNwkDeviceInfo are replaced with the information in this parameter. Type AreaNwkDeviceInfo, see 6.6.2.2.15. |
| lastModifiedTime | OUT | NO | The modified time. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.12.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to update device information for area network
4. Records the event



Figure D.2.2.12.4-1: updateDeviceForAreaNetwork Diagram

##### D.2.2.12.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to update device information for area network.

The event is recorded.

##### D.2.2.12.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.12.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.13 rebootDevice

##### D.2.2.13.1 Description

This service capability provides the ability to execute a rebootDevice request from an AE.

##### D.2.2.13.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.13.3 Signature – rebootDevice

Table D.2.2.13.3-1: Device Management Service – rebootDevice capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.13.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to reboot device
4. Records the event



Figure D.2.2.13.4-1: rebootDevice Interaction Diagram

##### D.2.2.13.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reboot device.

The event has been recorded.

##### D.2.2.13.6 Exceptions

Not Applicable.

##### D.2.2.13.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.14 resetDevice

##### D.2.2.14.1 Description

This service capability provides the ability to execute a resetDevice request from an AE.

##### D.2.2.14.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.14.3 Signature –resetDevice

Table D.2.2.14.3-1: Device Management Service –resetDevice capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.14.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to reset device
4. Records the event



Figure D.2.2.14.4-1: resetDevice Interaction Diagram

##### D.2.2.14.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to reset device.

The event has been recorded.

##### D.2.2.14.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.14.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.15 uploadDeviceLog

##### D.2.2.15.1 Description

This service capability provides the ability to execute a uploadDeviceLog request from an AE.

##### D.2.2.15.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.15.3 Signature –uploadDeviceLog

Table D.2.2.15.3-1: Device Management Service –uploadDeviceLog capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| logInfo | IN | NO | The log information. Type LogInfo, see 6.6.2.2.19. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| logURL | OUT | YES | The URL from which the log can be uploaded. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.15.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to upload device log
4. Records the event



Figure D.2.2.15.4-1: uploadDeviceLog Interaction Diagram

##### D.2.2.15.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to upload device log.

The event is recorded.

##### D.2.2.15.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.15.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.16 getDeviceLogs

##### D.2.2.16.1 Description

This service capability provides the ability to execute a getDeviceLogs request from an AE.

##### D.2.2.16.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.16.3 Signature – getDeviceLogs

Table D.2.2.16.3-1: Device Management Service – getDeviceLogs capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| logList | OUT | YES | Array of log. Type Log, see 6.6.2.2.21. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.16.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get all logs of a device
4. Records the event



Figure D.2.2.16.4-1: getDeviceLogs Interaction Diagram

##### D.2.2.16.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get all logs of a device.

The event is recorded.

##### D.2.2.16.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.16.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.17 getDeviceLogInformation

##### D.2.2.17.1 Description

This service capability provides the ability to execute a getDeviceLogInformation request from an AE.

##### D.2.2.17.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.17.3 Signature – getDeviceLogInformation

Table D.2.2.17.3-1: Device Management Service – getDeviceLogInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| filterCriteria | IN | YES | See Table 6.6.2.2.22 |
| logURL | IN | YES | The URL from which the log can be accessed. |
| log | OUT | YES | Type Log, see 6.6.2.2.21. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.17.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get a device log information
4. Records the event



Figure D.2.2.17.4-1: getDeviceLogInformation Interaction Diagram

##### D.2.2.17.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get a device log information.

The event is recorded.

##### D.2.2.17.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.17.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.18 getSoftwareInformation

##### D.2.2.18.1 Description

This service capability provides the ability to execute a getSoftwareInformation request from an AE.

##### D.2.2.18.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.18.3 Signature – getSoftwareInformation

Table D.2.2.18.3-1: Device Management Service – getSoftwareInformation capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | OUT | YES | The version of the software. |
| name | OUT | YES | The name of the software. |
| URL | OUT | YES | The URL from which the software package can be downloaded. |
| installStatus | OUT | YES | Indicates the status of the install.  Enum ActionStatus, see 6.6.2.2.26. |
| activeStatus | OUT | YES | The status of active or deactivate action.  Enum ActionStatus, see 6.6.2.2.26. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.18.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to get application software information
4. Records the event



Figure D.2.2.18.4-1: getSoftwareInformation Interaction Diagram

##### D.2.2.18.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to get application software information.

The event has been recorded.

##### D.2.2.18.6 Exceptions

Not Applicable.

##### D.2.2.18.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.19 downloadSoftware

##### D.2.2.19.1 Description

This service capability provides the ability to execute a downloadSoftware request from an AE.

##### D.2.2.19.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.19.3 Signature – downloadSoftware

Table D.2.2.19.3-1: Device Management Service – downloadSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| URL | IN | NO | The URL from which the software package can be downloaded. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.19.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to download application software
4. Records the event



Figure D.2.2.19.4-1: downloadSoftware Interaction Diagram

##### D.2.2.19.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to download application software.

The event has been recorded.

##### D.2.2.19.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.19.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.20 installSoftware

##### D.2.2.20.1 Description

This service capability provides the ability to execute a installSoftware request from an AE.

##### D.2.2.20.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.20.3 Signature –installSoftware

Table D.2.2.20.3-1: Device Management Service –installSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.20.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to install application software
4. Records the event



Figure D.2.2.20.4-1: installSoftware Interaction Diagram

##### D.2.2.20.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to install application software.

The event is recorded.

##### D.2.2.20.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.20.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.21 activateSoftware

##### D.2.2.21.1 Description

This service capability provides the ability to execute an activateSoftware request from an AE.

##### D.2.2.21.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.21.3 Signature – activateSoftware

Table D.2.2.21.31: Device Management Service – activateSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.21.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to activate software previously installed
4. Records the event



Figure D.2.2.21.4-1: activateSoftware Interaction Diagram

##### D.2.2.21.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to activate software previously installed.

Record the event.

##### D.2.2.21.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.21.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.22 deactivateSoftware

##### D.2.2.22.1 Description

This service capability provides the ability to execute a deactivateSoftware request from an AE.

##### D.2.2.22.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.22.3 Signature – deactivateSoftware

Table D.2.2.22.3-1: Device Management Service – deactivateSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.22.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to deactivates software
4. Records the event



Figure D.2.2.22.4-1: deactivateSoftware Interaction Diagram

##### D.2.2.22.5 Post-Conditions

The Management Adapter has submitted a request to the Management Server to deactivates software.

The event is recorded.

##### D.2.2.22.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.22.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

#### D.2.2.23 removeSoftware

##### D.2.2.23.1 Description

This service capability provides the ability to execute a removeSoftware request from an AE.

##### D.2.2.23.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a Management Adapter, the M2M Service Capability and device exist.

##### D.2.2.23.3 Signature – removeSoftware

Table D.2.2.23.3-1: Device Management Service – removeSoftware capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Common request input attributes | - | - | See Table A.2.2-1 |
| deviceId | IN | NO | The unique device identifier in the context of the M2M M2M Service Subscription. |
| version | IN | NO | The version of the software. |
| name | IN | NO | The name of the software. |
| reportPolicy | IN | YES | The policy used to report the state of the operation to the originating AE. See clause 6.6.2.2.1. |
| responseType | OUT | YES | Unique response types for this service.  NOTE: Consumed services also provide response types. |

##### D.2.2.23.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Retrieves the Management Adapter to be used for the device and M2M Service Subscription
3. Issues the request to the Management Adapter to uninstall the software
4. Records the event



Figure D.2.2.23.4-1 removeSoftware Interaction Diagram

##### D.2.2.23.5 Post-Conditions

The Management Adapter has submitted a set of requests to the Management Server to uninstall the software.

The event is recorded.

##### D.2.2.23.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### D.2.2.23.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

# Annex E (informative): Device On-boarding Service

## E.1 Overview

This annex illustrates the usage of services to onboard a device or AE when the M2M Node or AE contacts the M2M System.

The Device On-boarding supporting service is a process by which a M2M Node is provided the artifacts (e.g. configuration information, software and firmware) needed to successfully register an AE with the M2M Service Layer and invoke or receive the authorized service capabilities.

## E.2 Supporting Services

### E.2.1 Remote Administration

#### E.2.1.1 Overview

This service provides remote administration of the device and/or AE when an AE registers or registers with the M2M System. The mechanism is implemented using the first contact subscription and notification services provided/used by the Registration Service.

#### E.2.1.2 Service Capabilities

##### E.2.1.1.1 notifyRegistrationContact

###### E.2.1.1.1.1 Description

This service capability provides the capability to invoke a process to update the M2M Service Layer artifacts (e.g. credentials, device firmware, and application software).

###### E.2.1.1.1.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

A correlation between a M2M Service Subscription and the contacting entity (M2M Node, AE) exist.

The Supporting Service subscribed to receive registration events using the subscribeInitialAERegistrationEvent service capability.

###### E.2.1.1.1.3 Signature – notifyRegistrationContact

Table E.2.1.1.1.3-1: Device On-boarding Service – notifyRegistrationContact capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca Common request input parameters | - | - | See Table A.2.2-1 |
| aeId | IN | NO | The AE-ID of the registered AE. |
| event | IN | NO | The event that caused the registration contact.  Enumeration of:   * FirstContact |

###### E.2.1.1.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Determine the Application information (Device, Subscription, and Application Id) for the registering AE.
3. Determine from the Device information if the device need be updated
4. Determine from the Application information if Applications need updated on the Device
5. Record the event for accounting purposes.



Figure E.2.1.1.1.4-1: notifyRegistrationContact Diagram

###### E.2.1.1.1.5 Post-Conditions

Success case: The request is permitted and the associated.

Failure case: The request is recorded as a failure.

###### E.2.1.1.1.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are recorded by this service capability.

###### E.2.1.1.1.7 Policies for Use

Message Exchange Patterns: In-Only

Transaction Pattern: Creates Transaction

Maximum Response: Not applicable for the In-Only message exchange pattern

# Annex F (informative): Registration Services

## F.1 Overview

This annex illustrates the usage of the services for requests to register AEs across the Mca Reference Point and between M2M Service Components across the Msc Reference Point.

## F.2 Mca Registration Service Processing and Supporting Services

### F.2.1 Overview

AEs communicate with the M2M System over the Mca Reference Point through the SE component. The SE component accepts the request from the AE and provides the request to the Supporting Service in order allow the M2M Service Provider to ensure the request is properly authorized and recorded. In addition, the M2M Service Provider is able to orchestrate other capabilities that have not been specified.

### F.2.2 Service Capabilities

#### F.2.2.1 registerAE

##### F.2.2.1.1 Description

This service capability enables an AE to register with the M2M System. This service capability shall be restricted across the Mca Reference Point

##### F.2.2.1.2 Pre-Conditions

The AE has not registered with the M2M System.

The Pre-Conditions for Mca Received Requests are met.

##### F.2.2.1.3 Signature – registerAE

Table F.2.2.1.3-1: Registration Services – registerAE capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca Common request input parameters | - | - | See Table A.2.2-1 |
| aeId | IN | NO | The Application Entity Identifier (AE-ID) to be refreshed. |
| pointOfAccess | IN | YES | The point of Access of the registered AE. POA is optional only if identical to the one in the refreshed registration |
| expirationTime | IN | NO | The expiration time of the registration as requested by the Originator. |
| reachabilitySchedule | IN | YES | The contact reachability schedule information of the AE associated with the device node. The absence of this parameter implies the AE associated with the device node is always contact reachable. Type Schedule, see 6.9.2.7.1. |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully refreshed * Registration does not exist |

##### F.2.2.1.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Mca Reference Point
2. Record the event



Figure F.2.2.1.4-1: Registration Services – registerAE Diagram

##### F.2.2.1.4 Post-Conditions

Event is recorded.

##### F.2.2.1.5 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### F.2.2.1.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 250 ms

#### F.2.2.2 refreshAERegistration

##### F.2.2.2.1 Description

This service capability enables an AE to refresh an existing registration with the M2M System

##### F.2.2.2.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

The AE is registered and allocated an aeId by the M2M System.

##### F.2.2.2.3 Signature – refreshAERegsitration

Table F.2.2.2.3-1: Registration Services – refreshAERegistration capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca Common request input parameters | - | - | See Table A.2.2-1 |
| aeId | IN | NO | The Application Entity Identifier (AE-ID) to be refreshed. |
| pointOfAccess | IN | YES | The point of Access of the registered AE. POA is optional only if identical to the one in the refreshed registration |
| expirationTime | IN | NO | The expiration time of the registration as requested by the Originator. |
| reachabilitySchedule | IN | YES | The contact reachability schedule information of the AE associated with the device node. The absence of this parameter implies the AE associated with the device node is always contact reachable. Type Schedule, see 6.9.2.7.1. |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully refreshed * Registration does not exist |

##### F.2.2.2.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Msc Reference Point
2. Record the event



Figure F.2.2.2.4-1: Registration Services – refreshAERegistration Diagram

##### F.2.2.2.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted to the AE

##### F.2.2.2.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### F.2.2.2.7 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 50 ms

#### F.2.2.3 deregisterAE

##### F.2.2.3.1 Description

This service capability enables an AE to deregister from the M2M System.

##### F.2.2.3.2 Pre-Conditions

The Pre-Conditions for Mca Received Requests are met.

The Application Entity is registered.

##### F.2.2.3.3 Signature – deregisterAE

Table F.2.2.3.3-1: RegistrationServcies – deregisterAE capability

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Mca Common request input parameters | - | - | See Table A.2.2-1 |
| aeId | IN | NO | The Application Entity Identifier (AE-ID) to be deregistered. |
| responseType | OUT | NO | Unique response types for this service:   * AE successfully De-registered * Registration does not exist |

##### F.2.2.3.4 Service Interactions

The interactions of service capabilities required for this service capability:

1. Perform the Common Request Services for requests across the Msc Reference Point
2. Record the event



Figure F.2.2.3.4-1: Registration Services – deregisterAE Diagram

##### F.2.2.3.5 Post-Conditions

Success case: The request is permitted.

Failure case: The request is not permitted and a response type is transmitted back to the AE

##### F.2.2.3.6 Exceptions

No unique exceptions for this service capability.

Consumed services may throw exceptions which are forwarded by this service capability.

##### F.2.2.3.6 Policies for Use

Message Exchange Patterns: In-Out

Transaction Pattern: Participation allowed

Maximum Response: 300 ms

# Annex G (informative): M2M Service Capability Template

## G.1 Introduction

The M2M Service Capability template is used as a specification that defines the contract between the consumer of the service capability and the producer of the service capability. The specification contract includes documenting the provided Signature, constraints (Pre-Conditions, post-conditions, exceptions), policies and runtime expectations.

## G.2 <serviceCapabilityName>

<Document introductory description of the service capability>

The <serviceCapabilityName> reflects the operational functionality provided by the M2M Service Capability. M2M Service Capabilities are named using a construct [verb][noun][context] where the:

**verb**: Used to indicate what will happen to the noun

**noun**: Is the target of the noun

**context**: Is optional and further defines the service capability

### G.2.1 Description

The description of the service capability.

### G.2.2 Pre-Conditions

<Document the Pre-Conditions that may only be valid to run provided some testable prior business rule check or other value to be changed is actually present and available for the service capability to act upon. Pre-Conditions are documented that are in addition to that provided by the internal resource operations and procedures>

### G.2.3 Signature

Table G.2.3-1: M2M Service Capability Signature

| Parameter name | Direction | Optional | Description |
| --- | --- | --- | --- |
| Name of the parameter. | IN, OUT, IN-OUT | YES, NO | Description of the parameter in the context of the service capability. |

Direction: The direction is relative to the entity that provides (implements) the M2M Service Capability. The value "IN" means that the entity expects to receive a value for the parameter from the consumer (sender) of the M2M Service Capability request. The value "Out" means that the entity will send a value for the parameter to the consumer (sender) of the M2M Service Capability request. A value of "IN-OUT" means that the entity will receive the value for the parameter from the consumer and then send a value (not necessarily the same value) for the parameter back to the consumer.

Optional: Indicates if the parameter is required in requests (Direction: IN, IN-OUT) or responses (Direction: IN-OUT, OUT). A value of YES means that the parameter is optional. A value of NO means that the parameter is mandatory.

### G.2.4 Service Interactions

<Document the detail procedure for <serviceCapabilityName>. The detail procedure for the service capability is written as an Diagram in a time order and step-by-step. The Originator and what the Originator carries out (a task, function, accessing to resources or other services) are defined in each step.

### G.2.5 Post-Conditions

<Document the post-conditions of the <serviceCapabilityName>. If the service capability has no defined output that can be validated except a notification of success (or failure) to set a value in the target of the service capability, a testable post condition of the service capability is documented. Post-conditions are documented that are in addition to that provided by the internal resource operations and procedures.>

### G.2.6 Exceptions

<Document the exception or error conditions that may be returned by the <serviceCapabilityName>. Exceptions are documented that are in addition to that provided by the internal resource operations and procedures.>

### G.2.7 Policies for Use

Message Exchange Patterns : See clause 5.2.3.1Message Exchange Patterns for allowable patterns.

Transaction Pattern:

* Creates Transaction: This service capability starts and completes a transaction
* Participation allowed: This service capability is able to participate in a transaction without violating the ongoing transaction's properties (i.e. Atomicity, Consistency, Isolation, Durability)
* Participation not allowed: This service capability is unable to participate in a transaction

Maximum Response: The maximum time in milliseconds permitted to complete this service capability.

### G.2.8 oneM2M Resource Interworking

<Document the related oneM2M Resources operations to <serviceCapabilityName> here. Interworking rules are defined for each Resource operation. If there is no related internal resource, this resource list can be empty (e.g. the service capability is 'sendTrigger').>.

# Annex H (informative): oneM2M Service Requirements

The primary motivation of the present documentis to integrate oneM2M Service capabilities with existing M2M deployments without affecting that existing M2M solution's underlying deployment framework and protocols. For example if an existing M2M solution uses a XMPP based framework to communicate between applications in the network and devices, then M2M Service capabilities are efficiently exposed to the XMPP based framework without requiring modifications to the existing M2M solution's deployment framework or protocol. A secondary motivation for the present documentis to offer M2M Service capabilities to M2M service providers who utilize service oriented architectural frameworks.

This annex defines requirements that have not been captured in the oneM2M Requirements [1].

|  |  |
| --- | --- |
| Requirement ID | Description |
| SCA-001 | The M2M System shall be capable of integrating oneM2M service capabilities with existing M2M deployments without affecting the existing M2M solution's underlying deployment framework and protocols. |
| SCA-002 | The M2M System shall be capable of offering oneM2M service capabilities to SOA architectural frameworks. |

# History

|  |  |  |
| --- | --- | --- |
| **History** (to be removed on publication) | | |
| V0.0.1 | 19-Feb-2014 | Rapporteur Input – Draft Skeleton |
| V.0.1.0 | 22-Feb-2014 | Added agreed contributions from TP9  ARC-2014-0081R02 |
| V.0.2.0 | 15-May-2014 | Added agreed contributions from TP10 and interim conference calls  ARC-2014-1259-TS-0007-Reference\_Update  ARC-2014-1260R02-TS-0007-Mca-Request\_Services  ARC-2014-1324-TS-0007\_Attribute\_Alignment  ARC-2014-1261R02-TS-0007-Mca-Sub-Pub-Notify |
| V.0.3.0 | 17-June-2014 | Added agreed contributions from TP11  ARC-2014-1390-TS-0007\_IN-OUT\_DeSignation  ARC-2014-1391-TS-0007\_Alignment\_with\_TS-0001\_terms  ARC-2014-1398-TS-0007\_Clause-Role-Interworking-Removal  ARC-2014-1401R02-TS-0007\_Response\_Code\_Cleanup  ARC-2014-1404-TS-0007-Service\_Adminstration  ARC-2014-1405-TS-0007-Service\_Subscription\_Adminstration |
| V.0.4.0 | 04-August-2014 | Added agreed contributions from TP12  ARC-2014-1411R02-TS-0007-Mca\_Device\_Firmware\_management  ARC-2014-1473R01-TS-0007-Mca\_Device\_Configuration\_service  ARC-2014-1474R01-TS-0007-Mca\_Device\_Topology\_Management\_service |
| V.0.5.0 | 01-October-2014 | Added agreed contributions from TP12 conference calls  ARC-2014-1519R01-TS-0007-Request-Response-Data-Exchange-Pattern  Added agreed contributions from TP13  Updated Normative Reference text  ARC-2014-1534-TS-0007-Annex-A-Rework  ARC-2014-1523R03-TS-0007-Device-Onboarding  ARC-2014-1548R02-TS\_0007\_Event\_Collection\_service  ARC-2014-1554-TS-0007-Section\_7\_DM\_update  ARC-2014-1560R01-TS-0007-Mca\_Device\_Troubleshooting\_service  ARC-2014-1555-TS-0007-Mca\_Application\_Software\_Management\_Service  ARC-2014-1540R01-TS0007-Registration-Service  ARC-2014-1541R01-TS0007-Supporting-Service-Registration-Services |
| V.0.5.1 | 17-October-2014 | Added agreed contributions from TP13 conference calls  ARC-2014-1600-TS-0007-\_ServiceCapabilities\_CommonRequest\_Alignment |
| V.0.6.0 | 24-November-2014 | Added agreed contributions from TP13.4 conference call (email) and TP14  ARC-2014-1615-TS-0007-M2M\_Service\_Capability\_Alignment  ARC-2014-1643-TS-0007-downloadFirmware&installFirmware\_update  ARC-2014-1644R01-TS-0007-Section\_6\_getManagementAdapter\_update |
| V.0.6.1 | 05-January-2015 | Added agreed contributions from TP14.2 conference call  ARC-2014-1688R02-TS-0007-Service\_Subscription\_Alignment  ARC-2014-1689R06-TS0007-Registration\_Alignment\_with\_Service\_Subscription |
| V0.7.0 | 27-January-2015 | Added agreed contributions from TP15 plenary  ARC-2015-0001-Msc-TS0007-Common-Request-Parameters  ARC-2015-0002-TS-0007-Section\_3\_5\_Editor\_Notes\_Cleanup  ARC-2015-0004R02-TS\_0007\_clean\_up\_-\_event\_collection\_filterCriteria  ARC-2015-0008R04-TS-0007-DM\_editor\_notes\_cleanup |
| V0.8.0 | 30-March-2015 | Added agreed contributions from TP16 plenary  ARC-2015-1737-TS-0007-Non-DM-MSC-Notation\_correction  ARC-2015-1742-TS-0007-DM-MSC-Notation\_correction  ARC-2015-1743-TS-0007-DM\_editor\_note\_cleanup |
| V0.8.1 | May 2015 | Pre-processing done before TB approval e-mail: <mailto:edithelp@etsi.org> |