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ONEM2M TECHNICAL REPORT	
Document Number	TR-0025 V2.0.3
Document Name:	Application Developer Guide
Date:	2019-June-06
Abstract:	Provides a use case for guiding application developers to develop applications using functionalities provided by a oneM2M service platform.
Template Version:23 February 2015 (Dot not modify)	

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

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

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# Contents

50	Contents.....	3
51	1 Scope.....	5
52	2 References.....	5
53	2.1 Normative references.....	5
54	2.2 Informative references.....	5
55	3 Definitions and abbreviations.....	5
56	3.1 Definitions.....	5
57	3.2 Abbreviations.....	6
58	4 Conventions.....	6
59	5 Use case.....	6
60	6 Architecture.....	7
61	7 Procedures.....	8
62	7.1 Introduction.....	8
63	7.2 Call Flows.....	9
64	7.2.1 Application registration and Access control policy creation.....	9
65	7.2.2 Initial resource creation.....	9
66	7.2.3 Discovery of group resources.....	10
67	7.2.4 Discovery and retrieval of contentInstance resources.....	11
68	7.3 Remote control scenarios.....	13
69	7.3.1 Introduction.....	13
70	7.3.2 Single light control.....	13
71	7.3.3 Multiple light control.....	13
72	8 Implementation.....	14
73	8.1 Introduction.....	14
74	8.2 Assumptions.....	14
75	8.3 Addressing for Entities.....	15
76	8.4 Modelling for Light State Data.....	15
77	8.5 Resource Structure.....	15
78	8.5.0 Introduction.....	15
79	8.5.1 Resource Structure of IN-CSE.....	15
80	8.5.2 Resource Structure of MN-CSE.....	16
81	8.6 Role of Entities.....	17
82	8.6.1 oneM2M service platform (IN-CSE).....	17
83	8.6.2 Home gateway application (MN-AE).....	18
84	8.6.3 Light applications (ADN-AE1 and ADN-AE2).....	18
85	8.6.4 Smartphone application (IN-AE).....	18
86	8.7 Implementation Procedures.....	18
87	8.7.1 Introduction.....	18
88	8.7.2 MN-CSE registration.....	18
89	8.7.3 Access control policy creation.....	19
90	8.7.4 Application entities registration.....	21
91	8.7.4.1 Light application ADN-AE1.....	21
92	8.7.4.2 Light application ADN-AE2.....	22
93	8.7.4.3 Home gateway application MN-AE.....	23
94	8.7.4.4 Smartphone application IN-AE.....	23
95	8.7.5 Containers creation.....	24
96	8.7.5.1 Create a container of ADN-AE1.....	24
97	8.7.5.2 Create a container of ADN-AE2.....	25
98	8.7.6 ContentInstances creation.....	26
99	8.7.6.1 Create a content instance of ADN-AE1.....	26
100	8.7.6.2 Create a content instance of ADN-AE2.....	27
101	8.7.7 Group creation.....	27

102	8.7.8	Subscriptions creation .....	28
103	8.7.8.1	Subscription to the content instance of ADN-AE1 .....	28
104	8.7.8.2	Subscription to the content instance of ADN-AE2 .....	29
105	8.7.9	Discovery .....	30
106	8.7.9.1	Introduction .....	30
107	8.7.9.2	Discovery of single light registered with MN-CSE .....	31
108	8.7.9.3	Discovery of groups located in MN-CSE .....	31
109	8.7.10	Latest content instances retrieval .....	32
110	8.7.10.1	Introduction .....	32
111	8.7.10.2	Retrieve the latest content instance of ADN-AE1 .....	33
112	8.7.10.3	Retrieve the latest content instance of ADN-AE2 .....	34
113	8.7.10.4	Retrieve a group of latest content instances for all light states .....	35
114	8.7.11	Light state modification .....	37
115	8.7.11.1	Introduction .....	37
116	8.7.11.2	Create a content instance under container of ADN-AE1 .....	37
117	8.7.11.3	Create a content instance under container of ADN-AE2 .....	38
118	8.7.11.4	Update the state of all lights using group fanout .....	38
119	8.7.12	Notifications .....	41
120	8.7.12.1	Introduction .....	41
121	8.7.12.2	Post a notification to ADN-AE1 .....	41
122	8.7.12.3	Post a notification to ADN-AE2 .....	42
123		Annex A: Reading Resources .....	44
124		Annex A.1 Introduction .....	44
125		Annex A.2 CSE resources .....	44
126		<i>Annex A.2.1 IN-CSE</i> .....	44
127		<i>Annex A.2.2 MN-CSE</i> .....	44
128		Annex A.3 Gateway device application MN-AE .....	45
129		Annex A.4. Light device applications .....	45
130		<i>Annex A.4.1 ADN-AE1</i> .....	45
131		<i>Annex A.4.2 ADN-AE2</i> .....	46
132		Annex A.5 Smartphone application IN-AE .....	46
133		Annex A.6 Access control policy .....	47
134		Annex A.7 Containers .....	47
135		<i>Annex A.7.1 Container under ADN-AE1</i> .....	47
136		<i>Annex A.7.2 Container under ADN-AE2</i> .....	48
137		Annex A.8 ContentInstances .....	48
138		<i>Annex A.8.1 Latest contentInstance in ADN-AE1</i> .....	48
139		<i>Annex A.8.2 Latest contentInstance in ADN-AE2</i> .....	49
140		Annex A.9 Subscriptions .....	49
141		<i>Annex A.9.1 Subscription to container in ADN-AE1</i> .....	49
142		<i>Annex A.9.2 Subscription to container in ADN-AE2</i> .....	50
143		Annex A.10 Groups .....	51
144		<i>Annex A.10.1 Group1</i> .....	51
145		History .....	51

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# 1 Scope

The present document provides a guide for application developers to develop applications using functionalities provided by any oneM2M compliant service platform with the scope of as follows:

- Objective of the use case,
- The architecture of the use case mapped into an oneM2M service platform,
- The execution procedures for implementation of the use case, and
- Implementation details of the use case.

---

# 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.

Not applicable.

## 2.2 Informative references

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://www.onem2m.org/images/files/oneM2M-Drafting-Rules.pdf>

[i.2] oneM2M TS-0001 (V12.12.1): "Functional Architecture".

[i.3] oneM2M TS-0004 (V2.9.0): "Service Layer Core protocol Specification".

[i.4] oneM2M TS-0009 (V2.8.0): "HTTP Protocol Binding".

[i.5] oneM2M TS-0011: "Common Terminology".

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# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in oneM2M TS-0011 [i.5] and the following apply.

NOTE: A term defined in the present document takes precedence over the definition of the same term, if any, in oneM2M TS-0011 [i.5].

**M2M service provider domain:** part of the M2M System that is associated with a specific M2M Service Provider

179 **registrar CSE:** CSE where an Application or another CSE has registered

180 **resource:** uniquely addressable entity in oneM2M architecture

## 181 3.2 Abbreviations

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

183	ACP	Access Control Policy
184	ADN	Application Dedicated Node
185	ADN-AE	AE which resides in the Application Dedicated Node
186	AE	Application Entity
187	CoAP	Constrained Application Protocol
188	CSE	Common Services Entity
189	CSE-ID	Common Service Entity Identifier
190	DNS	Domain Name System
191	FQDN	Fully Qualified Domain Name
192	HTTP	HyperText Transfer Protocol
193	IN	Infrastructure Node
194	IN-AE	Application Entity that is registered with the CSE in the Infrastructure Node
195	IN-CSE	CSE which resides in the Infrastructure Node
196	IP	Internet Protocol
197	JSON	JavaScript Object Notation
198	M2M	Machine to Machine
199	Mca	Reference Point for M2M Communication with AE
200	Mcc	Reference Point for M2M Communication with CSE
201	MN	Middle Node
202	MN-AE	Application Entity that is registered with the CSE in Middle Node
203	MN-CSE	CSE which resides in the Middle Node
204	PoA	Point of Access
205	SP	Service Provider
206	URI	Uniform Resource Identifier
207	XML	eXtensible Markup Language
208		

209

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## 210 4 Conventions

211 The key words "Shall", "Shall not", "May", "Need not", "Should", "Should not" in this document are to be interpreted as  
212 described in the oneM2M Drafting Rules [i.1].

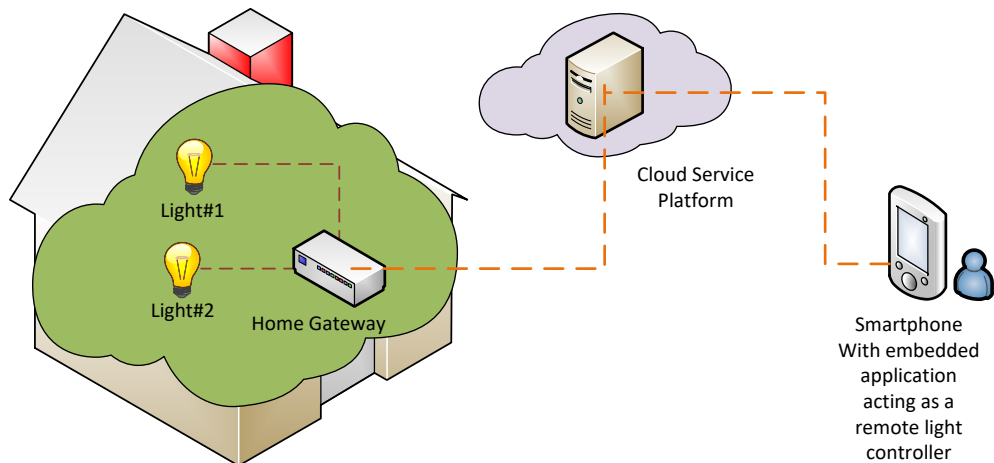
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## 213 5 Use case

214 This guide is based on a home lighting use case involving lights in a home that can be remotely controlled by a user's  
215 smartphone leveraging the capabilities of oneM2M. An overview of the use case is shown in figure 5-1. The main  
216 components are introduced as follows:

- 217 ① The lights are deployed in a home and are attached to a home gateway.
- 218 ② The home gateway communicates with a cloud service platform allowing the lights to be controlled remotely  
219 by the smartphone.
- 220 ③ The cloud service platform supports a set of services to enable the smartphone to more easily control the  
221 lights in the home. Some examples of services include registration, discovery, data management, group  
222 management, subscription/notification etc
- 223 ④ The smartphone hosts an application used to remotely control the lights in the home and supports the  
224 following capabilities:

- 225 ■ Discovery of lights deployed in the home.
- 226 ■ Sending commands to change light states i.e. ON and OFF.
- 227 ■ Retrieval of light states.
- 228



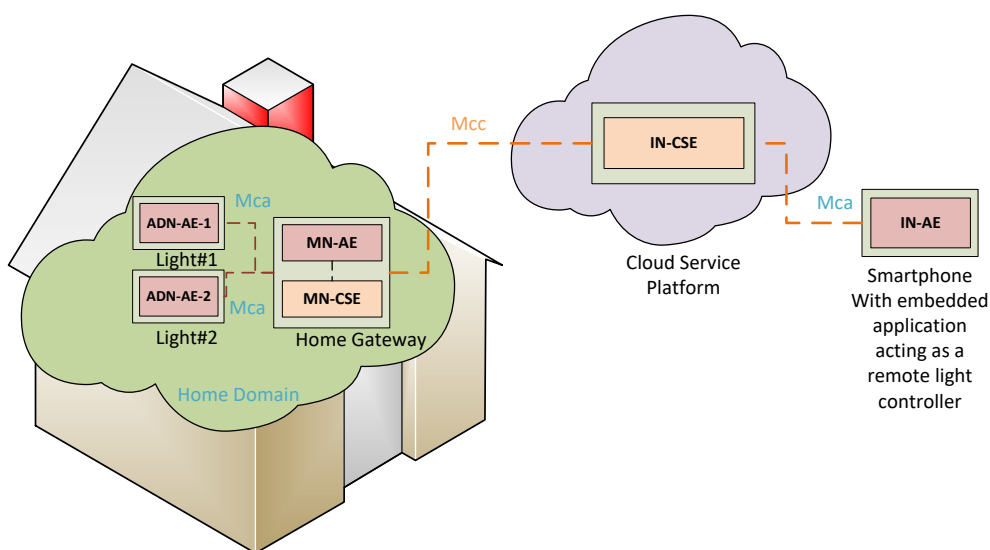
229  
230 **Figure 5-1: Overview of remote lights control use case**

231  
232

## 6 Architecture

233 This clause describes how the different components of this use case can be represented by corresponding oneM2M architectural entities as shown in figure 6-1.

234  
235



236  
237 **Figure 6-1: oneM2M functional architecture of remote lights control use case**

238

239 In the oneM2M functional architecture two basic types of entities are defined. One is an AE (short for Application  
240 Entity) and the other is a CSE (short for Common Services Entity). In this use case, the lights and smartphone each host  
241 an AE. Also an IN-CSE (short for Infrastructure Node CSE) is hosted in the cloud by the oneM2M Service Provider and  
242 a MN-CSE (short for Middle Node CSE) is hosted on the Home Gateway.

243 The oneM2M defined Mca reference point is used to interface an AE and CSE. The oneM2M defined Mcc reference  
244 point is used to interface CSEs. In this use case, the reference point used between a Light AE and home gateway MN-  
245 CSE or Smartphone AE and IN-CSE is Mca while reference point used between the home gateway MN-CSE and  
246 oneM2M service platform IN-CSE is Mcc

247 In summary, applications used in the current use case are classified as follows:

- 248 ① ADN-AE1: an application embedded in *Light#1* with capabilities to control *Light#1* and interact with the  
249 home gateway MN-CSE through *Mca* reference point;
- 250 ② ADN-AE2: an application embedded in *Light#2* with capabilities to control *Light#2* and interact with the  
251 home gateway MN-CSE through *Mca* reference point;
- 252 ③ IN-AE: a smartphone application embedded in the smartphone device with capabilities to interact directly  
253 with the oneM2M service platform IN-CSE through *Mcc* reference point and thereby remotely control *Light#1*  
254 and *Light#2*;
- 255 ④ MN-AE: a gateway application embedded into the home gateway that interacts with the MN-CSE through  
256 *Mca* reference point.

257

---

## 258 7 Procedures

### 259 7.1 Introduction

260 The deployment of the oneM2M standard in the present use case requires procedures that are classified as follows:

- 261 ① **Registration:** The current procedure contains light application registration, gateway application registration, and  
262 accessControlPolicy resource creation for selective access to data storage resources.
- 263 ② **Initial resource creation:** The current procedure contains group resource creation, container resources creation  
264 with specific access control policies, content instance resources creation with initial light states, subscription  
265 resources creation for notifications.
- 266 ③ **Discovery of container resource:** all containers with a specific filter criteria are discovered by the gateway  
267 application and then configured as members of a group resource.
- 268 ④ **Discovery and retrieval lights states:** all containers with a specific filter criteria are discovered and retrieved  
269 using resource identities through a smartphone application which gains access to oneM2M service platform so  
270 content information can be retrieved.
- 271 ⑤ **Single light switch on/off:** Any light that is discovered by and connected to the smartphone application is able  
272 to be switched on and off via a smartphone application.
- 273 ⑥ **Multiple lights switch on/off:** Multiple lights that are discovered are able to be switched on and off together via  
274 a smartphone application.

275



276

## 7.2 Call Flows

277

### 7.2.1 Application registration and Access control policy creation

278

Call flows regarding the registration phase depicted in figure 7.2.1-1 are ordered as follows:

279

① Gateway (MN-CSE) registers with the oneM2M service platform (IN-CSE).

280

② Gateway application (MN-AE) registers with the gateway (MN-CSE).

281

③ Light applications (ADN-AE1 and ADN-AE2) register with the gateway (MN-CSE).

282

④ Smartphone application (IN-AE) registers with the oneM2M service platform (IN-CSE).

283

⑤ Gateway application (MN-AE) discovers the smartphone application (IN-AE) from gateway (MN-CSE) with specific filter criteria. The discovered IN-AE is granted access to the remote light control service containers.

284

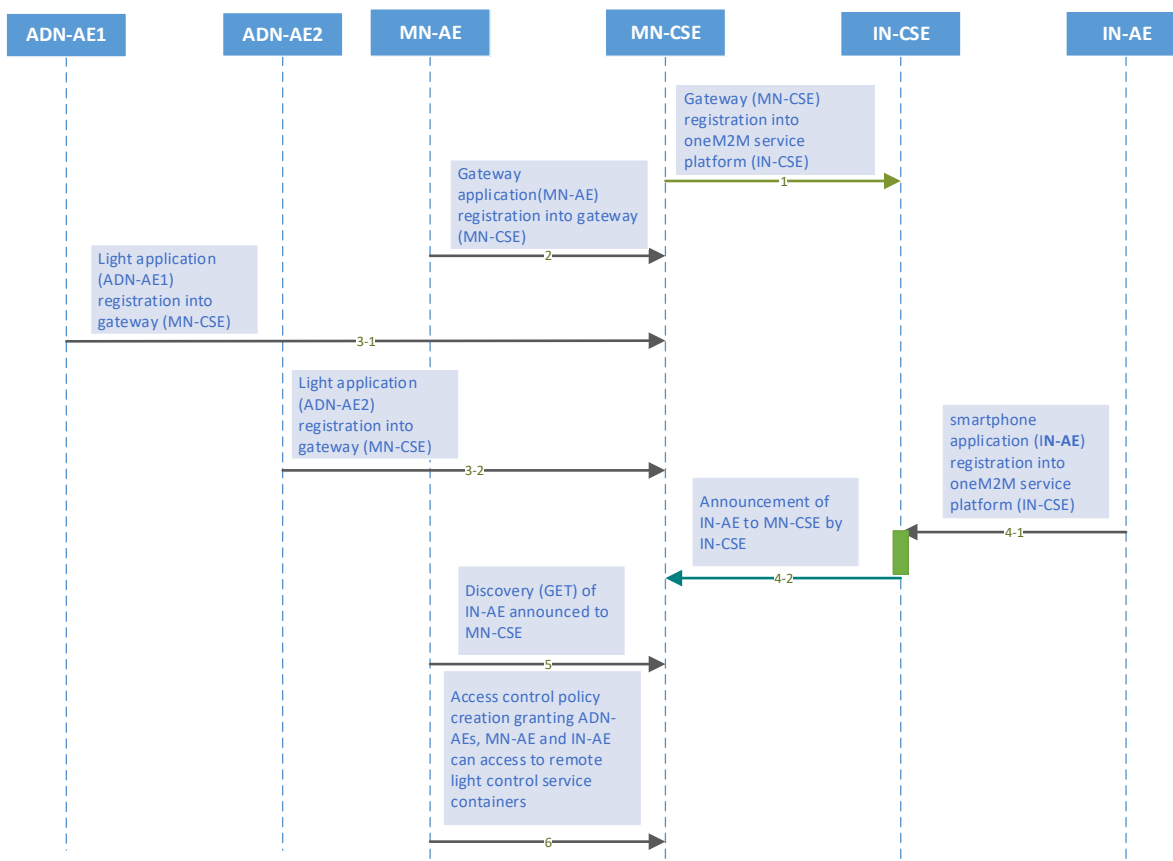
285

286

⑥ Gateway application (MN-AE) creates an accessControlPolicy resource granting all the entities playing roles in the current use case including ADN-AE1, ADN-AE2, MN-AE and IN-AE access to the created container and content instance resources.

287

288



289

290

Figure 7.2.1-1: Registration phase call flows

291

### 7.2.2 Initial resource creation

292

Call flows regarding the initial resource creation phase depicted in figure 7.2.2-1 are ordered as follows:

293

① Gateway application (MN-AE) creates a group resource on gateway (MN-CSE), for updating and retrieving group light state named as *containers\_group*. The group members are added from the list of discovered container resources that the MN-AE discovers. The group resource is created with a link to the same access control policy.

294

295

296

- 297 ② Two container resources are created in the gateway (MN-CSE) to store the light states under the  
 298 registered light application ADN-AE1 and ADN-AE2, respectively. The containers are created with a link to  
 299 the same access control policy.
- 300 ③ Content Instance resources are created by light applications (ADN-AE1 and ADN-AE2) under each  
 301 created container and represent the controlled light states.
- 302 ④ Subscription resources are created under the containers in the gateway (MN-CSE) so that subscribers, i.e.  
 303 light applications, can be notified whenever there is a new contentInstance resource created by the IN-AE.  
 304

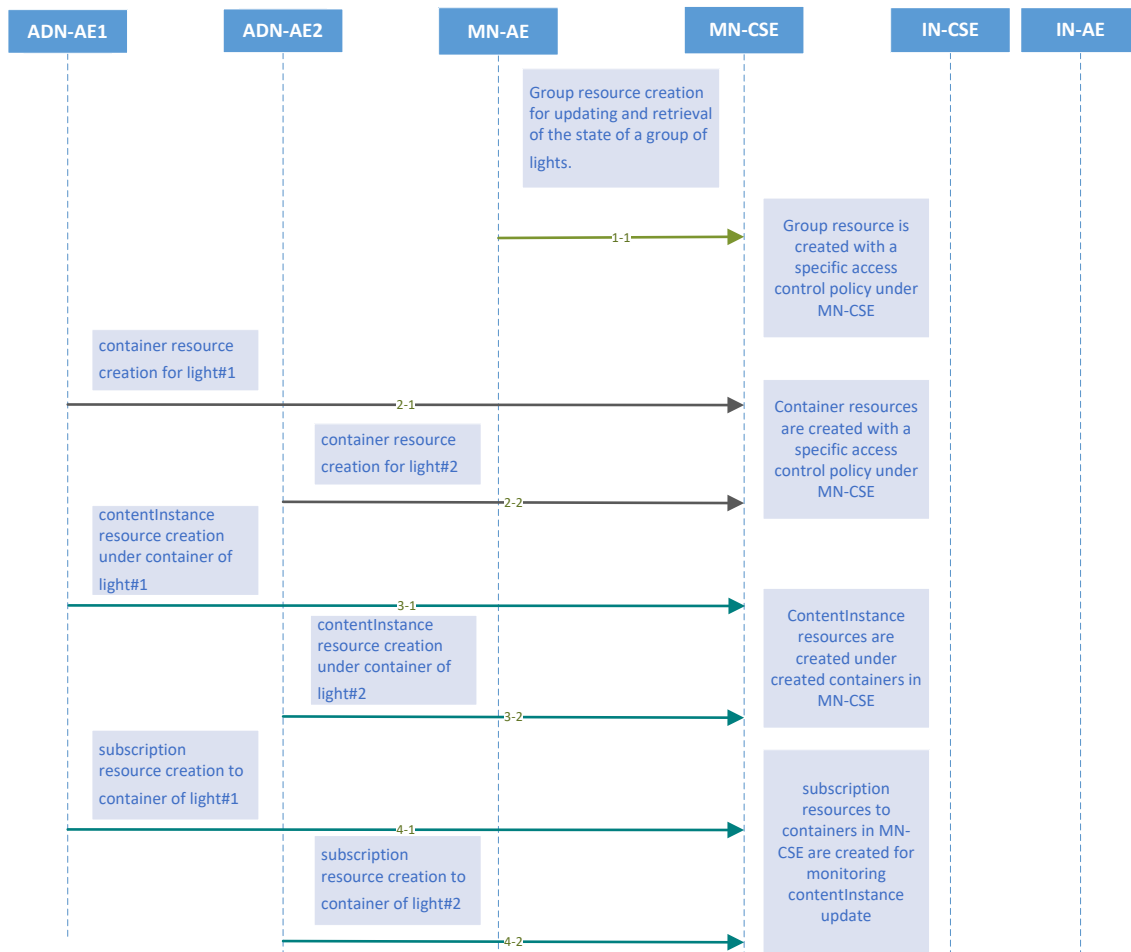


Figure 7.2.2-1: Initial resource creation phase call flows

### 7.2.3 Discovery of group resources

Call flows regarding the discovery and update of group resources are depicted in figure 7.2.3-1 and ordered as follows:

- 309 ① Gateway application (MN-AE) periodically sends a RETRIEVE request including the parameter  
 310 *filterUsage* and specific filter criteria condition(s) as a query string for discovery of container resources  
 311 stored in the MN-CSE of gateway. The filter criteria conditions for the discovery operation include  
 312 *createdBefore*, *createdAfter*, *modifiedSince*, *unmodifiedSince*, *label*, *creator*, *expireAfter*, *resourceType* etc.
- 313 ② Gateway (MN-CSE) responds with URIs of the discovered container resources, if any, to the gateway  
 314 application (MN-AE) according to the filter criteria(s).
- 315 ③ Gateway application (MN-AE) sends a update request to update the list of group members within the  
 316 previously created group resource with identifiers of the discovered containers.

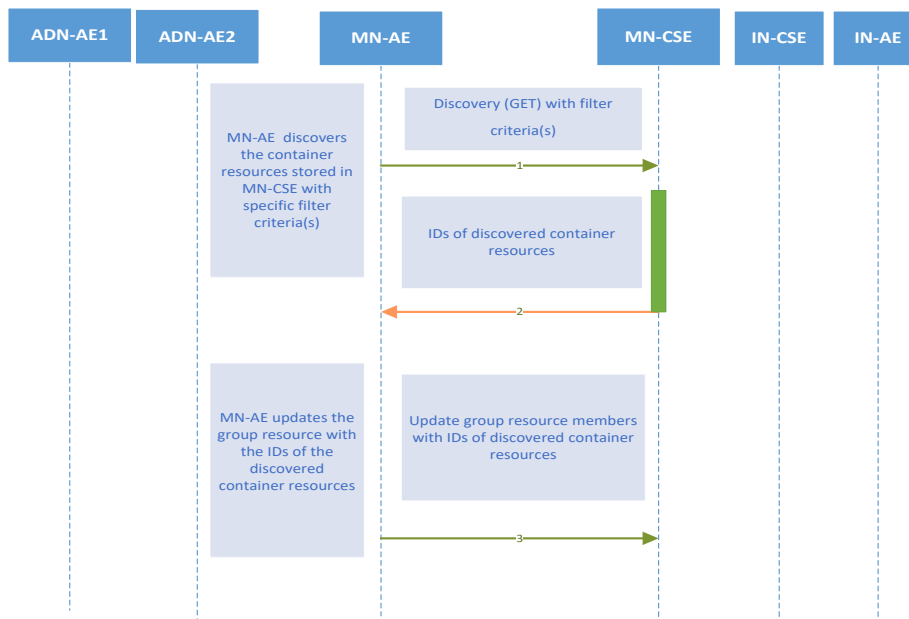
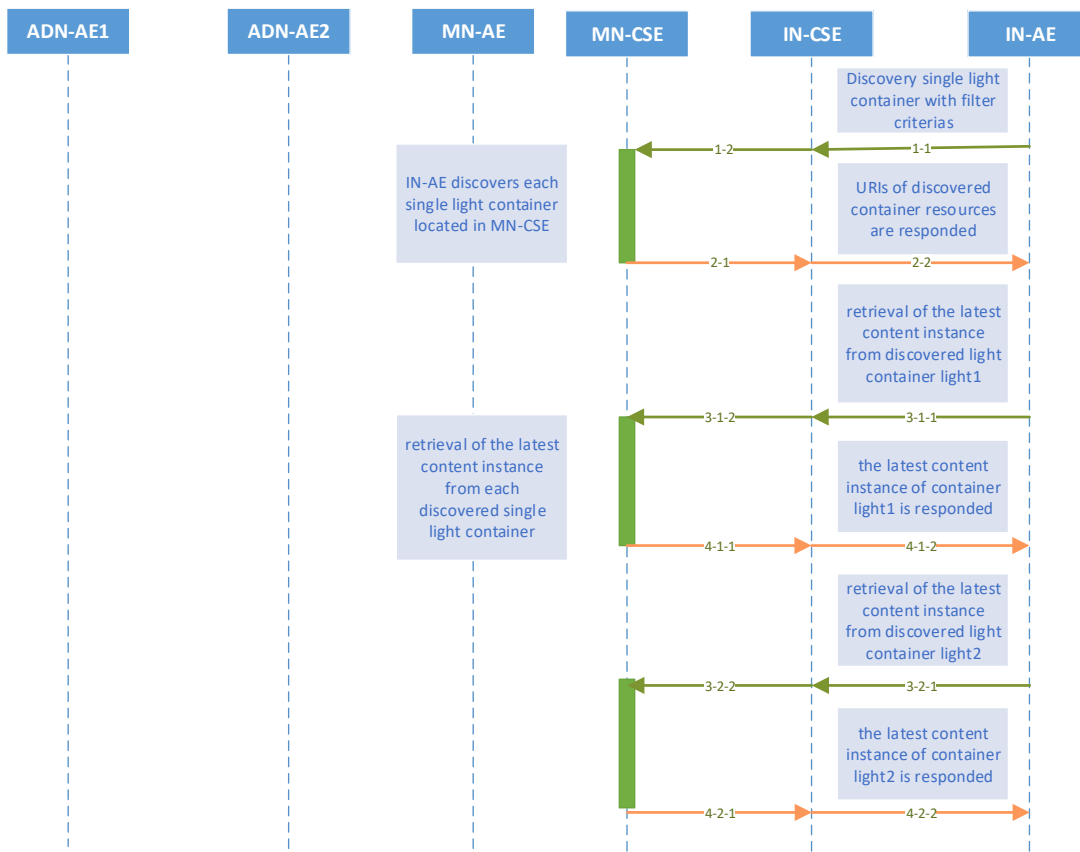


Figure 7.2.3-1: Discovery and group light state update phase call flows

### 7.2.4 Discovery and retrieval of contentInstance resources

Call flows regarding the discovery and retrieval of contentInstance resources depicted in figure 7.2.4-1 and 7.2.4-2 are ordered as follows:

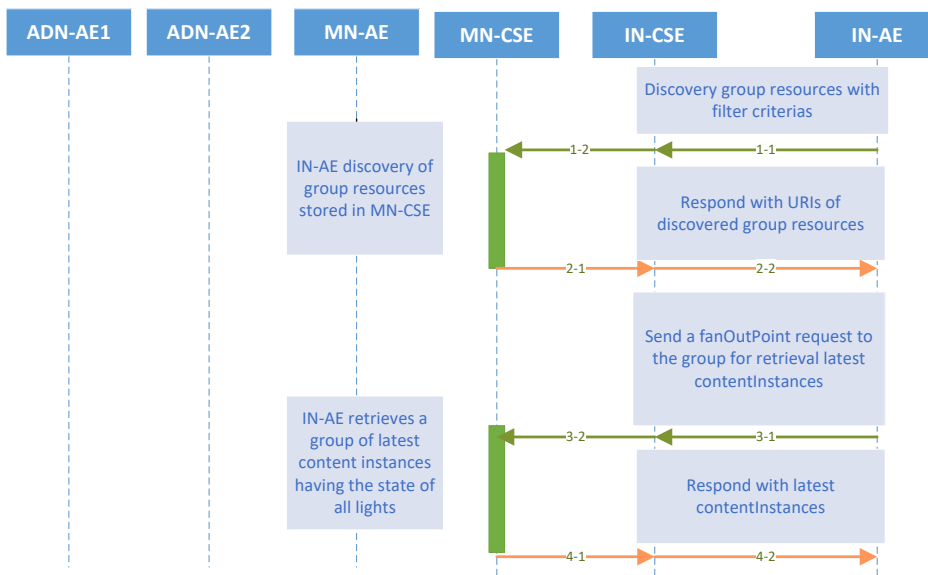
- ① The smartphone application (IN-AE) periodically sends a RETRIEVE request including the parameter *filterUsage* and specific filter criteria condition(s) as a query string for discovery of container resources stored in the MN-CSE of gateway.  
 The IN-AE also sends a Discovery request to the MN-CSE for the discovery of the group resources located in the MN-CSE.
- ② The gateway (MN-CSE) responds to the IN-AE with URIs of the discovered container resources under ADN-AE1 and ADN-AE2, if any.  
 For the case where the IN-AE sends a Discovery request for the discovery of group resources, the MN-CSE responds to the IN-AE with the URIs of the discovered group resources located in the MN-CSE, if any.
- ③ The IN-AE sends GET requests for retrieval of the latest contentInstance resources from each discovered light container resource.  
 In the case of retrieval of the latest contentInstance resources of the group of containers, the IN-AE sends a retrieve request to the *fanOutPoint* of the discovered group resource.
- ④ The MN-CSE responds to the IN-AE with the latest light state(s).



336

337

Figure 7.2.4-1: Discovery and single light retrieval phase call flows



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339

340

Figure 7.2.4-2 Discovery and a group of lights retrieval phase call flows

### 341 7.3 Remote control scenarios

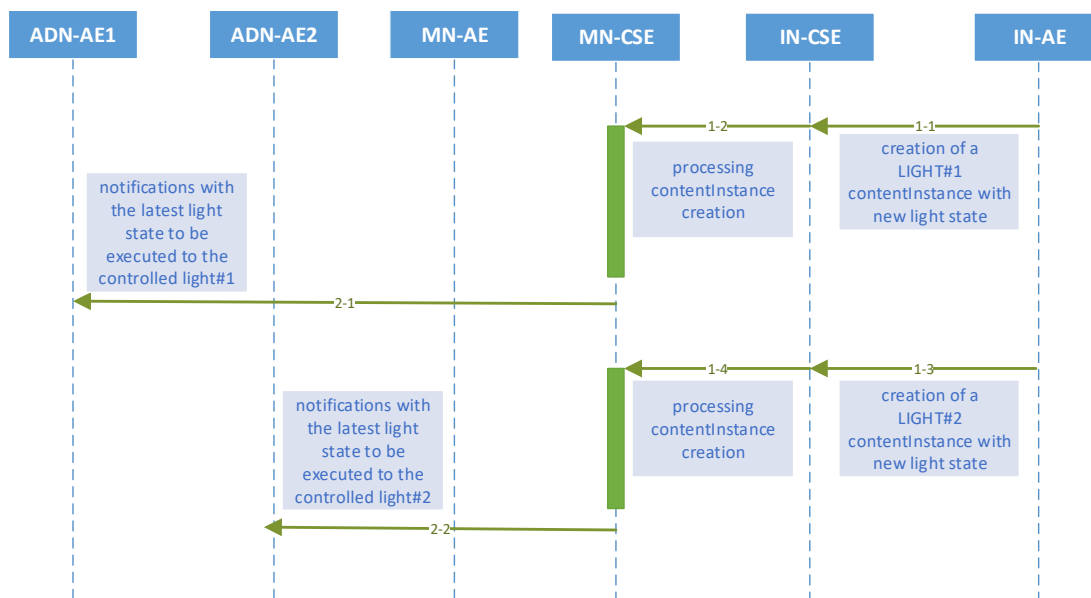
#### 342 7.3.1 Introduction

343 Lights are able to be controlled remotely through the smartphone application accessing the oneM2M service platform.  
 344 Two scenarios are introduced in clauses 7.3.2 and 7.3.3.

#### 345 7.3.2 Single light control

346 *Light#1* and *Light#2* are controlled remotely by a human user through a smartphone application (IN-AE). A call flow  
 347 for single light control is depicted in figure 7.3.2-1 and the steps are ordered as follows:

- 348 ① When the user updates the light state on her/his smartphone, the IN-AE creates a new contentInstance  
 349 representing a new light state under the targeted container of a Light ADN-AE stored in the MN-CSE.
- 350 ② If the contentInstance is created successfully, the MN-CSE sends a notification to the correspondng Light  
 351 ADN-AE to notify it that a new contentInstance resource was created.



352  
353 **Figure 7.3.2-1: Single light remote control phase call flows**

#### 354 7.3.3 Multiple light control

356 Users can also remotely control multiple lights through the smartphone application (IN-AE) by sending a single light  
 357 control command to the group resource. A call flow for multiple lights control is depicted in figure 7.3.3-1 and the steps  
 358 are ordered as follows:

- 359 ① When the user updates the state of a group of lights on her/his smartphone, the IN-AE sends a  
 360 contentInstance create request targeting the group resource on the MN-CSE. The MN-CSE then fans out the  
 361 request to the individual Light container member resources on the MN-CSE..
- 362 ② For each contentInstances created successfully, the MN-CSE sends a notification to the correspondng Light  
 363 ADN-AE.

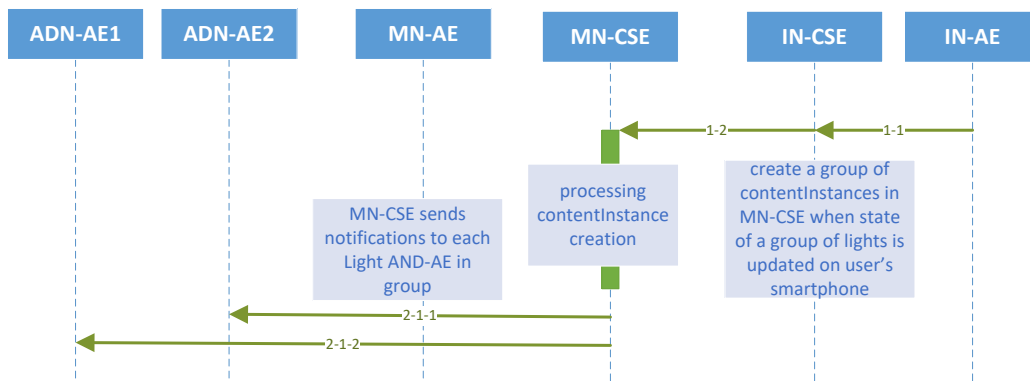


Figure 7.3.3-1: Multiple lights remote control phase call flows

## 8 Implementation

### 8.1 Introduction

Clause 8 presents necessary procedures required for the implementation of the remote lights control use case, including conditions that are met for the correct implementation of the current use case, and resource tree etc.

### 8.2 Assumptions

Assumptions are presented as below in order to ensure the remote lights control use case can be correctly implemented.

- All the applications are server capable;
- Devices and application entites are independently addressable with host names resolved by DNS network services;
- Host port number 8080 is reserved for oneM2M services;
- Security is not considered in the current use case;
- HTTP binding of oneM2M primitives is used in the current use case;
- Both XML and JSON serializations of oneM2M primitives are used in the current use case;
- All mandatory HTTP headers are presented in the HTTP requests while optional headers are selectively used in the current use case;
- All mandatory resource attributes for resources presented in the current use case are presented in the HTTP requests while optional resource attributes are selectively used in the current use case;
- The IN-CSE and MN-CSE in the current use case are deployed within the same oneM2M Service Provider domain;
- All AEs in the current use case are initially registered with CSEs and the identifier of the AEs are assigned by the Registrar CSE of the AE accordingly, starting with a character of ‘C’;
- All resources created in the current use case are addressable with the oneM2M Resource Identifier form of Hierarchical address;

- 390 • Short names for the representation of the resources and attributes are used in the current use case;
- 391 • Default access control policy has already been created under IN-CSE and it is used for MN-CSE registration  
392 with IN-CSE;
- 393 • All request originators send *Blocking Requests* for accessing resources located in CSEs.

## 394 8.3 Addressing for Entities

395 Each oneM2M entity including AE and CSE are addressable with correct host address that can be IP addresses or  
396 FQDN addresses resolved to IP addresses by DNS network services according to addressing rules specified in oneM2M  
397 standards.

398 The IN-CSE and MN-CSE entities presented in this use case are addressable with the following identifiers.

- 399 • IN-CSE:
  - 400 ■ CSE-ID: `in-cse`
  - 401 ■ resourceName of IN-CSE's CSEBase resource: `server`
- 402 • MN-CSE:
  - 403 ■ CSE-ID: `mn-cse`
  - 404 ■ resourceName of MN-CSE's CSEBase resource: `home_gateway`

## 406 8.4 Modelling for Light State Data

407 The light state *ON* or *OFF* stored as the content of content instance resource is modelled as string in XML  
408 representation and can be represented as `<con>ON</con>` or `<con>OFF</con>`, while represented as `{ ...`  
409 `"con": "ON" ...}` or `{... "con": "OFF" ...}`, respectively.

## 410 8.5 Resource Structure

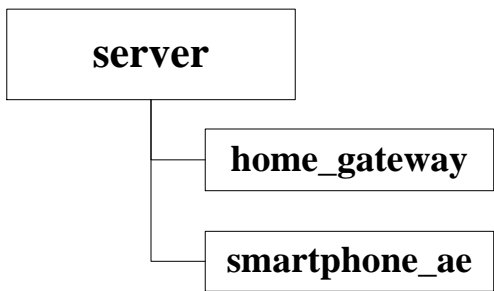
### 411 8.5.0 Introduction

412 The development of an oneM2M application includes the design of the resource trees of service capability layers i.e.  
413 IN-CSE and MN-CSE in the current use case. The resource tree is constructed with child resources created according to  
414 the high level procedures presented in oneM2M application developer guide clause 7. All the child resources shown in  
415 the resource trees are mandatorily required in order to correctly implement the remote lights control use case.

### 416 8.5.1 Resource Structure of IN-CSE

417 The resource tree of IN-CSE starts with a CSEBase named *server* depicted in figure 8.5.1-1.

418 The root CSEBase has two direct child resources, a remoteCSE named *home\_gateway* and an AE named  
419 *smartphone\_ae*.



420

421

422

Figure 8.5.1-1: IN-CSE resource structure

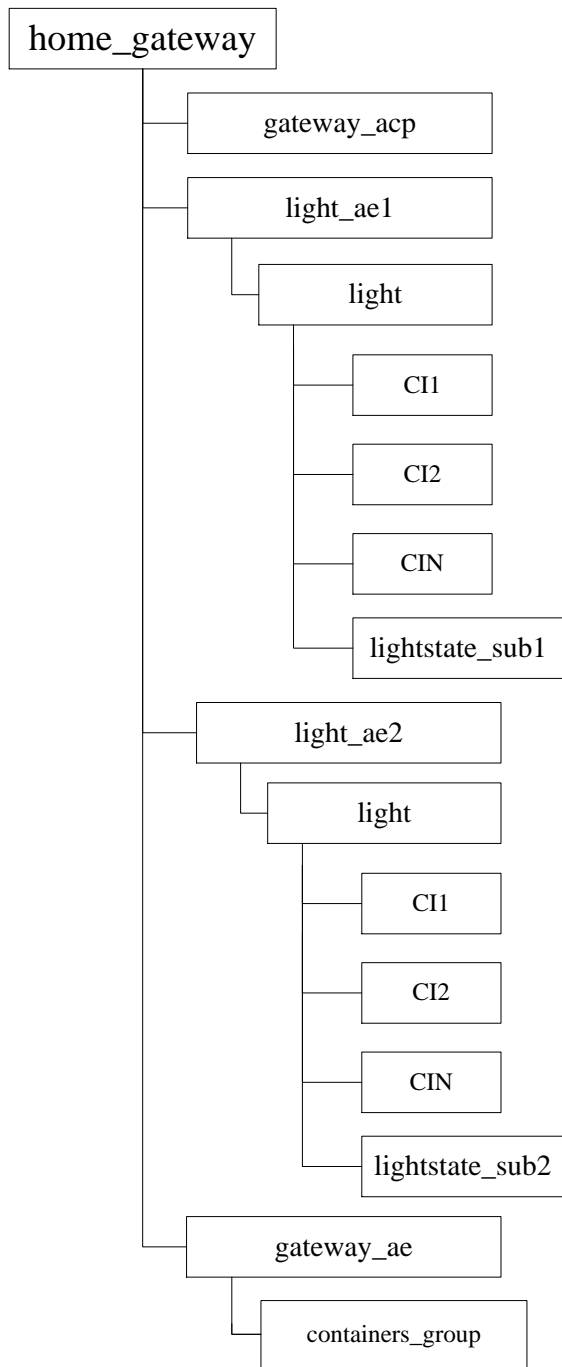
## 8.5.2 Resource Structure of MN-CSE

424 The resource tree of MN-CSE starts with a CSEBase named *home\_gateway* depicted in figure 8.5.2-1.

425 The resource tree of MN-CSE is constructed with child resources as follows:

- 426 • an accessControlPolicy named *gateway\_acp*,
- 427 • an ADN-AE named *light\_ae1* which contains sub-resources of a container named *light* and multiple  
428 contentInstances,
- 429 • an ADN-AE named *light\_ae2* which contains sub-resources of a container named *light* and multiple  
430 contentInstances,
- 431 • *light\_state\_sub1* and *light\_state\_sub2* subscription resources that are child resources of the two *light*  
432 containers, and
- 433 • a MN-AE named *gateway\_ae* which contains a group child resource,
- 434 • A group resource named *containers\_group* whose members are the *light* containers of each AND-AEs.  
435 Smartphone application users with proper access control privileges can send a *fanOutPoint* request to this  
436 group to create and retrieve content instances in the two *light* containers.





437

438

Figure 8.5.2-1: MN-CSE resource tree

439

## 8.6 Role of Entities

440

### 8.6.1 oneM2M service platform (IN-CSE)

441

The oneM2M service platform is modelled as an IN-CSE and is responsible for

442

- handling the registration requests from *the* smartphone AE and home gateway MN-CSE

## 443 8.6.2 Home gateway application (MN-AE)

444 The home gateway application is modelled as a MN-AE and is responsible for

- 445 • initializing the home gateway device,
- 446 • creating an access control policy resource gateway\_acp in the MN-CSE,
- 447 • registering the home gateway application with the MN-CSE,
- 448 • creating the group resource with access control policy gateway\_acp in the MN-CSE,
- 449 • discovering device applications registered with the MN-CSE, and

## 450 8.6.3 Light applications (ADN-AE1 and ADN-AE2)

451 Each of the light applications are modelled as an ADN-AE and are responsible for

- 452 • initializing the light control device,
- 453 • registering the light devices with the MN-CSE,
- 454 • creating container resources named “light” with access control policy gateway\_acp in the MN-CSE,  
455 respectively,
- 456 • creating subscription resources lightstate\_sub1 and lightstate\_sub2 under the two *light* containers, and
- 457 • creating content instance resources under containers light1 and light2 with initial light state, respectively.

## 458 8.6.4 Smartphone application (IN-AE)

459 The smartphone application is modelled as a IN-AE, which directly communicates with the oneM2M service platform  
460 IN-CSE and is responsible for

- 461 • initializing the smartphone light control application,
- 462 • registering the smartphone application with the IN-CSE,
- 463 • discovering the two *light* containers,
- 464 • displaying the discovered light states,
- 465 • accepting the light state modification commands from the smartphone application user,
- 466 • executing the light state modification commands for single and multiple lights.

## 467 8.7 Implementation Procedures

### 468 8.7.1 Introduction

469 The implementation procedures in the current use case are mapped into HTTP bindings with both XML and JSON  
470 serializations of oneM2M primitives according to the standard APIs describing the reference points Mca and Mcc, as  
471 defined in oneM2M TS-0001 [i.2], oneM2M TS-0004 [i.3], the HTTP binding TS-0009 [i.4].

472 In addition, *short names* for the representation of the resources and attributes are used in the implementation  
473 procedures.

### 474 8.7.2 MN-CSE registration

475 The implementation starts with the registration of MN-CSE with IN-CSE as shown in the following procedure.

476 The following example shows the MN-CSE registration request and response using XML serialization

```

477
478 HTTP Request:
479
480 POST ~/in-cse/server?rcn=0 HTTP/1.1
481 Host: in.provider.com:8080
482 X-M2M-Origin: /mn-cse
483 Content-Type: application/xml;ty=16
484 X-M2M-RI: incse-88643
485
486 <?xml version="1.0" encoding="UTF-8"?>
487 <m2m:csr xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="home_gateway">
488   <csi>mn-cse</csi>
489   <cb>mn.provider.com/mn-cse</cb>
490   <rr>true</rr>
491   <poa>http://mn.provider.com:8080</poa>
492   <cst>2</cst>
493   <acpi>/in-cse/acp-666957710</acpi>
494 </m2m:csr>
495
496 HTTP Response:
497
498 201 Created
499 X-M2M-RSC: 2001
500 X-M2M-RI: incse-88643
501 Content-Location: /in-cse/csr-299409504
502

```

503 The following example shows the MN-CSE registration request and response using HTTP with JSON serialization.:

```

504
505 HTTP Request:
506
507 POST ~/in-cse/server?rcn=0 HTTP/1.1
508 Host: in.provider.com:8080
509 X-M2M-Origin: /mn-cse
510 Content-Type: application/json;ty=16
511 X-M2M-RI: incse-88643
512
513 {
514   "m2m:csr":
515   {
516     "rn": "home_gateway",
517     "csi": "mn-cse",
518     "cb": "mn.provider.com/mn-cse",
519     "rr": true,
520     "poa": ["http://mn.provider.com:8080"],
521     "cst": 2,
522     "acpi": ["/in-cse/acp-666957710"]
523   }
524 }
525
526 HTTP Response:
527
528 201 Created
529 X-M2M-RSC: 2001
530 X-M2M-RI: incse-88643
531 Content-Location: /in-cse/csr-299409504
532

```

### 533 8.7.3 Access control policy creation

534 When an access control policy resource is created, a list of one or more allowed request originators is specified in the *acor* field and the allowed operations in the *acop* field.

536 The value of *acop* is set to 63 which indicates that the specified originator is granted privileges to conduct *CREATE*, *RETRIEVE*, *UPDATE*, *DELETE*, *DISCOVERY*, and *NOTIFY* operations.

538 The creation of access control policy resource *gateway\_acp* in MN-CSE is implemented in the following procedure.

539 The following example shows an access control policy create request and response using HTTP with XML serialization.

```

540 HTTP Request:
541
542 POST /~/mn-cse/home_gateway?rcn=0 HTTP/1.1
543 Host: mn.provider.com:8080
544 X-M2M-Origin: Cgateway_ae
545 Content-Type: application/xml;ty=1
546 X-M2M-RI: mncse-62948
547
548 <m2m:acp xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="gateway_acp">
549
550     <pv>
551         <acr>
552             <acor>Cgateway_ae Clight_ae1 Clight_ae2 /in-
553 cse/Csmartphone_ae</acor>
554             <acop>63</acop>
555         </acr>
556     </pv>
557     <pvs>
558         <acr>
559             <acor>Cgateway_ae </acor>
560             <acop>51</acop>
561         </acr>
562     </pvs>
563 </m2m:acp>
564
565 HTTP Response:
566
567 201 Created
568 X-M2M-RSC: 2001
569 X-M2M-RI: mncse-62948
570 Content-Location: /mn-cse/acp-805496226
571
572
573

```

573 The following example shows an access control policy create request and response using HTTP with XML serialization.

```

574 HTTP Request:
575
576 POST /~/mn-cse/home_gateway?rcn=0 HTTP/1.1
577 Host: mn.provider.com:8080
578 X-M2M-Origin: Cgateway_ae
579 Content-Type: application/json;ty=1
580 X-M2M-RI: mncse-62948
581
582 {
583     "m2m:acp":
584     {
585         "rn": "gateway_acp",
586         "pv":
587         {
588             "acr":[{"
589                 "acor":
590                 [
591                     "Cgateway_ae",
592                     "Clight_ae1",
593                     "Clight_ae2",
594                     "/in-cse/Csmartphone_ae"
595                 ],
596                 "acop": 63
597             }],
598         },
599         "pvs":
600         {
601             "acr":[{"
602                 "acor":
603                 [
604                     "Cgateway_ae"

```

```

605         ],
606         "acop":51
607     ]]
608 }
609 }
610 }

```

HTTP Response:

```

614 201 Created
615 X-M2M-RSC: 2001
616 X-M2M-RI: mncse-62948
617 Content-Location: /mn-cse/acp-805496226
618
619

```

The access control policy resource is used to grant applications the access rights to conduct specific operations and access to specific resources. The list of applications could be obtained with a discovery procedure using filter criteria conditions. For more details about the discovery procedure, please go to clause 8.7.9. Here it is required that the list of applications has been discovered before creating the access control policy resource.

## 8.7.4 Application entities registration

### 8.7.4.1 Light application ADN-AE1

The registration of ADN-AE1 with MN-CSE is shown in the following procedure. Note that the access control policy identifier (unstructured SP-relative resourceID) which is assigned to ADN-AE1 is `/mn-cse/acp-805496226`.

The following example shows an ADN-AE registration request and response using HTTP with XML serialization.

HTTP Request:

```

630 POST /home_gateway?rcn=0 HTTP/1.1
631 Host: mn.provider.com:8080
632 X-M2M-Origin: C
633 Content-Type: application/xml;ty=2
634 X-M2M-RI: mncse-92345
635
636
637 <?xml version="1.0" encoding="UTF-8"?>
638 <m2m:ae xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="light_ae1">
639   <api>A01.com.company.lightApp1</api>
640   <rr>>true</rr>
641   <poa>http://192.168.0.10:9090</poa>
642   <acpi>/mn-cse/acp-805496226</acpi>
643 </m2m:ae>
644

```

HTTP Response:

```

647 201 Created
648 X-M2M-RSC: 2001
649 X-M2M-RI: mncse-92345
650 Content-Location: /mn-cse/ae-CAE340304071
651
652

```

The following example shows an ADN-AE registration request and response using HTTP with JSON serialization.

HTTP Request:

```

654 POST /home_gateway?rcn=0 HTTP/1.1
655 Host: mn.provider.com:8080
656 X-M2M-Origin: C
657 Content-Type: application/json;ty=2
658 X-M2M-RI: mncse-92345
659
660

```

```

661 {
662   "m2m:ae":
663   {
664     "rn": "light_ae1",

```

```

665         "api": "A01.com.company.lightApp1",
666         "rr": true,
667         "poa": ["http://192.168.0.10:9090"],
668         "acpi": ["/mn-cse/acp-805496226"]
669     }
670 }
671
672 HTTP Response:
673
674 201 Created
675 X-M2M-RSC: 2001
676 X-M2M-RI: mncse-92345
677 Content-Location: /mn-cse/ae-CAE340304071
678

```

### 8.7.4.2 Light application ADN-AE2

680 The registration of ADN-AE2 with MN-CSE is shown in the following procedure. Note that the access control policy  
 681 identifier (unstructured SP-relative resourceID) which is assigned to ADN-AE2 is `/mn-cse/acp-805496226`.

682 The following example shows an ADN-AE registration request and response using HTTP with XML serialization.

```

683 HTTP Request:
684
685 POST /home_gateway?rcn=0 HTTP/1.1
686 Host: mn.provider.com:8080
687 X-M2M-Origin: C
688 Content-Type: application/xml;ty=2
689 X-M2M-RI: mncse-18346
690
691 <?xml version="1.0" encoding="UTF-8"?>
692 <m2m:ae xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="light_ae2">
693   <api>A01.com.company.lightApp2</api>
694   <rr>true</rr>
695   <poa>http://192.168.0.20:9090</poa>
696   <acpi>/mn-cse/acp-805496226</acpi>
697 </m2m:ae>
698
699 HTTP Response:
700
701 201 Created
702 X-M2M-RSC: 2001
703 X-M2M-RI: mncse-18346
704 Content-Location: /mn-cse/ae-CAE340304042
705

```

706 The following example shows an ADN-AE registration request and response using HTTP with JSON serialization.

```

707 HTTP Request:
708
709 POST /home_gateway?rcn=0 HTTP/1.1
710 Host: mn.provider.com:8080
711 X-M2M-Origin: C
712 Content-Type: application/json;ty=2
713 X-M2M-RI: mncse-18346
714
715 {
716   "m2m:ae":
717   {
718     "rn": "light_ae2",
719     "api": "A01.com.company.lightApp2",
720     "rr": true,
721     "poa": ["http://192.168.0.20:9090"],
722     "acpi": ["/mn-cse/acp-805496226"]
723   }
724 }
725
726 HTTP Response:
727
728 201 Created

```

```

729         X-M2M-RSC: 2001
730         X-M2M-RI: mncse-18346
731         Content-Location: /mn-cse/ae-CAE340304042

```

### 8.7.4.3 Home gateway application MN-AE

The registration of MN-AE with MN-CSE is shown in the following procedure. Note that the access control policy identifier (unstructured SP-relative resourceID) which is assigned to MN-AE is `/mn-cse/acp-805496226`.

The following example shows an MN-AE registration request and response using HTTP with XML serialization.

```

736         HTTP Request:
737
738         POST /home_gateway?rcn=0 HTTP/1.1
739         Host: mn.provider.com:8080
740         X-M2M-Origin: C
741         Content-Type: application/xml;ty=2
742         X-M2M-RI: mncse-19347
743
744         <?xml version="1.0" encoding="UTF-8"?>
745         <m2m:ae xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="gateway_ae">
746           <api>A01.com.company.gatewayApp</api>
747           <rr>>false</rr>
748           <acpi>/mn-cse/acp-805496226</acpi>
749         </m2m:ae>
750
751         HTTP Response:
752
753         201 Created
754         X-M2M-RSC: 2001
755         X-M2M-RI: mncse-19347
756         Content-Location: /mn-cse/ae-CAE340303271

```

The following example shows an MN-AE registration request and response using HTTP with JSON serialization.

```

760         HTTP Request:
761
762         POST /home_gateway?rcn=0 HTTP/1.1
763         Host: mn.provider.com:8080
764         X-M2M-Origin: C
765         Content-Type: application/json;ty=2
766         X-M2M-RI: mncse-19347
767
768         {
769           "m2m:ae":
770             {
771               "rn": "gateway_ae",
772               "api": "A01.com.company.gatewayApp",
773               "rr": false,
774               "acpi": ["/mn-cse/acp-805496226"]
775             }
776         }
777
778         HTTP Response:
779
780         201 Created
781         X-M2M-RSC: 2001
782         X-M2M-RI: mncse-19347
783         Content-Location: /mn-cse/ae-CAE340303271
784

```

### 8.7.4.4 Smartphone application IN-AE

The registration of IN-AE with IN-CSE is shown in the following procedure. Note that the access control policy identifier (unstructured SP-relative resourceID) which is assigned to IN-AE is `/in-cse/acp-666957710`.

The following example shows an IN-AE registration request and response using HTTP with XML serialization.

```

789     HTTP Request:
790
791     POST /server?rcn=0 HTTP/1.1
792     Host: mn.provider.com:8080
793     X-M2M-Origin: C
794     Content-Type: application/xml;ty=2
795     X-M2M-RI: incse-16346
796
797     <?xml version="1.0" encoding="UTF-8"?>
798     <m2m:ae xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="smartphone_ae">
799       <api>A01.com.company.lightControlApp</api>
800       <rr>false</rr>
801       <acpi>/in-cse/acp-666957710</acpi>
802     </m2m:ae>
803
804     HTTP Response:
805
806     201 Created
807     X-M2M-RSC: 2001
808     X-M2M-RI: incse-16346
809     Content-Location: /in-cse/ae-CAE340304178
810
811

```

The following example shows an IN-AE registration request and response using HTTP with JSON serialization.

```

812     HTTP Request:
813
814     POST /server?rcn=0 HTTP/1.1
815     Host: mn.provider.com:8080
816     X-M2M-Origin: C
817     Content-Type: application/json;ty=2
818     X-M2M-RI: incse-16346
819
820     {
821       "m2m:ae":
822       {
823         "rn": "smartphone_ae",
824         "api": "A01.com.company.lightControlApp",
825         "rr": false,
826         "acpi": ["/in-cse/acp-666957710"]
827       }
828     }
829
830     HTTP Response:
831
832     201 Created
833     X-M2M-RSC: 2001
834     X-M2M-RI: incse-16346
835     Content-Location: /in-cse/ae-CAE340304178
836
837

```

## 8.7.5 Containers creation

### 8.7.5.1 Create a container of ADN-AE1

The creation of a container resource for ADN-AE1 is shown in the following procedure.

The following example shows a container create request and response using HTTP with XML serialization.

```

842     HTTP Request:
843
844     POST /home_gateway/light_ae1?rcn=0 HTTP/1.1
845     Host: mn.provider.com:8080
846     X-M2M-Origin: Clight_ae1
847     Content-Type: application/xml;ty=3
848     X-M2M-RI: mncse/13345
849
850     <m2m:cnt xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="light">

```



```

850     </m2m:cnt>
851
852     HTTP Response:
853
854     201 Created
855     X-M2M-RSC: 2001
856     X-M2M-RI: mncse-13345
857     Content-Location: /mn-cse/cnt-582759912
858

```

The following example shows a container create request and response using HTTP with JSON serialization.

```

860     HTTP Request:
861
862     POST /home_gateway/light_ae1?rcn=0 HTTP/1.1
863     Host: mn.provider.com:8080
864     X-M2M-Origin: Clight_ae1
865     Content-Type: application/json;ty=3
866     X-M2M-RI: mncse-13345
867
868     {
869       "m2m:cnt":
870       {
871         "rn": "light"
872       }
873     }
874
875     HTTP Response:
876
877     201 Created
878     X-M2M-RSC: 2001
879     X-M2M-RI: mncse-13345
880     Content-Location: /mn-cse/cnt-582759912
881
882

```

### 8.7.5.2 Create a container of ADN-AE2

The creation of a container resource for ADN-AE2 is shown in the following procedure.

The following example shows a container create request and response using HTTP with XML serialization.

```

886     HTTP Request:
887
888     POST /home_gateway/light_ae2?rcn=0 HTTP/1.1
889     Host: mn.provider.com:8080
890     X-M2M-Origin: Clight_ae2
891     Content-Type: application/xml;ty=3
892     X-M2M-RI: mncse-62345
893
894     <m2m:cnt xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="light">
895     </m2m:cnt>
896
897     HTTP Response:
898
899     201 Created
900     X-M2M-RSC: 2001
901     X-M2M-RI: mncse-62345
902     Content-Location: /mn-cse/cnt-582769893
903

```

The following example shows a container create request and response using HTTP with JSON serialization.

```

905     HTTP Request:
906
907     POST /home_gateway/light_ae2?rcn=0 HTTP/1.1
908     Host: mn.provider.com:8080
909     X-M2M-Origin: Clight_ae2
910     Content-Type: application/json;ty=3
911     X-M2M-RI: mncse-62345
912

```

```

913     {
914         "m2m:cnt":
915         {
916             "rn": "light"
917         }
918     }
919
920 HTTP Response:
921 201 Created
922 X-M2M-RSC: 2001
923 X-M2M-RI: mncse-62345
924 Content-Location: /mn-cse/cnt-582769893
925

```

## 926 8.7.6 ContentInstances creation

### 927 8.7.6.1 Create a content instance of ADN-AE1

928 The creation of a content instance resource under the light container of ADN-AE1 with initial content `OFF` is shown in  
 929 the following procedure.

930 The following example shows a contentInstance create request and response using HTTP with XML serialization.:

```

931 HTTP Request:
932
933 POST /home_gateway/light_ae1/light?rcn=0 HTTP/1.1
934 Host: mn.provider.com:8080
935 X-M2M-Origin: Clight_ae1
936 Content-Type: application/xml;ty=4
937 X-M2M-RI: mncse-24345
938
939 <m2m:cin xmlns:m2m="http://www.onem2m.org/xml/protocols">
940     <cnf>text/plain:0</cnf>
941     <con>OFF</con>
942 </m2m:cin>
943
944 HTTP Response:
945
946 201 Created
947 X-M2M-RSC: 2001
948 X-M2M-RI: mncse-24345
949 Content-Location: /mn-cse/cin-394798749
950 Content-Type: application/xml
951

```

952 The following example shows a contentInstance create request and response using HTTP with JSON serialization.

```

953 HTTP Request:
954
955 POST /home_gateway/light_ae1/light?rcn=0 HTTP/1.1
956 Host: mn.provider.com:8080
957 X-M2M-Origin: Clight_ae1
958 Content-Type: application/json;ty=4
959 X-M2M-RI: mncse-24345
960
961 {
962     "m2m:cin":
963     {
964         "cnf": "text/plains:0",
965         "con": "OFF"
966     }
967 }
968
969 HTTP Response:
970
971 201 Created
972 X-M2M-RSC: 2001
973 X-M2M-RI: mncse-24345
974

```

```

975         Content-Location: /mn-cse/cin-394798749
976         Content-Type: application/json
977

```

### 978 8.7.6.2 Create a content instance of ADN-AE2

979 The creation of a content instance resource under the light container of ADN-AE2 with initial content `OFF` is shown in  
 980 the following procedure.

981 The following example shows a contentInstance create request and response using HTTP with XML serialization.

```

982     HTTP Request:
983
984     POST /home_gateway/light_ae2/light?rcn=0 HTTP/1.1
985     Host: mn.provider.com:8080
986     X-M2M-Origin: Clight_ae1
987     Content-Type: application/xml;ty=4
988     X-M2M-RI: mncse-22345
989
990     <m2m:cin xmlns:m2m="http://www.onem2m.org/xml/protocols">
991         <cnf>text/plain:0</cnf>
992         <con>OFF</con>
993     </m2m:cin>
994
995     HTTP Response:
996
997     201 Created
998     X-M2M-RSC: 2001
999     X-M2M-RI: mncse-22345
1000     Content-Location: /mn-cse/cin-256599578
1001

```

1002 The following example shows a contentInstance create request and response using HTTP with JSON serialization.

```

1003     HTTP Request:
1004
1005     POST /home_gateway/light_ae2/light?rcn=0 HTTP/1.1
1006     Host: mn.provider.com:8080
1007     X-M2M-Origin: Clight_ae1
1008     Content-Type: application/json;ty=4
1009     X-M2M-RI: mncse-22345
1010
1011     {
1012         "m2m:cin":
1013         {
1014             "cnf": "text/plains:0",
1015             "con": "OFF"
1016         }
1017     }
1018
1019     HTTP Response:
1020
1021     201 Created
1022     X-M2M-RSC: 2001
1023     X-M2M-RI: mncse-22345
1024     Content-Location: /mn-cse/cin-256599578
1025

```

### 1027 8.7.7 Group creation

1028 The creation of a group resource by the MN-AE is shown in the following procedure. The group resource is created  
 1029 with two initial member ids of the light container resources..

1030 The following example shows a group create request and response using HTTP with XML serialization.

```

1031     HTTP Request:
1032
1033     POST /home_gateway/gateway_ae?rcn=0 HTTP/1.1
1034     Host: mn.provider.com:8080

```

```

1035     X-M2M-Origin: Cgateway_ae
1036     Content-Type: application/xml;ty=9
1037     X-M2M-RI: mncse-76905
1038
1039     <?xml version="1.0" encoding="UTF-8"?>
1040     <m2m:grp xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="containers_grp">
1041         <mt>3</mt>
1042         <mid>/mn-cse/cnt-582759912 /mn-cse/cnt-582769893</mid>
1043         <mnsm>10</mnsm>
1044     </m2m:grp>
1045
1046     HTTP Response:
1047
1048     201 Created
1049     X-M2M-RSC: 2001
1050     X-M2M-RI: mncse-76905
1051     Content-Location: /mn-cse/grp-977978327
1052

```

The following example shows a group create request and response using HTTP with JSON serialization.

```

1053
1054     HTTP Request:
1055
1056     POST /home_gateway/gateway_ae?rcn=0 HTTP/1.1
1057     Host: mn.provider.com:8080
1058     X-M2M-Origin: Cgateway_ae
1059     Content-Type: application/json;ty=9
1060     X-M2M-RI: mncse-76905
1061
1062     {
1063         "m2m:grp":
1064         {
1065             "rn": "containers_grp",
1066             "mt": 3,
1067             "mid": ["/mn-cse/cnt-582759912", "/mn-cse/cnt-582769893"],
1068             "mnsm": 10
1069         }
1070     }
1071
1072     HTTP Response:
1073
1074     201 Created
1075     X-M2M-RSC: 2001
1076     X-M2M-RI: mncse-76905
1077     Content-Location: /mn-cse/grp-977978327
1078
1079
1080

```

## 8.7.8 Subscriptions creation

### 8.7.8.1 Subscription to the content instance of ADN-AE1

When a subscription resource is created, the *notification content type* (short for *nct*) parameter is set to a value 1 to indicate that all attributes of the subscribed resource will be notified to the subscriber.

ADN-AE1 creates a subscription resource including the notification URI set to the resource identifier of ADN-AE1 so that the ADN-AE1 will get notified whenever a content instance child resource is created in the container. The corresponding subscription create request is shown in the following procedure.

The following example shows a subscription create request and response using HTTP with XML serialization.

```

1088
1089     HTTP Request:
1090
1091     POST /home_gateway/light_ae1/light?rcn=0 HTTP/1.1
1092     Host: mn.provider.com:8080
1093     X-M2M-Origin: Clight_ae1
1094     Content-Type: application/xml;ty=23
1095     X-M2M-RI: mncse-67891
1096

```

```

1097     <?xml version="1.0" encoding="UTF-8"?>
1098     <m2m:sub xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="lightstate_sub1">
1099         <enc>
1100             <net>3</net>
1101         </enc>
1102         <nu>Clight_ae1</nu>
1103         <nct>1</nct>
1104     </m2m:sub>
1105
1106     HTTP Response:
1107
1108     201 Created
1109     X-M2M-RSC: 2001
1110     X-M2M-RI: mncse-67891
1111     Content-Location: /mn-cse/sub-856593979
1112

```

The following example shows a subscription create request and response using HTTP with JSON serialization.

```

1114     HTTP Request:
1115
1116     POST /home_gateway/light_ae1/light?rcn=0 HTTP/1.1
1117     Host: mn.provider.com:8080
1118     X-M2M-Origin: Clight_ae1
1119     Content-Type: application/json;ty=23
1120     X-M2M-RI: mncse-67891
1121
1122     {
1123         "m2m:sub":
1124         {
1125             "rn": "lightstate_sub1",
1126             "enc":
1127             {
1128                 "net": [3]
1129             },
1130             "nu": ["Clight_ae1"],
1131             "nct": 1
1132         }
1133     }
1134
1135     HTTP Response:
1136
1137     201 Created
1138     X-M2M-RSC: 2001
1139     X-M2M-RI: mncse-67891
1140     Content-Location: /mn-cse/sub-856593979
1141
1142

```

### 8.7.8.2 Subscription to the content instance of ADN-AE2

When a subscription resource is created, the *notification content type* (short for *nct*) parameter is set to a value 1 to indicate that all attributes of the subscribed resource will be notified to the subscriber.

ADN-AE1 creates a subscription resource including the notification URI set to the resource identifier of ADN-AE1 so that the ADN-AE1 will get notified whenever a content instance child resource is created in the container. The corresponding subscription create request is shown in the following procedure.

When a subscription resource is created, the *notification content type* (short for *nct*) parameter is set to value 1 to indicate that all attributes of the subscribed resource will be notified to the subscriber.

ADN-AE2 creates a subscription resource including the notification URI set to the resource identifier of ADN-AE2 so that the ADN-AE2 will get notified whenever a content instance child resource is created in the container. The corresponding subscription create request is shown in the following procedures.

The following example shows a subscription create request and response using HTTP with XML serialization.

```

1155     HTTP Request:

```

```

1156
1157     POST /home_gateway/light_ae2/light?rcn=0 HTTP/1.1
1158     Host: mn.provider.com:8080
1159     X-M2M-Origin: Clight_ae2
1160     Content-Type: application/xml;ty=23
1161     X-M2M-RI: mncse-29387
1162
1163     <?xml version="1.0" encoding="UTF-8"?>
1164     <m2m:sub xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="lightstate_sub2">
1165         <enc>
1166             <net>3</net>
1167         </enc>
1168         <nu>Clight_ae2</nu>
1169         <nct>1</nct>
1170     </m2m:sub>
1171
1172     HTTP Response:
1173
1174     201 Created
1175     X-M2M-RSC: 2001
1176     X-M2M-RI: mncse-29387
1177     Content-Location: /mn-cse/sub-856463728
1178

```

The following example shows a subscription create request and response using HTTP with JSON serialization.

```

1180     HTTP Request:
1181
1182     POST /home_gateway/light_ae2/light?rcn=0 HTTP/1.1
1183     Host: mn.provider.com:8080
1184     X-M2M-Origin: Clight_ae2
1185     Content-Type: application/json;ty=23
1186     X-M2M-RI: mncse-29387
1187
1188     {
1189         "m2m:sub":
1190         {
1191             "rn": "lightstate_sub2",
1192             "enc":
1193             {
1194                 "net": [3]
1195             },
1196             "nu": ["Clight_ae2"],
1197             "nct": 1
1198         }
1199     }
1200
1201     HTTP Response:
1202
1203     201 Created
1204     X-M2M-RSC: 2001
1205     X-M2M-RI: mncse-29387
1206     Content-Location: /mn-cse/sub-856463728
1207

```

## 8.7.9 Discovery

### 8.7.9.1 Introduction

The discovery functionality in oneM2M is implemented using a RETRIEVE operation along with one or multiple filter criteria parameters.

In order to enable the retrieve operation for resource discovery, parameter *filterUsage* (short for *fu*) is included in the RETRIEVE request as a query string.

In addition, parameter *resource type* (short for *rty*) is used as a *filterCriteria* condition for the discovery of single light and group light members. The parameter *discovery result type* (short for *drt*) is set to 2 to indicate that the format of elements of URIList is unstructured. The detailed discovery procedures are presented in clauses 8.7.9.2 and 8.7.9.3.

### 8.7.9.2 Discovery of single light registered with MN-CSE

The discovery of containers for each light registered with the MN-CSE by the smartphone AE is shown in the following procedure.

If the discovery response is preferred to be returned with a XML representation, the HTTP request message is sent as following example:

```

1222 HTTP Request:
1223
1224 GET /~/mn-cse/home_gateway?fu=1&rty=3&drt=2 HTTP/1.1
1225 Host: in.provider.com:8080
1226 X-M2M-Origin: /in-cse/Csmartphone_ae
1227 X-M2M-RI: mncse-99882
1228 Accept: application/xml
1229
1230 HTTP Response:
1231
1232 200 OK
1233 X-M2M-RSC: 2000
1234 X-M2M-RI: mncse-99882
1235 X-M2M-CNST: 2
1236 Content-Type: application/xml
1237
1238 <?xml version="1.0" encoding="UTF-8"?>
1239 <m2m:uril xmlns:m2m="http://www.onem2m.org/xml/protocols">
1240     /mn-cse/cnt-582759912
1241     /mn-cse/cnt-582769893
1242 </m2m:uril>
1243

```

If the discovery response is preferred to be returned with a JSON representation, the HTTP request message is sent as following example:

```

1246 HTTP Request:
1247
1248 GET /~/mn-cse/home_gateway?fu=1&rty=3&drt=2 HTTP/1.1
1249 Host: in.provider.com:8080
1250 X-M2M-Origin: /in-cse/Csmartphone_ae
1251 X-M2M-RI: mncse-99882
1252 Accept: application/json
1253
1254 HTTP Response:
1255
1256 200 OK
1257 X-M2M-RSC: 2000
1258 X-M2M-RI: mncse-99882
1259 X-M2M-CNST: 2
1260 Content-Type: application/json
1261
1262 {
1263     "m2m:uril":
1264     [
1265         "/mn-cse/cnt-582759912",
1266         "/mn-cse/cnt-582769893"
1267     ]
1268 }
1269
1270

```

The smartphone application retrieves a list of URIs representing containers registered with MN-CSE from the response message, e.g. `/mn-cse/cnt-582759912` which is the URI of container created in ADN-AE1. The retrieved URIs of the discovered containers are then used for the group member update operation.

### 8.7.9.3 Discovery of groups located in MN-CSE

The discovery of groups located in MN-CSE by the smartphone AE is shown in the following procedures.

1277 If the discovery response is preferred to be returned with a XML representation, the HTTP request message is sent as  
1278 following example:

```
1279     HTTP Request:
1280
1281     GET ~/mn-cse/home_gateway?fu=1&rty=9&drt=2 HTTP/1.1
1282     Host: in.provider.com:8080
1283     X-M2M-Origin: /in-cse/Csmartphone_ae
1284     X-M2M-RI: mncse-15001
1285     Accept: application/xml
1286
1287     HTTP Response:
1288
1289     200 OK
1290     X-M2M-RSC: 2000
1291     X-M2M-RI: mncse-15001
1292     X-M2M-CNST: 2
1293     Content-Type: application/xml
1294
1295     <?xml version="1.0" encoding="UTF-8"?>
1296     <m2m:uril xmlns:m2m="http://www.onem2m.org/xml/protocols">
1297         /mn-cse/grp-977978327
1298     </m2m:uril>
1299
```

1300 If the discovery response is preferred to be returned with a JSON representation, the HTTP request message is sent as  
1301 following example:

```
1302     HTTP Request:
1303
1304     GET ~/mn-cse/home_gateway?fu=1&rty=9&drt=2 HTTP/1.1
1305     Host: in.provider.com:8080
1306     X-M2M-Origin: /in-cse/Csmartphone_ae
1307     X-M2M-RI: mncse-15001
1308     Accept: application/json
1309
1310     HTTP Response:
1311
1312     200 OK
1313     X-M2M-RSC: 2000
1314     X-M2M-RI: mncse-15001
1315     X-M2M-CNST: 2Content-Type: application/json
1316
1317     {
1318         "m2m:uril":
1319         [
1320             "/mn-cse/grp-977978327"
1321         ]
1322     }
1323
1324
```

1325 The smartphone application retrieves a list of URIs representing group resources located in MN-CSE from the response  
1326 message, e.g. `/mn-cse/grp-977978327` which is the URI of the group resource. The retrieved URIs of the  
1327 discovered group resource are then used for the group member update operation.

1328

## 1329 8.7.10 Latest content instances retrieval

### 1330 8.7.10.1 Introduction

1331 The smartphone application can retrieve the latest light states via sending a RETRIEVE request targeting a container's  
1332 *la* (short for *latest*) virtual resource.

1333 The smartphone application can also retrieve a group of latest light states via sending a RETRIEVE request targeting  
1334 the group *fanOutPoint* virtual resource.



### 8.7.10.2 Retrieve the latest content instance of ADN-AE1

The latest content instance of the *light* container resource for ADN-AE1 can be retrieved by the following procedure.

If the response is preferred to be returned with a XML representation, the following is a HTTP request message example:

HTTP Request:

```
GET /~/mn-cse/home_gateway/light_ael/light/la HTTP/1.1
Host: in.provider.com:8080
X-M2M-Origin: /in-cse/Csmartphone_ae
X-M2M-RI: mncse-11223
Accept: application/xml
```

HTTP Response:

```
200 OK
X-M2M-RSC: 2000
X-M2M-RI: mncse-11223
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8"?>
<m2m:cin
  xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="cin-394798749">
  <ty>4</ty>
  <ri>cin-394798749</ri>
  <pi>cnt-181049109</pi>
  <ct>20150925T045938</ct>
  <lt>20150925T045938</lt>
  <et>20151107T154802</et>
  <st>0</st>
  <cnf>text/plain:0</cnf>
  <cs>3</cs>
  <con>OFF</con>
</m2m:cin>
```

If the response is preferred to be returned with a JSON representation, the following is a HTTP request message example:

```
GET /~/mn-cse/home_gateway/light_ael/light/lat HTTP/1.1
Host: in.provider.com:8080
X-M2M-Origin: /in-cse/Csmartphone_ae
X-M2M-RI: mncse-11223
Accept: application/json
```

HTTP Response:

```
200 OK
X-M2M-RSC: 2000
X-M2M-RI: mncse-11223
Content-Type: application/json

{
  "m2m:cin":
  {
    "ty":4,
    "ri":"cin-394798749",
    "pi":"cnt-181049109",
    "rn":"cin-394798749",
    "ct":"20150925T045938",
    "lt":"20150925T045938",
    "et":"20151107T154802",
    "st":0,
    "cnf":"text/plain:0",
    "cs":3,

```

```

1397         "con":"OFF"
1398     }
1399 }
1400

```

### 1401 8.7.10.3 Retrieve the latest content instance of ADN-AE2

1402 The latest content instance of the *light* container resource for ADN-AE2 can be retrieved by the following procedures.

1403 If the response is preferred to be represented in XML, the following is a HTTP request message example:

```

1404 HTTP Request:
1405
1406 GET /~/mn-cse/home_gateway/light_ae2/light/la HTTP/1.1
1407 Host: mn.provider.com:8080
1408 X-M2M-Origin: /in-cse/Csmartphone_ae
1409 X-M2M-RI: mncse-22336
1410 Accept: application/xml
1411
1412 HTTP Response:
1413
1414 200 OK
1415 X-M2M-RSC: 2000
1416 X-M2M-RI: mncse-22336
1417 Content-Type: application/xml
1418
1419 <?xml version="1.0" encoding="UTF-8"?>
1420 <m2m:cin
1421     xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="cin-256599578">
1422     <ty>4</ty>
1423     <ri>cin-256599578</ri>
1424     <pi>cnt-790965889</pi>
1425     <ct>20150925T050515</ct>
1426     <lt>20150925T050515</lt>
1427     <et>20151107T154802</et>
1428     <st>0</st>
1429     <cnf>text/plain:0</cnf>
1430     <cs>3</cs>
1431     <con>OFF</con>
1432 </m2m:cin>
1433

```

1434 If the response is preferred be returned in representation of JSON, the following is a HTTP request message example:

```

1435 GET /~/mn-HTTP/1.1
1436 Host: mn.provider.com:8080
1437 X-M2M-Origin: /in-cse/Csmartphone_ae
1438 X-M2M-RI: mncse-22336
1439 Accept: application/json
1440
1441 HTTP Response:
1442
1443 200 OK
1444 X-M2M-RSC: 2000
1445 X-M2M-RI: mncse-22336
1446 Content-Type: application/json
1447
1448 {
1449     "m2m:cin":
1450     {
1451         "ty":4,
1452         "ri": "cin-256599578",
1453         "pi": "cnt-790965889",
1454         "rn": "cin-256599578",
1455         "ct": "20150925T050515",
1456         "lt": "20150925T050515",
1457         "et": "20151107T154802",
1458         "st": 0,
1459         "cnf": "text/plain:0",

```

```

1460         "vcs": 3,
1461         "con": "OFF"
1462     }
1463 }
1464
1465

```

#### 1466 8.7.10.4 Retrieve a group of latest content instances for all light states

1467 A group of latest content instances can be retrieved via sending a RETRIEVE request targeting the group *fanOutPoint*  
 1468 virtual resource and appending *latest* as shown in the following procedures.

1469 If the response is preferred to be returned with a XML representation, the following is a HTTP request message  
 1470 example:

```

1471 HTTP Request:
1472
1473 GET /~/mn-cse/home_gateway/gateway_ae/containers_grp/fopt/la HTTP/1.1
1474 Host: in.provider.com:8080
1475 X-M2M-Origin: /in-cse/Csmartphone_ae
1476 X-M2M-RI: mncse-55667
1477 Accept: application/xml
1478
1479 HTTP Response:
1480
1481 200 OK
1482 X-M2M-RSC: 2000
1483 X-M2M-RI: mncse-55667
1484 Content-Type: application/xml
1485
1486 <?xml version="1.0" encoding="UTF-8"?>
1487 <m2m:agr
1488     xmlns:m2m="http://www.onem2m.org/xml/protocols">
1489     <m2m:rsp>
1490         <rsc>2000</rsc>
1491         <rqi>mncse-55667</rqi>
1492         <pc>
1493             <m2m:cin rn="cin-394798749">
1494                 <ty>4</ty>
1495                 <ri>cin-394798749</ri>
1496                 <pi>cnt-181049109</pi>
1497                 <ct>20150925T045938</ct>
1498                 <lt>20150925T045938</lt>
1499                 <et>20151107T154802</et>
1500                 <st>0</st>
1501                 <cnf>text/plain:0</cnf>
1502                 <cs>3</cs>
1503                 <con>OFF</con>
1504             </m2m:cin>
1505         </pc>
1506         <to>/in-cse/Csmartphone_ae</to>
1507         <fr>/mn-cse/cnt-582759912/la</fr>
1508     </m2m:rsp>
1509     <m2m:rsp>
1510         <rsc>2000</rsc>
1511         <rqi>mncse-55667</rqi>
1512         <pc>
1513             <m2m:cin rn="cin-256599578">
1514                 <ty>4</ty>
1515                 <ri>cin-256599578</ri>
1516                 <pi>cnt-790965889</pi>
1517                 <ct>20150925T050515</ct>
1518                 <lt>20150925T050515</lt>
1519                 <et>20151107T154802</et>
1520                 <st>0</st>
1521                 <cnf>text/plain:0</cnf>
1522                 <cs>3</cs>
1523                 <con>OFF</con>
1524             </m2m:cin>

```

```

1525         </pc>
1526         <to>/in-cse/Csmartphone_ae</to>
1527         <fr>/mn-cse/cnt-582769893/la</fr>
1528     </m2m:rsp>
1529 </m2m:agr>
1530
1531

```

If the response is preferred to be returned with a JSON representation, the following is a HTTP request message example:

HTTP Request:

```

1534
1535 GET /~/mn-cse/home_gateway/containers_grp/fopt/la HTTP/1.1
1536 Host: in.provider.com:8080
1537 X-M2M-Origin: /in-cse/Csmartphone_ae
1538 X-M2M-RI: mncse-55667
1539 Accept: application/json
1540
1541

```

HTTP Response:

```

1542
1543 200 OK
1544 X-M2M-RSC: 2000
1545 X-M2M-RI: mncse-55667
1546 Content-Type: application/json
1547
1548

```

```

1549 {
1550     "m2m:agr":
1551     {
1552         "m2m:rsp": [
1553         {
1554             "rsc": 2000,
1555             "rqi": "mncse-55667",
1556             "pc":
1557             {
1558                 "m2m:cin":
1559                 {
1560                     "ty": 4,
1561                     "ri": "cin-394798749",
1562                     "pi": "cnt-181049109",
1563                     "rn": "cin-394798749",
1564                     "ct": "20150925T045938",
1565                     "lt": "20150925T045938",
1566                     "et": "20151107T154802",
1567                     "st": 0,
1568                     "cnf": "text/plain:0",
1569                     "cs": 3,
1570                     "con": "OFF"
1571                 }
1572             },
1573             "to": "/in-cse/Csmartphone_ae",
1574             "fr": "/mn-cse/cnt-582759912/la"
1575         },
1576         {
1577             "rsc": 2000,
1578             "rqi": "mncse-55667",
1579             "pc":
1580             {
1581                 "m2m:cin":
1582                 {
1583                     "ty": 4,
1584                     "ri": "cin-256599578",
1585                     "pi": "cnt-790965889",
1586                     "rn": "cin-256599578",
1587                     "ct": "20150925T050515",
1588                     "lt": "20150925T050515",
1589                     "et": "20151107T154802",
1590                     "st": 0,
1591                     "cnf": "text/plain:0",
1592                     "cs": 3,

```

```

1593         "con": "OFF"
1594     }
1595 },
1596 "to": "/in-cse/Csmartphone_ae",
1597 "fr": "/mn-cse/cnt-582769893/1a"
1598 }
1599 ]]
1600 }
1601
1602

```

## 1603 8.7.11 Light state modification

### 1604 8.7.11.1 Introduction

1605 Once the smartphone application is registered with the IN-CSE, it can be granted access to resources including  
 1606 containers located in the MN-CSE so that smartphone application users can send light control commands for modifying  
 1607 the light states.

1608 When the user makes a change to the light state via the smartphone user interface, the smartphone application performs  
 1609 a new content instance creation procedure carrying the new state.

1610 The modification of a single light state is implemented by creating a new content instance resource for the specific  
 1611 container with access control policy acp1 (*gateway\_acp*) while the modification of all light states is implemented by  
 1612 creating a new content instance resource for each member of group (*containers\_grp*) with access control policy acp1  
 1613 (*gateway\_acp*). The implementation of the latter case is to target the <fopt> virtual resource of *containers\_grp*  
 1614 resource with a content instance create request so that the content of all members of the group is updated together.

### 1615 8.7.11.2 Create a content instance under container of ADN-AE1

1616 If the contentInstance create request body is represented in XML, the following is a HTTP request message example:  
 1617

```

1618 HTTP Request:
1619
1620 POST /~/mn-cse/home_gateway/light_ae1/light?rcn=0 HTTP/1.1
1621 Host: mn.provider.com:8080
1622 X-M2M-Origin: /in-cse/Csmartphone_ae
1623 Content-Type: application/xml;ty=4
1624 X-M2M-RI: mncse-11123
1625
1626 <m2m:cin xmlns:m2m="http://www.onem2m.org/xml/protocols">
1627   <cnf>text/plain:0</cnf>
1628   <con>ON</con>
1629 </m2m:cin>
1630
1631 HTTP Response:
1632
1633 201 Created
1634 X-M2M-RSC: 2001
1635 X-M2M-RI: mncse-11123
1636 Content-Location: /mn-cse/cin-789356234
1637

```

1638 If the contentInstance create request body is represented in JSON, the following is a HTTP request message example:

```

1639 HTTP Request:
1640
1641 POST /~/mn-cse/home_gateway/light_ae1/light?rcn=0 HTTP/1.1
1642 Host: mn.provider.com:8080
1643 X-M2M-Origin: /in-cse/Csmartphone_ae
1644 Content-Type: application/json;ty=4
1645 X-M2M-RI: mncse-11123
1646
1647 {
1648   "m2m:cin":
1649   {
1650     "cnf": "text/plains:0",

```

```

1651         "con": "ON"
1652     }
1653 }
1654
1655 HTTP Response:
1656
1657 201 Created
1658 X-M2M-RSC: 2001
1659 X-M2M-RI: mncse-11123
1660 Content-Location: /mn-cse/cin-789356234
1661
1662

```

### 1663 8.7.11.3 Create a content instance under container of ADN-AE2

1664 If the contentInstance create request body is represented in XML, the following is an HTTP request message the  
1665 example:

```

1666 HTTP Request:
1667
1668 POST /~/mn-cse/home_gateway/light_ae2/light?rcn=0 HTTP/1.1
1669 Host: mn.provider.com:8080
1670 X-M2M-Origin: /in-cse/Csmartphone_ae
1671 Content-Type: application/xml;ty=4
1672 X-M2M-RI: mncse-12222
1673
1674 <m2m:cin xmlns:m2m="http://www.onem2m.org/xml/protocols">
1675     <cnf>text/plain:0</cnf>
1676     <con>ON</con>
1677 </m2m:cin>
1678
1679 HTTP Response:
1680
1681 201 Created
1682 X-M2M-RSC: 2001
1683 X-M2M-RI: mncse/12222
1684 Content-Location: /mn-cse-cin-237896783
1685
1686

```

1687 If the contentInstance create request body is represented in JSON, the following is a HTTP request message example:

```

1687 HTTP Request:
1688
1689 POST /~/mn-cse/home_gateway/light_ae2/light?rcn=0 HTTP/1.1
1690 Host: mn.provider.com:8080
1691 X-M2M-Origin: /in-cse/Csmartphone_ae
1692 Content-Type: application/json;ty=4
1693 X-M2M-RI: mncse-12222
1694
1695 {
1696     "m2m:cin":
1697     {
1698         "cnf": "text/plains:0",
1699         "con": "ON"
1700     }
1701 }
1702
1703 HTTP Response:
1704
1705 201 Created
1706 X-M2M-RSC: 2001
1707 X-M2M-RI: mncse-12222
1708 Content-Location: /mn-cse/cin-237896783
1709
1710

```

### 1711 8.7.11.4 Update the state of all lights using group fanout

1712 If the fanOutPoint request body is represented in XML, the following is a HTTP request message example:

```

1713 HTTP Request:
1714
1715 POST /~/mn-cse/home_gateway/gateway_ae/containers_grp/fopt HTTP/1.1
1716 Host: mn.provider.com:8080
1717 X-M2M-Origin: /in-cse/Csmartphone_ae
1718 Content-Type: application/xml;ty=4
1719 X-M2M-RI: mncse-33344
1720
1721 <?xml version="1.0" encoding="UTF-8"?>
1722 <m2m:cin xmlns:m2m="http://www.onem2m.org/xml/protocols">
1723   <cnf>text/plain:0</cnf>
1724   <con>ON</con>
1725 </m2m:cin>
1726
1727 HTTP Response:
1728
1729 200 OK
1730 X-M2M-RSC: 2000
1731 X-M2M-RI: mncse-33344
1732 Content-Type: application/xml
1733
1734 <?xml version="1.0" encoding="UTF-8"?>
1735 <m2m:agr
1736   xmlns:m2m="http://www.onem2m.org/xml/protocols">
1737   <m2m:rsp>
1738     <rsc>2001</rsc>
1739     <rqi>mncse-33344</rqi>
1740     <pc>
1741       <m2m:cin rn="cin-479874939">
1742         <ty>4</ty>
1743         <ri>cin-479874939</ri>
1744         <pi>cnt-181049109</pi>
1745         <ct>20151025T045938</ct>
1746         <lt>20151025T045938</lt>
1747         <et>20151207T154802</et>
1748         <st>0</st>
1749         <cs>2</cs>
1750       </m2m:cin>
1751     </pc>
1752     <to>/in-cse/Csmartphone_ae</to>
1753     <fr>/mn-cse/cnt-582759912</fr>
1754   </m2m:rsp>
1755   <m2m:rsp>
1756     <rsc>2001</rsc>
1757     <rqi>mncse-33344</rqi>
1758     <pc>
1759       <m2m:cin rn="cin-659957825">
1760         <ty>4</ty>
1761         <ri>cin-659957825</ri>
1762         <pi>cnt-790965889</pi>
1763         <ct>20151025T045938</ct>
1764         <lt>20151025T045938</lt>
1765         <et>20151207T154802</et>
1766         <st>0</st>
1767         <cs>2</cs>
1768       </m2m:cin>
1769     </pc>
1770     <to>/in-cse/Csmartphone_ae</to>
1771     <fr>/mn-cse/cnt-582769893</fr>
1772   </m2m:rsp>
1773 </m2m:agr>
1774

```

If the fanOutPoint request body is represented in JSON, the following is a HTTP request message example:

```

1776 HTTP Request:
1777
1778 POST /~/mn-cse/home_HTTP/1.1
1779 Host: mn.provider.com:8080
1780 X-M2M-Origin: /in-cse/Csmartphone_ae

```

```

1781     Content-Type: application/json;ty=4
1782     X-M2M-RI: mncse-33344
1783
1784     {
1785         "m2m:cin":
1786         {
1787             "cnf": "text/plains:0",
1788             "con": "ON"
1789         }
1790     }
1791
1792 HTTP Response:
1793
1794     200 OK
1795     X-M2M-RSC: 2000
1796     X-M2M-RI: mncse-33344
1797     Content-Type: application/json
1798
1799     {
1800         "m2m:agr":
1801         {
1802             "m2m:rsp":
1803             [
1804                 {
1805                     "rsc": 2001,
1806                     "rqi": "mncse-33344",
1807                     "pc":
1808                     {
1809                         "m2m:cin":
1810                         {
1811                             "ty": 4,
1812                             "ri": "cin-479874939",
1813                             "pi": "cnt-181049109",
1814                             "rn": "cin-479874939",
1815                             "ct": "20151025T045938",
1816                             "lt": "20151025T045938",
1817                             "et": "20151207T154802",
1818                             "st": 0,
1819                             "cs": 2
1820                         }
1821                     },
1822                     "to": "/in-cse/Csmartphone_ae",
1823                     "fr": "/mn-cse/cnt-582759912"
1824                 },
1825                 {
1826                     "rsc": 2001,
1827                     "rqi": "mncse-33344",
1828                     "pc":
1829                     {
1830                         "m2m:cin":
1831                         {
1832                             "ty": 4,
1833                             "ri": "cin-659957825",
1834                             "pi": "cnt-790965889",
1835                             "rn": "cin-659957825",
1836                             "ct": "20151025T050515",
1837                             "lt": "20151025T050515",
1838                             "et": "20151207T154802",
1839                             "st": 0,
1840                             "cs": 2
1841                         }
1842                     },
1843                     "to": "/in-cse/Csmartphone_ae ",
1844                     "fr": "/mn-cse/cnt-582769893"
1845                 }
1846             ]
1847         }
1848     }

```



## 1849 8.7.12 Notifications

### 1850 8.7.12.1 Introduction

1851 Each time a content instance is created under a container of an ADN-AE, then a notification containing the whole  
 1852 created content instance is posted to the targeted subscriber i.e. ADN-AE1 or ADN-AE2, that can actuate the light with  
 1853 the new state received in the notification.

### 1854 8.7.12.2 Post a notification to ADN-AE1

1855 If the notification request body is represented in XML, the following is a HTTP request message example:

```
1856 HTTP Request:
1857
1858 POST / HTTP/1.1
1859 Host: 192.168.0.10:9090
1860 X-M2M-Origin: /mn-cse
1861 X-M2M-RI: notif-12345
1862 Content-Type: application/xml
1863
1864 <?xml version="1.0" encoding="UTF-8"?>
1865 <m2m:sgn
1866     xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="cin-394798749">
1867     <nev>
1868         <rep>
1869             <m2m:cin>
1870                 <ty>4</ty>
1871                 <ri>cin-394798749</ri>
1872                 <pi>cnt-790965889</pi>
1873                 <ct>20150925T050534</ct>
1874                 <lt>20150925T050534</lt>
1875                 <et>20151107T154802</et>
1876                 <st>0</st>
1877                 <cnf>text/plain:0</cnf>
1878                 <cs>3</cs>
1879                 <con>ON</con>
1880             </m2m:cin>
1881         </rep>
1882         <net>3</net>
1883     </nev>
1884     <sur>
1885         /mn-cse/sub-856593979
1886     </sur>
1887 </m2m:sgn>
```

```
1889 HTTP Response:
1890
1891 200 OK
1892 X-M2M-RSC: 2000
1893 X-M2M-RI: notif-12345
```

1896 If the notification request body is represented in JSON, the following is a HTTP request message:

```
1897 HTTP Request:
1898
1899 POST / HTTP/1.1
1900 Host: 192.168.0.10:9090
1901 X-M2M-Origin: /mn-cse
1902 X-M2M-RI: notif-12345
1903 Content-Type: application/json
1904
1905 {
1906     "m2m:sgn":
1907     {
1908         "nev":{
1909             "rep":
```

```

1911     {
1912         "m2m:cin":
1913         {
1914             "ty": 4,
1915             "ri": "cin-394798749",
1916             "pi": "cnt-790965889",
1917             "rn": "cin-394798749",
1918             "ct": "20150925T050534",
1919             "lt": "20150925T050534",
1920             "et": "20151107T154802",
1921             "st": 0,
1922             "cnf": "text/plain:0",
1923             "cs": 3,
1924             "con": "ON"
1925         }
1926     }
1927     "net": [3]
1928 }
1929 "sur": "/mn-cse/sub-856593979"
1930 }
1931 }

```

HTTP Response:

```

1934     200 OK
1935     X-M2M-RSC: 2000
1936     X-M2M-RI: notif-12345
1937
1938

```

### 8.7.12.3 Post a notification to ADN-AE2

If the notification request body is represented in XML, the following is a HTTP request message example:

HTTP Request:

```

1941     POST / HTTP/1.1
1942     Host: 192.168.0.20:9090
1943     X-M2M-Origin: /mn-cse
1944     X-M2M-RI: notif-12346
1945     Content-Type: application/xml
1946
1947     <?xml version="1.0" encoding="UTF-8"?>
1948     <m2m:sgn
1949         xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="cin-256599578">
1950         <nev>
1951             <rep>
1952                 <m2m:cin>
1953                     <ty>4</ty>
1954                     <ri>cin-256599578</ri>
1955                     <pi>cnt-790965889</pi>
1956                     <ct>20150925T050623</ct>
1957                     <lt>20150925T050623</lt>
1958                     <et>20151107T154802</et>
1959                     <st>0</st>
1960                     <cnf>text/plain:0</cnf>
1961                     <cs>3</cs>
1962                     <con>ON</con>
1963                 </cin>
1964             </rep>
1965             <net>3</net>
1966         </nev>
1967         <sur>
1968             /mn-cse/sub-856463728
1969         </sur>
1970     </m2m:sgn>

```

HTTP Response:

```

1971     200 OK
1972
1973
1974

```

1978 X-M2M-RSC: 2000  
 1979 X-M2M-RI: notif-12346

1981 If the notification request body is represented in JSON, the following is a HTTP request message example:

1982 HTTP Request:

1983 POST / HTTP/1.1  
 1984 Host: 192.168.0.20:9090  
 1985 X-M2M-Origin: /mn-cse  
 1986 X-M2M-RI: notif-12346  
 1987 Content-Type: application/json

```

1988 {
1989   "m2m:sgn":
1990   {
1991     "nev":{
1992       "rep":
1993       {
1994         "m2m:cin":
1995         {
1996           "ty": 4,
1997           "ri": "cin-256599578",
1998           "pi": "cnt-790965889",
1999           "rn": "cin-256599578",
2000           "ct": "20150925T050623",
2001           "lt": "20150925T050623",
2002           "et": "20151107T154802",
2003           "st": 0,
2004           "cnf": "text/plain:0",
2005           "cs": 3,
2006           "con": "ON"
2007         }
2008       }
2009     }
2010     "net": [3]
2011   }
2012   "sur": "/mn-cse/sub-856463728"
2013 }
    
```

2014 HTTP Response:

2015 200 OK  
 2016 X-M2M-RSC: 2000  
 2017 X-M2M-RI: notif-12346

2024

2025

## Annex A: Reading Resources

### Annex A.1 Introduction

The information of resources created during each call flow of current use case can be retrieved via smartphone application IN-AE initiates a RETRIEVE request to the target resources as following.

### Annex A.2 CSE resources

#### Annex A.2.1 IN-CSE

HTTP Request:

```
GET ~/in-cse/server HTTP/1.1
Host: in.provider.com:8080
X-M2M-Origin: /mn-cse/Cgateway_ae
X-M2M-RI: incse-12345
Accept: application/xml
```

HTTP Response:

```
200 OK
X-M2M-RSC: 2000
X-M2M-RI: incse-12345
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8"?>
<m2m:cb xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="server">
  <ty>5</ty>
  <ri>/in-cse</ri>
  <ct>20150925T045938</ct>
  <lt>20150925T045938</lt>
  <acpi>/in-cse/acp-666957710</acpi>
  <cst>1</cst>
  <csi>in-cse</csi>
  <srt>1 2 3 4 5 9 14 15 16 17 23</srt>
  <poa>http://in.provider.com:8080</poa>
</m2m:cb>
```

#### Annex A.2.2 MN-CSE

HTTP Request:

```
GET ~/in-cse/server/home_gateway HTTP/1.1
Host: mn.provider.com:8080
X-M2M-Origin: /in-cse/Csmartphone_ae
X-M2M-RI: incse-12346
Accept: application/xml
```

HTTP Response:

```
200 OK
X-M2M-RSC: 2000
X-M2M-RI: incse-12346
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8"?>
<m2m:csr xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="home_gateway">
```

```

2078     <ty>16</ty>
2079     <ri>csr-299409504</ri>
2080     <pi>/in-cse</pi>
2081     <ct>20150925T045938</ct>
2082     <lt>20150925T045938</lt>
2083     <et>20171005T105550</et>
2084     <acpi>/in-cse/acp-666957710</acpi>
2085     <poa>http://mn.provider.com:8080</poa>
2086     <cb>mn.provider.com/mn-cse</cb>
2087     <csi>/mn-cse</csi>
2088     <rr>>true</rr>
2089 </m2m:csr>

```

## 2090 Annex A.3 Gateway device application MN-AE

2091 HTTP Request:

```

2092
2093 GET /~/mn-cse/home_gateway/gateway_ae HTTP/1.1
2094 Host: mn.provider.com:8080
2095 X-M2M-Origin: /in-cse/Csmartphone_ae
2096 X-M2M-RI: mncse-12347
2097 Accept: application/xml
2098

```

2099 HTTP Response:

```

2100
2101 200 OK
2102 X-M2M-RSC: 2000
2103 X-M2M-RI: mncse-12347
2104 Content-Type: application/xml
2105
2106 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2107 <m2m:ae xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="gateway_ae">
2108     <ty>2</ty>
2109     <ri>ae-CAE340303271</ri>
2110     <pi>/mn-cse</pi>
2111     <ct>20150925T052438</ct>
2112     <lt>20150925T052438</lt>
2113     <et>20171005T105550</et>
2114     <acpi>/mn-cse/acp-805496226</acpi>
2115     <api>A01.com.company.gatewayApp</api>
2116     <aei>CAE340303271</aei>
2117     <rr>>false</rr>
2118 </m2m:ae>

```

## 2119 Annex A.4. Light device applications

### 2120 Annex A.4.1 ADN-AE1

2121 HTTP Request:

```

2122
2123 GET /~/mn-cse/home_gateway/light_ae1 HTTP/1.1
2124 Host: mn.provider.com:8080
2125 X-M2M-Origin: /mn-cse/Cgateway_ae
2126 X-M2M-RI: mncse-12347
2127 Accept: application/xml
2128

```

2129 HTTP Response:

```

2130
2131 200 OK
2132 X-M2M-RSC: 2000
2133 X-M2M-RI: mncse-12347
2134 Content-Type: application/xml
2135
2136 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2137 <m2m:ae xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="light_ae1">

```

```

2138     <ty>2</ty>
2139     <ri>ae-CAE340304071</ri>
2140     <pi>/mn-cse</pi>
2141     <ct>20150925T052455</ct>
2142     <lt>20150925T052455</lt>
2143     <et>20171005T105550</et>
2144     <acpi>/mn-cse/acp-805496226</acpi>
2145     <api>A01.com.company.lightApp1</api>
2146     <aei>CAE340304071</aei>
2147     <rr>>true</rr>
2148 </m2m:ae>
2149

```

## 2150 Annex A.4.2 ADN-AE2

2151 HTTP Request:

```

2152 GET /~/mn-cse/home_gateway/light_ae2 HTTP/1.1
2153 Host: mn.provider.com:8080
2154 X-M2M-Origin: /mn-cse/Cgateway_ae
2155 X-M2M-RI: mncse-12348
2156 Accept: application/xml
2157
2158

```

2159 HTTP Response:

```

2160 200 OK
2161 X-M2M-RSC: 2000
2162 X-M2M-RI: mncse-12348
2163 Content-Type: application/xml
2164
2165 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2166 <m2m:ae xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="light_ae2">
2167     <ty>2</ty>
2168     <ri>ae-CAE340304042</ri>
2169     <pi>/mn-cse</pi>
2170     <ct>20150925T052542</ct>
2171     <lt>20150925T052542</lt>
2172     <et>20171005T105550</et>
2173     <acpi>/mn-cse/acp-805496226</acpi>
2174     <api>A01.com.company.lightApp2</api>
2175     <aei>CAE340304042</aei>
2176     <rr>>true</rr>
2177 </m2m:ae>
2178
2179

```

## 2180 Annex A.5 Smartphone application IN-AE

2181 HTTP Request:

```

2182 GET /~/in-cse/server/smartphone_ae HTTP/1.1
2183 Host: in.provider.com:8080
2184 X-M2M-Origin: /mn-cse/Cgateway_ae
2185 X-M2M-RI: incse-12349
2186 Accept: application/xml
2187
2188

```

2189 Resonse status:

```

2190 200 OK
2191 X-M2M-RSC: 2000
2192 X-M2M-RI: incse-12349
2193 Content-Type: application/xml
2194
2195

```

2196 Resonse message:

```

2197 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2198

```

```

2199     <m2m:ae xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="smartphone_ae">
2200         <ty>2</ty>
2201         <ri>ae-CAE340304178</ri>
2202         <pi>/in-cse</pi>
2203         <ct>20150925T052622</ct>
2204         <lt>20150925T052622</lt>
2205         <et>20171005T105550</et>
2206         <acpi>/in-cse/acp-666957710</acpi>
2207         <api>A01.com.company.lightControlApp</api>
2208         <aei>CAE340304178</aei>
2209         <rr>>false</rr>
2210     </m2m:ae>

```

## Annex A.6 Access control policy

HTTP Request:

```

2212     GET /~/mn-cse/home_gateway/gateway_acp HTTP/1.1
2213     Host: mn.provider.com:8080
2214     X-M2M-Origin: /mn-cse/Cgateway_ae
2215     X-M2M-RI: mncse-12350
2216     Accept: application/xml

```

HTTP Response:

```

2220     200 OK
2221     X-M2M-RSC: 2000
2222     X-M2M-RI: mncse-12350
2223     Content-Type: application/xml
2224
2225     <m2m:acp xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="gateway_acp">
2226         <ty>1</ty>
2227         <ri>acp-805496226</ri>
2228         <pi>/mn-cse</pi>
2229         <ct>20150925T050238</ct>
2230         <lt>20150925T050238</lt>
2231         <et>20171005T105550</et>
2232         <pv>
2233             <acr>
2234                 <acor>/in-cse/home_gateway /mn-cse/Cgateway_ae /mn-cse/Clight_ae1
2235                 /mn-cse/Clight_ae2 /in-cse/Csmartphone_ae</acor>
2236                 <acop>63</acop>
2237             </acr>
2238             </pv>
2239             <pvs>
2240                 <acr>
2241                     <acor>/in-cse/home_gateway /mn-cse/Cgateway_ae /mn-cse/Clight_ae1
2242                     /mn-cse/Clight_ae2 /in-cse/Csmartphone_ae</acor>
2243                     <acop>51</acop>
2244                 </acr>
2245             </pvs>
2246         </m2m:acp>

```

## Annex A.7 Containers

### Annex A.7.1 Container under ADN-AE1

HTTP Request:

```

2252     GET /~/mn-cse/home_gateway/light_ae1/light HTTP/1.1
2253     Host: mn.provider.com:8080
2254     X-M2M-Origin: /mn-cse/Cgateway_ae
2255     X-M2M-RI: mncse-12351
2256     Accept: application/xml

```

2259

```

2260 HTTP Response:
2261
2262 200 OK
2263 X-M2M-RSC: 2000
2264 X-M2M-RI: mncse-12351
2265 Content-Type: application/xml
2266
2267 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2268 <m2m:cnt xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="light">
2269   <ty>3</ty>
2270   <ri>cnt-582759912</ri>
2271   <pi>/mn-cse/ae-CAE340304071</pi>
2272   <ct>20150925T052955</ct>
2273   <lt>20150925T052955</lt>
2274   <et>20171005T105550</et>
2275   <acpi>/mn-cse/acp-805496226</acpi>
2276   <st>0</st>
2277   <cni>1</cni>
2278   <cbs>3</cbs>
2279 </m2m:cnt>
2280

```

## 2281 Annex A.7.2 Container under ADN-AE2

```

2282 HTTP Request:
2283
2284 GET /~/mn-cse/home_gateway/light_ae2/light HTTP/1.1
2285 Host: mn.provider.com:8080
2286 X-M2M-Origin: /mn-cse/Cgateway_ae
2287 X-M2M-RI: mncse-12352
2288 Accept: application/xml
2289

```

```

2290 HTTP Response:
2291
2292 200 OK
2293 X-M2M-RSC: 2000
2294 X-M2M-RI: mncse-12352
2295 Content-Type: application/xml
2296
2297 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2298 <m2m:cnt xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="light">
2299   <ty>3</ty>
2300   <ri>cnt-582769893</ri>
2301   <pi>/mn-cse/ae-CAE340304042</pi>
2302   <ct>20150925T053135</ct>
2303   <lt>20150925T053135</lt>
2304   <et>20171005T105550</et>
2305   <acpi>/mn-cse/acp-805496226</acpi>
2306   <st>0</st>
2307   <cni>1</cni>
2308   <cbs>3</cbs>
2309 </m2m:cnt>
2310

```

## 2311 Annex A.8 ContentInstances

### 2312 Annex A.8.1 Latest contentInstance in ADN-AE1

```

2313 HTTP Request:
2314
2315 GET /~/mn-cse/home_gateway/light_ae1/light/la HTTP/1.1
2316 Host: mn.provider.com:8080
2317 X-M2M-Origin: /mn-cse/Cgateway_ae

```



2318 X-M2M-RI: mncse-12353  
 2319 Accept: application/xml  
 2320

2321 HTTP Response:  
 2322  
 2323 200 OK  
 2324 X-M2M-RSC: 2000  
 2325 X-M2M-RI: mncse-12353  
 2326 Content-Type: application/xml

2327  
 2328 <?xml version="1.0" encoding="UTF-8"?>  
 2329 <m2m:cin  
 2330 xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="cin-394798749">  
 2331 <ty>4</ty>  
 2332 <ri>cin-394798749</ri>  
 2333 <pi>/mn-cse/cnt-582759912</pi>  
 2334 <ct>20150925T053225</ct>  
 2335 <lt>20150925T053225</lt>  
 2336 <et>20171005T105550</et>  
 2337 <st>0</st>  
 2338 <cnf>text/plain:0</cnf>  
 2339 <cs>2</cs>  
 2340 <con>ON</con>  
 2341 </m2m:cin>  
 2342

## 2343 *Annex A.8.2 Latest contentInstance in ADN-AE2*

2344 HTTP Request:  
 2345  
 2346 GET /~/mn-cse/home\_gateway/light\_ae2/light/la HTTP/1.1  
 2347 Host: mn.provider.com:8080  
 2348 X-M2M-Origin: /mn-cse/Cgateway\_ae  
 2349 X-M2M-RI: mncse-12354  
 2350 Accept: application/xml  
 2351

2352 HTTP Response:  
 2353  
 2354 200 OK  
 2355 X-M2M-RSC: 2000  
 2356 X-M2M-RI: mncse-12354  
 2357 Content-Type: application/xml

2358  
 2359 <?xml version="1.0" encoding="UTF-8"?>  
 2360 <m2m:cin  
 2361 xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="cin-256599578">  
 2362 <ty>4</ty>  
 2363 <ri>cin-256599578</ri>  
 2364 <pi>/mn-cse/cnt-582769893</pi>  
 2365 <ct>20150925T053425</ct>  
 2366 <lt>20150925T053425</lt>  
 2367 <et>20171005T105550</et>  
 2368 <st>0</st>  
 2369 <cnf>text/plain:0</cnf>  
 2370 <cs>2</cs>  
 2371 <con>ON</con>  
 2372 </m2m:cin>  
 2373

## 2374 *Annex A.9 Subscriptions*

### 2375 *Annex A.9.1 Subscription to container in ADN-AE1*

2376 HTTP Request:

```

2377
2378 GET /~/mn-cse/home_gateway/light_ae1/light/lightstate_sub1 HTTP/1.1
2379 Host: mn.provider.com:8080
2380 X-M2M-Origin: /mn-cse/Cgateway_ae
2381 X-M2M-RI: mncse-12355
2382 Accept: application/xml
2383
2384 HTTP Response:
2385
2386 200 OK
2387 X-M2M-RSC: 2000
2388 X-M2M-RI: mncse-12355
2389 Content-Type: application/xml
2390
2391 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2392 <m2m:sub xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="lightstate_sub1">
2393   <ty>23</ty>
2394   <ri>sub-856593979</ri>
2395   <pi>/mn-cse/cnt-582759912</pi>
2396   <ct>20150926T052955</ct>
2397   <lt>20150926T052955</lt>
2398   <et>20171005T105550</et>
2399   <acpi>/mn-cse/acp-805496226</acpi>
2400   <enc>
2401     <net>3</net>
2402   </enc>
2403   <nu>/mn-cse/ae-CAE340304071</nu>
2404   <nct>1</nct>
2405 </m2m:sub>
2406

```

## Annex A.9.2 Subscription to container in ADN-AE2

```

2407
2408 HTTP Request:
2409
2410 GET /~/mn-cse/home_gateway/light_ae2/light/lightstate_sub2 HTTP/1.1
2411 Host: mn.provider.com:8080
2412 X-M2M-Origin: /mn-cse/Cgateway_ae
2413 X-M2M-RI: mncse-12356
2414 Accept: application/xml
2415
2416 HTTP Response:
2417
2418 200 OK
2419 X-M2M-RSC: 2000
2420 X-M2M-RI: mncse-12356
2421 Content-Type: application/xml
2422
2423 <?xml version="1.0" encoding="UTF-8" standalone="yes"?>
2424 <m2m:sub xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="lightstate_sub2">
2425   <ty>23</ty>
2426   <ri>sub-856463728</ri>
2427   <pi>/mn-cse/cnt-582759912</pi>
2428   <ct>20150926T053055</ct>
2429   <lt>20150926T053055</lt>
2430   <et>20171005T105550</et>
2431   <acpi>/mn-cse/acp-805496226</acpi>
2432   <enc>
2433     <net>3</net>
2434   </enc>
2435   <nu>/mn-cse/ae-CAE340304042</nu>
2436   <nct>1</nct>
2437 </m2m:sub>

```

## Annex A.10 Groups

### Annex A.10.1 Group1

HTTP Request:

```
GET /~/mn-cse/home_gateway/gateway_ae/containers_grp HTTP/1.1
Host: mn.provider.com:8080
X-M2M-Origin: /in-cse/Csmartphone_ae
X-M2M-RI: mncse-12357
Accept: application/xml
```

HTTP Response:

```
200 OK
X-M2M-RSC: 2000
X-M2M-RI: mncse-12357
Content-Type: application/xml

<?xml version="1.0" encoding="UTF-8"?>
<m2m:grp xmlns:m2m="http://www.onem2m.org/xml/protocols" rn="containers_grp">
  <ty>9</ty>
  <ri>grp-977978327</ri>
  <pi>/mn-cse/ae-CAE340303271</pi>
  <ct>20151004T045954</ct>
  <lt>20151004T045954</lt>
  <et>20171005T105550</et>
  <acpi>/mn-cse/acp-805496226 /mn-cse/acp-805496226</acpi>
  <mt>3</mt>
  <cnm>2</cnm>
  <mnrm>10</mnrm>
  <mid>/mn-cse/cnt-582759912 /mn-cse/cnt-582769893</mid>
  <mtv>true</mtv>
  <csy>1</csy>
  <fopt>/mn-cse/grp-977978327/fopt</fopt>
</m2m:grp>
```

---

## History

Publication history		

<b>Draft history</b> (to be removed on publication)		
V2.0.0	28 Feb 2017	Initial release 2 version based on TR-0025 V1.2.0 Implemented the agreed contribution from TST#27 - TST-2017-0052-TR-0025_update
V2.0.1	24 June 2017	Implemented the agreed contributions from TST#29 - TST-2017-0117R01-CR-TR-0025_HTTP_Host_Header_correction_Rel_2 - TST-2017-0128-CR-TR-0025_Notification_correction_Rel_2
V2.0.2	23 March 2018	Implemented the agreed contributions from TST#34 - TST-2018-0043R01-TR-0025_subscription_error_correction
V2.0.3	06 June 2019	Implemented the agreed contributions from TDE#40 - TDE-2019-0076-Missing_resource_types_in_Content-Type_header_fields

2481

2482