



# LWM2M REQUIREMENTS IOT DEVICES AND COMPONENTS

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# SUMMARY

OMA Object Name	Object	DT Requirement
LwM2M Security	/0/	MANDATORY
LwM2M Server	/1/	MANDATORY
Access Control	/2/	OPTIONAL
LWM2M Device	/3/	MANDATORY
Connectivity Monitoring	/4/	MANDATORY
Firmware Update	/5/	MANDATORY
Location	/6/	MANDATORY
Connectivity Statistics	/7/	OPTIONAL
Lock and Wipe	/8/	Not Required
LwM2M Software Management	/9/	Not Required
Cellular Connectivity	/10/	OPTIONAL
APN connection profile	/11/	MANDATORY
WLAN connectivity	/12/	Not Required
Bearer Selection	/13/	OPTIONAL
LwM2M Software Component	/14/	Not Required
DevCapMgmnt	/15/	OPTIONAL
Portfolio	/16/	Not Required
Communication Characteristics	/17/	Not Required
NAS	/18/	Not Required
BinaryAppDataContainer	/19/	MANDATORY (2021)
Event Log	/20/	Not Required
LWM2M OSCORE	/21/	MANDATORY (2022)
Virtual Observe Notify	/22/	Not Required
IoT Logging objects	/3351 - 3386/	OPTIONAL





**DT-REQUIRED  
OMA OBJECTS FOR  
LWM2M  
(MANDATORY)**

# LWM2M SECURITY

MANDATORY

- OMA Object ID: 0
- More than 1 instance is allowed for this object: resource 0 = bootstrap server
- OMA Standard definition: Mandatory
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	LwM2M Server URI		Single	Mandatory	Mandatory	As long as NB-IoT does not support DNS, this parameter is an IP address.
1	Bootstrap-Server		Single	Mandatory	Mandatory	
2	Security Mode		Single	Mandatory	Mandatory	0 (Pre-Shared Key mode) and 3 (NoSec mode) are to be supported
3	Public Key or Identity		Single	Mandatory	Mandatory	
4	Server Public Key		Single	Mandatory	Mandatory	
5	Secret Key		Single	Mandatory	Mandatory	
16	DTLS/TLS Ciphersuite		Multiple	Optional	Recommended	Note: Deutsche Telekom requires implementation of a separate DTLS/TLS stack for use cases without Private APN.

# LWM2M SERVER 1/2

MANDATORY

- OMA Object ID: 1
- OMA Standard definition: Mandatory
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	Short Server ID	Read	Single	Mandatory	Mandatory	
1	Lifetime	Read/Write	Single	Mandatory	Mandatory	
2	Default Minimum Period	Read/Write	Single	Optional	Recommended	
3	Default Maximum Period	Read/Write	Single	Optional	Recommended	
6	Notification Storing When Disabled or Offline	Read/Write	Single	Mandatory	Mandatory	
7	Binding	Read/Write	Single	Mandatory	Mandatory	

# LWM2M SERVER 2/2

MANDATORY

- OMA Object ID: 1
- OMA Standard definition: Mandatory
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
8	Registration Update Trigger	E	Single	Mandatory	Mandatory	
9	Bootstrap-Request Trigger	E	Single	Optional	Recommended	
10	APN Link	Read/Write	Single	Optional	Recommended	Link to Object 11 (APN Connection Profile)
12	Last Bootstrapped	Read	Single	Optional	Recommended	
13	Registration Priority Order		Single	Optional	Recommended	

# DEVICE 1/2

MANDATORY

- OMA Object ID: 3
- This object must contain the data from the device supplier and not from the modem supplier.
- OMA Standard definition: Mandatory
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	Manufacturer	Read	Single	Optional	Mandatory	Name of device supplier
1	Model Number	Read	Single	Optional	Mandatory	
2	Serial Number	Read	Single	Optional	Mandatory	
3	Firmware Version	Read	Single	Optional	Mandatory	This parameter contains the device firmware and not the modem firmware.
4	Reboot	E	Single	Optional	Mandatory	
5	Factory Reset	E	Single	Optional	Recommended	
9	Battery Level	Read	Single	Optional	Mandatory	Mandatory in case battery is used.
11	Error Code	Read	Multiple	Mandatory	Mandatory	

# DEVICE 2/2

MANDATORY

- OMA Object ID: 3
- This object must contain the data from the device supplier and not from the modem supplier.
- OMA Standard definition: Mandatory
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
16	Supported Binding and Modes	Read	Single	Mandatory	Mandatory	
18	Hardware Version	Read	Single	Optional	Mandatory	
20	Battery Status	Read	Single	Optional	Mandatory	Mandatory for devices containing a battery



# CONNECTIVITY MONITORING 1/2

MANDATORY

- OMA Object ID: 4
- OMA Standard definition: Optional
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	Network Bearer	Read	Single	Mandatory	Mandatory	
1	Available Network Bearer	Read	Multiple	Mandatory	Mandatory	
2	Radio Signal Strength	Read	Single	Mandatory	Mandatory	
3	Link Quality	Read	Single	Optional	Mandatory	
4	IP Addresses	Read	Multiple	Mandatory	Mandatory	
7	APN	Read	Multiple	Optional	Mandatory	
8	CellID	Read	Single	Optional	Mandatory	

# CONNECTIVITY MONITORING 2/2



- OMA Object ID: 4
- OMA Standard definition: Optional
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
9	SMNC	Read	Single	Optional	Mandatory	
10	SMCC	Read	Single	Optional	Mandatory	
11	SignalSNR	Read	Single	Optional	Mandatory	
12	LAC	Read	Single	Optional	Mandatory	

# FIRMWARE UPDATE

MANDATORY

- OMA Object ID: 5
- OMA Standard definition: Optional
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	Package	Write	Single	Mandatory	Mandatory	
1	Package URI	Read/Write	Single	Mandatory	Mandatory	
2	Update	E	Single	Mandatory	Mandatory	
3	State	Read	Single	Mandatory	Mandatory	
5	Update Result	Read	Single	Mandatory	Mandatory	
7	PkgVersion	Read	Single	Optional	Mandatory	
9	Firmware Update Delivery Method	Read	Single	Mandatory	Mandatory	

# LOCATION

MANDATORY

- OMA Object ID: 6
- OMA Standard definition: Optional
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	Latitude	Read	Single	Mandatory	Mandatory	Necessary for positioning use cases.
1	Longitude	Read	Single	Mandatory	Mandatory	Necessary for positioning use cases.
5	Timestamp	Read	Single	Mandatory	Mandatory	Necessary for positioning use cases.

# LWM2M APN CONNECTION PROFILE

MANDATORY

- OMA Object ID: 11
- OMA Standard definition: Optional
- Deutsche Telekom definition: Mandatory

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	Profile Name	Read/Write	Single	Mandatory, if supported	Mandatory	
1	APN	Read/Write	Single	Optional	Mandatory	
4	Authentication Type	Read/Write	Single	Mandatory, if supported	Mandatory	
10	Connection establishment result (1)	Read	Multiple	Optional	Mandatory	
11	Connection establishment reject cause (1)	Read	Multiple	Optional	Mandatory	



# BINARYAPPDATACONTAINER

MANDATORY

- OMA Object ID: 19
- OMA Standard definition: Optional
- Deutsche Telekom definition: Mandatory (Roadmap item – Priority 1)

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	Data	Read/Write	Multiple	Mandatory, if supported	Mandatory	

# LWM2M OSCORE

MANDATORY

- OMA Object ID: 21
- OMA Standard definition: Optional
- Deutsche Telekom definition: Mandatory (Roadmap item – Priority 2)

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	OSCORE Master Secret		Single	Mandatory	Optional	
1	OSCORE Sender ID		Single	Mandatory	Optional	
2	OSCORE Recipient ID		Single	Mandatory	Optional	



# **DT-RECOMMENDED OMA OBJECTS FOR LWM2M**

**(OPTIONAL)**

# LWM2M ACCESS CONTROL

OPTIONAL

- OMA Object ID: 2
- OMA Standard definition: Optional
- Deutsche Telekom definition: Optional

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	Object ID	Read	Single	Mandatory, if supported	Optional	
1	Object Instance ID	Read	Single	Mandatory, if supported	Optional	
3	Access Control Owner	Read/Write	Single	Mandatory, if supported	Optional	

# CONNECTIVITY STATISTICS

OPTIONAL

- OMA Object ID: 7
- OMA Standard definition: Optional
- Deutsche Telekom definition: Optional

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
6	Start	E	Single	Mandatory, if supported	Mandatory, if supported	
7	Stop	E	Single	Mandatory, if supported	Mandatory, if supported	



# LWM2M CELLULAR CONNECTIVITY

OPTIONAL

- OMA Object ID: 10
- OMA Standard definition: Optional
- Deutsche Telekom definition: Optional

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
1	Disable radio period	Read/Write	Single	Optional	Optional	
4	PSM Timer	Read/Write	Single	Optional	Mandatory	
11	Activated Profile Names	Read	Multiple	Mandatory, if supported	Mandatory, if supported	

# LWM2M BEARER SELECTION

OPTIONAL

- OMA Object ID: 13
- OMA Standard definition: Optional
- Deutsche Telekom definition: Optional

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
6	Operator list	Read/Write	Single	Optional	Mandatory	No SMS support over NB-IoT; critical for roaming features
7	Operator list mode	Read/Write	Single	Optional	Mandatory	No SMS support over NB-IoT; critical for roaming features
8	List of available PLMNs	Read	Single	Optional	Mandatory	No SMS support over NB-IoT; critical for roaming features

# DEVCPMGMT

OPTIONAL

- OMA Object ID: 15
- OMA Standard definition: Optional
- Deutsche Telekom definition: Optional

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
0	Property	Read	Single	Mandatory, if supported	Mandatory, if supported	
1	Group	Read	Single	Mandatory, if supported	Mandatory, if supported	
4	Enabled	Read	Single	Mandatory, if supported	Mandatory, if supported	
5	opEnable	E	Single	Mandatory, if supported	Mandatory, if supported	
6	opDisable	E	Multiple	Mandatory, if supported	Mandatory, if supported	

# SCELLID

OPTIONAL

- object ID: 3353
- OMA Standard definition: Optional
- Deutsche Telekom definition: Optional; highly recommended for devices with cellular connectivity to enable location features, e.g. for devices based on Cell-ID positioning

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
6030	plmnID	Read	Single	Mandatory, if supported	Mandatory	
6031	BandIndicator	Read	Single	Mandatory, if supported	Mandatory	
2	TrackingAreaCode	Read	Single	Mandatory, if supported	Mandatory	
6033	CellID	Read	Single	Mandatory, if supported	Mandatory	

# SERVINGCELLMEASUREMENT

OPTIONAL

- object ID: 3370
- OMA Standard definition: Optional
- Deutsche Telekom definition: Optional; highly recommended for devices with cellular connectivity to enable location features, e.g. for devices based on Cell-ID positioning

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
6037	sysFrameNumber	Read	Single	Mandatory, if supported	Mandatory	
6038	subFrameNumber	Read	Single	Mandatory, if supported	Mandatory	
6034	pci	Read	Single	Mandatory, if supported	Mandatory	
6035	rsrp	Read	Single	Mandatory, if supported	Mandatory	
6036	rsrq	Read	Single	Mandatory, if supported	Mandatory	
6032	dIEarfcn	Read	Single	Mandatory, if supported	Mandatory	





# NEIGHBORCELLMEASUREMENT

OPTIONAL

- object ID: 3371
- OMA Standard definition: Optional
- Deutsche Telekom definition: Optional; highly recommended for devices with cellular connectivity to enable location features, e.g. for devices based on Cell-ID positioning

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
6037	sysFrameNumber	Read	Single	Mandatory, if supported	Mandatory	
6038	subFrameNumber	Read	Single	Mandatory, if supported	Mandatory	
6034	pci	Read	Single	Mandatory, if supported	Mandatory	
6035	rsrp	Read	Single	Mandatory, if supported	Mandatory	
6036	rsrq	Read	Single	Mandatory, if supported	Mandatory	
6032	dIEarfcn	Read	Single	Mandatory, if supported	Mandatory	

# TIMINGADVANCE

OPTIONAL

- object ID: 3372
- OMA Standard definition: Optional
- Deutsche Telekom definition: Optional; highly recommended for devices with cellular connectivity to enable location features, e.g. for devices based on Cell-ID positioning

ID	Name	Operations	Instances	OMA standard mandatory	Telekom recommendation	Comment
6037	sysFrameNumber	Read	Single	Mandatory, if supported	Mandatory	
6038	subFrameNumber	Read	Single	Mandatory, if supported	Mandatory	
2	timingAdvance	Read	Single	Mandatory, if supported	Mandatory	



# **ADDITIONAL RECOMMENDATIONS FOR LWM2M**

# TIMER IMPLEMENTATIONS

For details see:

[https://www.openmobilealliance.org/release/LightweightM2M/V1\\_2-20201110-A/HTML-Version/OMA-TS-LightweightM2M\\_Transport-V1\\_2-20201110-A.html#12-8-5-0-D85-Timer-implementation-options](https://www.openmobilealliance.org/release/LightweightM2M/V1_2-20201110-A/HTML-Version/OMA-TS-LightweightM2M_Transport-V1_2-20201110-A.html#12-8-5-0-D85-Timer-implementation-options) (see chapter D.8.5)

1. Extended  $T3412 > \text{LwM2M Registration lifetime} > \mathbf{Pmax}$ , in the scenarios where only **Pmax** is configured for simple periodic reporting such as a water meter reading. Whenever **Pmax** expires the device will wake up, read the sensor, and sends service data to the server and can optionally send registration update at the same time. This way it will only need to wake up once every **Pmax** cycle.
2.  $\mathbf{Pmin} < \text{eDRX} < \mathbf{Pmax} \leq \text{translated value of Rate control (in deci-hours) to time interval}$ . The assumption is **Pmin** is configured alongside the setting of thresholds on a resource (greater than, less than, step) which means the device needs to wake up every so often (at a minimum every **Pmax**) to sample some sensor input. Therefore, when eDRX is also configured the device can simply wake up every eDRX cycle to both sample its sensor input and monitor its paging. It can then evaluate its sensor data against a threshold and decide whether to transmit any data or not. It also does not make sense for rate control to stop the device meeting **Pmax** requirements.
3. When rate control is applied the **Pmin** and **Pmax** setting need to be chosen in a way to avoid notifications in a higher rate than rate control allows.