



SIM7080 Series_LwM2M_Application Note

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About Document

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[1] SIM7080 Series AT Command Manual V1.02

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1 Purpose of this document

This document describes how to use the lightweight machine-to-machine (LwM2M) client to deploy a machine-to-machine system on MDM9205 devices.

2 Overview

Open mobile alliance (OMA) specifies the application layer communication protocol between an LwM2M server and an LwM2M client, located in an LwM2M device. The OMA LwM2M enabler includes device management and service enablement for LwM2M devices.

The LwM2M client is compliant with OMA technical specification version 1.0 and supports the following interfaces:

- (1) Bootstrap
- (2) Client registration
- (3) Device management and service enablement
- (4) Information reporting

3 LwM2M Interface

3.1 Bootstrap interface

The bootstrap interface is used to provide essential information to the LwM2M client and enable the LwM2M client to register with one or more LwM2M servers.

SIM7080 provides the LwM2M client to support factory bootstrap and client-initiated bootstrap. Information about bootstrap server or other servers, and access control is configured in the bootstrap.ini file and preloaded on the device. During the device start-up, the bootstrap.ini file is loaded and parsed to get the required information for bootstrapping or registering with the servers.

Chapter 5 provides information about bootstrap.ini file format and a sample file.

During the client initiated bootstrap, if disconnection or failure occurs, then retry timers are configured as per lwm2m_cfg file (see Chapter 5).

The default access point name (APN) specified in the lwm2m_cfg file is used for data call setup for bootstrap request.

3.2 Client registration

During bootstrapping, when the LwM2M client obtains the server information, it tries to register

with servers.

The carrier_apn_cfg file allows configuring the APN for data call connection to each server. In absence of the carrier_apn_cfg file, the default APN specified in the lwm2m_cfg file is used.

If there is a disconnection or failure in registration, then retry timers are configured per the lwm2m_cfg file (see Chapter 5).

After disconnection or device reboot during registration, reregistration with servers is disabled by enabling the PER_REGSTATUS_FEAT parameter.

The registration update follows the registration lifetime (per Resource /1/x/1 value)

3.3 Device management and service enablement

The LwM2M server uses the device management and service enablement interfaces to access object instances and resources available from the registered LwM2M client.

The LwM2M client supports the following operations for the supported objects:

- (1) Create
- (2) Read
- (3) Write
- (4) Delete
- (5) Execute
- (6) Write-attributes
- (7) Discover

3.4 Information reporting

The LwM2M server uses the information reporting interface to observe any changes in a resource on a registered LwM2M client and receives notifications when new values are available.

The LwM2M client supports the observe and notify feature of object instances and resources.

4 LwM2M objects

The LwM2M client implements and handles the server requests for the following objects:

- (1) Security
- (2) Server
- (3) Access control
- (4) Device
- (5) Connectivity monitoring
- (6) Location
- (7) Connectivity statistics
- (8) APN connection profile
- (9) Cellular connectivity

The LwM2M client supports the following objects as a pass-through object:

- (1) Firmware update
- (2) Software management
- (3) Device capability management

5 Provisioning and configuration

The LwM2M client of QTI has the following three configuration files:

(1) bootstrap.ini

Used as factory bootstrap to discover the bootstrap server or other servers.

Provides bootstrap server details for client-initiated bootstrap.

Used to instantiate multiple instances of objects (security, server, and ACL).

(2) lwm2m_cfg

Contains LwM2M options to control features. See more details see Section 5.2.

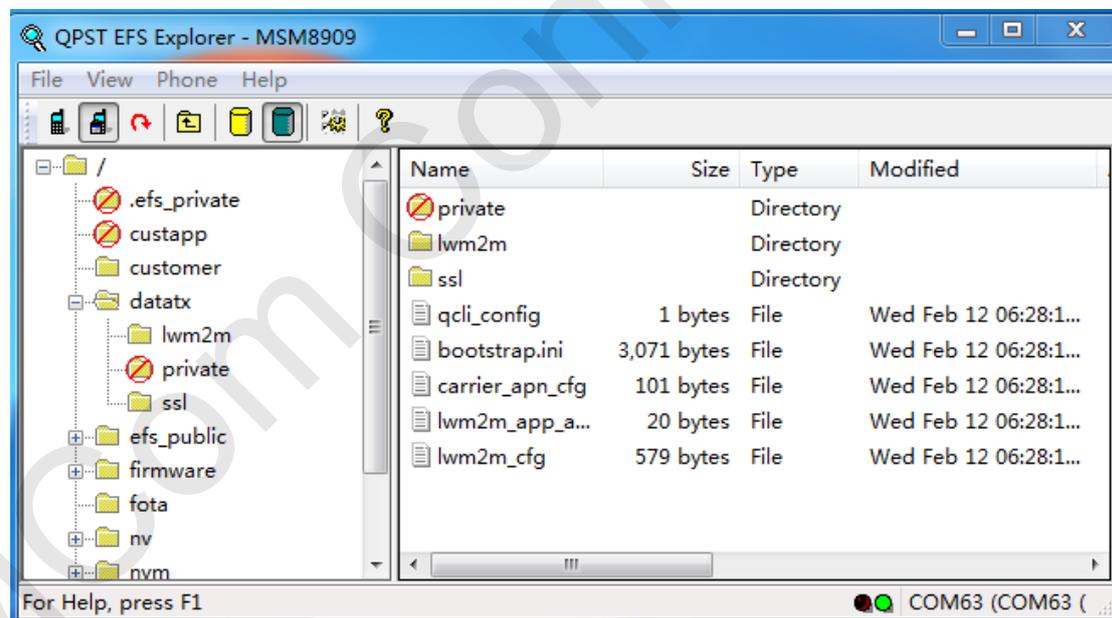
(3) carrier_apn_cfg

Contains information of the APN for the connection to servers.

(4) lwm2m_app_autostart

Is an empty file; the presence of this file indicates the application for autostart.

NOTE: The preceding files should be preloaded in the device to the folder /datatx, as shown in the following figure.



5.1 Bootstrap.ini file

The bootstrap.ini file contains the object information required for bootstrapping process. The object information is in JSON format, as defined in the OMA specification.

Attributes	JSON Variable	Mandatory	Description
Base	bn	No	The base name string which is prepended to

Name			the Name value of the entry for forming a globally unique identifier for the resource.
Base Time	bt	No	The base time which the time values are relative to.
Resource Array	e Array Parameters	Yes	The Resource list as JSON value array according to [SENML] with Array parameter extension(Object Link).
	Name n	No	The Name value is prepended by the Base Name value to form the name of the resource instance. The resulting name uniquely identifies the Resource Instance from all others.

	Time	t	No	The time of the representation relative to the Base Time in seconds for a notification. Required only for historical representation
	Float Value	v	One value field is mandatory	Value as a JSON float if the Resource data type is Integer,Float,or Time.
	Boolean Value	bv		Value as a JSON Boolean if the Resource data type is boolean.
	ObjectLink Value	ov		Value as a JSON string if the Resource data type is Objlnk.
	String Value	sv		Value as a JSON string for all other Resource data type.If the Resource data type is opaque the string value holds the Base64 encoded representation of the Resource.

The following is an example of a bootstrap.ini file containing security, server, and access control objects, specific to OMA 1.0 servers:

```

{"bn":"/0/0/",
  "e":[
    {"n":"0","sv":"coaps://10.230.20.192:1111"},
    {"n":"1","bv":true},
    {"n":"2","v":0},
    {"n":"10","v":100}
  ]}
{"bn":"/0/1/",
  "e":[
    {"n":"1","bv":false},
    {"n":"10","v":102}
  ]}
{"bn":"/0/2/",
  "e":[
    {"n":"0","sv":"coaps://10.231.21.192:1112"},
    {"n":"1","bv":false},

```

```

        {"n":"2","v":0},
        {"n":"10","v":101
    }}
{"bn":"/0/3/",
  "e":[
    {"n":"1","bv":false},
    {"n":"10","v":103
  ]}
{"bn":"/1/1/",
  "e":[
    {"n":"0","v":102},
    {"n":"1","v":50000},
    {"n":"2","v":1},
    {"n":"3","v":60},
    {"n":"5","v":86400},
    {"n":"6","bv":true},
    {"n":"7","sv":"UQS"
  ]}
{"bn":"/1/2/",
  "e":[
    {"n":"0","v":101},
    {"n":"1","v":50000},
    {"n":"2","v":1},
    {"n":"3","v":60},
    {"n":"5","v":86400},
    {"n":"6","bv":true},
    {"n":"7","sv":"UQS"
  ]}
{"bn":"/1/3/",
  "e":[
    {"n":"0","v":103},
    {"n":"1","v":50000},
    {"n":"2","v":1},
    {"n":"3","v":60},
    {"n":"5","v":86400},
    {"n":"6","bv":true},
    {"n":"7","sv":"UQS"
  ]}
{"bn":"/2/0",
  "e":[
    {"n":"0","v":1},
    {"n":"1","v":1},
    {"n":"2/102","v":15},
    {"n":"2/103","v":15},

```

```

        {"n":"2/101","v":15},
        {"n":"3","v":102
    }}
{"bn":"/2/1",
  "e":{
    {"n":"0","v":1},
    {"n":"1","v":2},
    {"n":"2/102","v":15},
    {"n":"2/103","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":102
  }}
{"bn":"/2/2",
  "e":{
    {"n":"0","v":1},
    {"n":"1","v":3},
    {"n":"2/102","v":15},
    {"n":"2/103","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":102
  }}
{"bn":"/2/3",
  "e":{
    {"n":"0","v":3},
    {"n":"1","v":0},
    {"n":"2/102","v":15},
    {"n":"2/103","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":101
  }}
{"bn":"/2/4",
  "e":{
    {"n":"0","v":4},
    {"n":"1","v":0},
    {"n":"2/102","v":15},
    {"n":"2/103","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":102
  }}
{"bn":"/2/5",
  "e":{
    {"n":"0","v":5},
    {"n":"1","v":0},
    {"n":"2/102","v":15},

```

```

        {"n":"2/103","v":15},
        {"n":"2/101","v":15},
        {"n":"3","v":102
    }}
{"bn":"/2/6",
  "e":{
    {"n":"0","v":6},
    {"n":"1","v":0},
    {"n":"2/102","v":15},
    {"n":"2/103","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":102
  }}
{"bn":"/2/7",
  "e":{
    {"n":"0","v":7},
    {"n":"1","v":0},
    {"n":"2/102","v":15},
    {"n":"2/103","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":102
  }}
{"bn":"/2/8",
  "e":{
    {"n":"0","v":9},
    {"n":"1","v":0},
    {"n":"2/102","v":15},
    {"n":"2/103","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":102
  }}
{"bn":"/2/9",
  "e":{
    {"n":"0","v":15},
    {"n":"1","v":0},
    {"n":"2/102","v":15},
    {"n":"2/103","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":102
  }}
{"bn":"/2/10",
  "e":{
    {"n":"0","v":10255},
    {"n":"1","v":0},

```

```

{"n":"2/102","v":15},
{"n":"2/103","v":15},
{"n":"2/101","v":15},
{"n":"3","v":102
}}

```

The following is an example of a bootstrap.ini file containing security, server, and access control objects, specific to OMA 1.1 servers:

```

{"bn":"/0/0/",
  "e":{
    {"n":"0","sv":"coap://2002:c023:9c17:c007:5443:ff62:a1f5:2c:5683"},
    {"n":"1","bv":true},
    {"n":"2","v":3},
    {"n":"10","v":100
    }}
{"bn":"/0/1/",
  "e":{
    {"n":"0","sv":"coap://2002:c023:9c17:c007:5443:ff62:a1f5:2c:5684"},
    {"n":"1","bv":false},
    {"n":"2","v":3},
    {"n":"10","v":101
    }}
{"bn":"/0/2/",
  "e":{
    {"n":"0","sv":"coaps://10.63.100.103:5670"},
    {"n":"1","bv":false},
    {"n":"2","v":0},
    {"n":"10","v":102
    }}
{"bn":"/1/1/",
  "e":{
    {"n":"0","v":101},
    {"n":"1","v":50000},
    {"n":"2","v":1},
    {"n":"3","v":60},
    {"n":"5","v":86400},
    {"n":"6","bv":true},
    {"n":"7","sv":"UN"},
    {"n":"22","sv":"U"},
    {"n":"10","ov":"11:65533"
    }}
{"bn":"/1/2/",
  "e":{
    {"n":"0","v":102},
    {"n":"1","v":50000},

```

```

        {"n":"2","v":1},
        {"n":"3","v":60},
        {"n":"5","v":86400},
        {"n":"6","bv":true},
        {"n":"7","sv":"UN"},
        {"n":"22","sv":"U"},
        {"n":"10","ov":"11:65534"}
    ]}]
{"bn":"/2/0",
  "e":[
    {"n":"0","v":1},
    {"n":"1","v":1},
    {"n":"2/102","v":15},
    {"n":"2/1000","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":101}
  ]}]
{"bn":"/2/1",
  "e":[
    {"n":"0","v":1},
    {"n":"1","v":2},
    {"n":"2/102","v":15},
    {"n":"2/1000","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":101}
  ]}]
{"bn":"/2/2",
  "e":[
    {"n":"0","v":1},
    {"n":"1","v":3},
    {"n":"2/102","v":15},
    {"n":"2/1000","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":101}
  ]}]
{"bn":"/2/3",
  "e":[
    {"n":"0","v":3},
    {"n":"1","v":0},
    {"n":"2/102","v":15},
    {"n":"2/1000","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":101}
  ]}]

```

```
{"bn":"/2/4",  
  "e":{  
    {"n":"0","v":4},  
    {"n":"1","v":0},  
    {"n":"2/102","v":15},  
    {"n":"2/1000","v":15},  
    {"n":"2/101","v":15},  
    {"n":"3","v":101}  
  }}
```

```
{"bn":"/2/5",  
  "e":{  
    {"n":"0","v":5},  
    {"n":"1","v":0},  
    {"n":"2/102","v":15},  
    {"n":"2/1000","v":15},  
    {"n":"2/101","v":15},  
    {"n":"3","v":101}  
  }}
```

```
{"bn":"/2/6",  
  "e":{  
    {"n":"0","v":6},  
    {"n":"1","v":0},  
    {"n":"2/102","v":15},  
    {"n":"2/1000","v":15},  
    {"n":"2/101","v":15},  
    {"n":"3","v":101}  
  }}
```

```
{"bn":"/2/7",  
  "e":{  
    {"n":"0","v":7},  
    {"n":"1","v":0},  
    {"n":"2/102","v":15},  
    {"n":"2/1000","v":15},  
    {"n":"2/101","v":15},  
    {"n":"3","v":101}  
  }}
```

```
{"bn":"/2/8",  
  "e":{  
    {"n":"0","v":9},  
    {"n":"1","v":0},  
    {"n":"2/102","v":15},  
    {"n":"2/1000","v":15},  
    {"n":"2/101","v":15},  
    {"n":"3","v":101}
```

```

    }}
{"bn":"/2/9",
  "e":{
    {"n":"0","v":15},
    {"n":"1","v":0},
    {"n":"2/102","v":15},
    {"n":"2/1000","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":101
  }}
{"bn":"/2/10",
  "e":{
    {"n":"0","v":10255},
    {"n":"1","v":0},
    {"n":"2/102","v":15},
    {"n":"2/1000","v":15},
    {"n":"2/101","v":15},
    {"n":"3","v":101
  }}
{"bn":"/11/65533/",
  "e":{
    {"n":"0","sv":"QCOM_PROFILE_1"},
    {"n":"1","sv":"vzwadmin"},
    {"n":"2","bv":false},
    {"n":"4","v":3},
    {"n":"24","v":3
  }}
{"bn":"/11/65534/",
  "e":{
    {"n":"0","sv":"QCOM_PROFILE_2"},
    {"n":"1","sv":"vzwinternet"},
    {"n":"2","bv":false},
    {"n":"4","v":3},
    {"n":"24","v":1
  }}

```

5.2 lwm2m_cfg file

lwm2m_cfg is an LwM2M client configuration file that contains the following configuration information:

Option name	Default value	Description
APN	-	Default APN to be used if carrier_apn_cfg is not

		available.
RETRY_TIMEOUT	30	Initial time period (in seconds) to retry data-call, if there is a data call failure.
RETRY_EXPONENT_VAL	2	Value by which the timeout for data-call retry must be increased exponentially.
MAX_RETRY_TIMEOUT	640	Maximum time period (in seconds) for the data-call retry.
MAX_NO_RETRIES	5	Maximum number of data call attempts, if there is a data-call failure.
ACK_TIMEOUT	60	Sleep-ACK timeout value (in seconds). If there is no activity during this period, then DUT goes to sleep.
REG_RETRY_TIMEOUT	60	Initial time period (in seconds) to retry registration, if there is a registration failure.
REG_RETRY_EXPONENT	2	Value by which the timeout for registration retry must be increased exponentially.
REG_RETRY_MAXTIME OUT	480	Maximum time period in seconds for registration retry, if there is a registration failure.
REG_UPDATE_ON_REC ONNECT	0	Determines whether a registration update must be sent on reconnect, such as during reboot with persistence-enabled or when IP address changes: <input type="checkbox"/> When set to 1, registration update is sent on reconnect. When set to 0, registration update is not sent on reconnect.
ROAMING_FEAT	1	Determines LwM2M functionality enablement in roaming conditions. <input type="checkbox"/> When set to 1, the LwM2M functionality is disabled in roaming. When set to 0, the LwM2M functionality is enabled in roaming.
PER_REGSTATUS_FEAT	0	Determines the registration persistence across reboot in the LwM2M client. <input type="checkbox"/> When set to 1, registration persistence is enabled across reboot in the LwM2M client. <input type="checkbox"/> When set to 0, registration persistence is disabled across reboot in LwM2M client.
PER_BOOTSTRAP_FEAT	1	Determines the bootstrap persistence across reboot in the LwM2M client. <input type="checkbox"/> When set to 1, bootstrap persistence is enabled across reboot in the LwM2M client. <input type="checkbox"/> When set to 0, bootstrap persistence is disabled across reboot in the LwM2M client.
BATTERY_LEVEL_THRES HOLD	20	Battery level less than the threshold mentioned in this

		configuration value is considered as low battery by the client.
CARRIER_TYPE	0	Enables the carrier-specific functionality in the client: <input type="checkbox"/> 0 - Default <input type="checkbox"/> 1 - Verizon
REBOOTSTRAP_REG_FAILS_MAX_NO_ATTEMPTS	0	Maximum number of re-attempts on bootstrap failure
REG_EP_NAME	4	Endpoint name to be used during registration. OEMs must refer to Section 6.3.1 Endpoint client name of Lightweight Machine to Machine Technical Specification for more details. The following values are supported: <input type="checkbox"/> 4 - IMEI URN <input type="checkbox"/> 7 - IMEI MSISDN URN
BOOTSTRAP_EP_NAME	7	Endpoint name to be used during bootstrap. OEMs must refer to Section 6.3.1 Endpoint client name of Lightweight Machine to Machine Technical Specification for more details. The following values are supported: <input type="checkbox"/> 4 - IMEI URN <input type="checkbox"/> 7 - IMEI MSISDN URN
BOOT_UP_SLEEP_TIME	5	Sleep time before the LwM2M client operation starts.
GPS_MIN_INTERVAL	3000	The interval (in milliseconds) after which the GPS information is fetched periodically.
GPS_MIN_DISTANCE	1	The change in distance (in meters) after which the GPS information is fetched.
MAX_NO_OF_FACTORY_RESET_PER_HOUR_BY_SMS	1	Number of factory-reset operations per hour allowed by SMS transport.
MAX_NO_OF_REG_UPDATE_PER_HOUR_BY_SMS	1	Number of registration update operations per hour allowed by SMS transport.
IP_FAMILY	V4	Supported values include v4, v6, and v4v6. This is the default IP family chosen to connect to the server that does not have the IP family mentioned in carrier apn_config.
WAIT_TIME_TO_TRIGGER_NEXT_REG_CYCLE	86400	Hold off time (in seconds) to trigger the next registration on failure of all the registration attempts.
SESSION_TIMEOUT	60	Inactivity period (in seconds) after which resumption should be triggered for the uplink operation. It is recommended that OEMs configure the value to be the same as network address translation

		(NAT) timeout.
ENABLE_LOCATION	1	Determines whether to enable/disable location object. <input type="checkbox"/> 0 - Disable <input type="checkbox"/> 1 - Enable
ENABLE_LOCATION_AFTERTER_LTE	0	Determines whether to initialize the location module immediately or to wait for LTE services. If the value is configured as 1, it waits for LTE services to initialize the location module.
ENABLE_DTLS_CLOSE_NOTIFY	0	Determines whether SSL must send Close-Notify message to network when connection shutdown occurs, so that the session does not resume.
ENABLE_PSM	1	Determines whether LwM2M is aware of PSM. <input type="checkbox"/> 0 - Disable <input type="checkbox"/> 1 - Enable
AWAKE_AFTER_PMIN	0	Determines whether the device must go to PSM for every Pmin cycle. <input type="checkbox"/> 0 - By default, the device wakes from Pmin till Pmax. <input type="checkbox"/> 1 - DUT goes to PSM for every Pmin cycle till Pmax limit.
STARTUP_MODE	0	Determines whether the LwM2M initialization is through OEM application. <input type="checkbox"/> 0 - By default, LwM2M initialization is preloaded. <input type="checkbox"/> 1 - LwM2M initialization through application.
MAX_BOOTSTRAP_WAIT_TIME	0	This is the hold of time in seconds where bootstrap procedure is kept on hold, meanwhile extended applications can register objects.
ROOTCA_SUPPORT_MODE	0	Determines whether to use RootCA or domain issue certificate to validate certificate from peer (bootstrap server and DM server) <input type="checkbox"/> 0 - To use domain issue certificate <input type="checkbox"/> 3 - To use RootCA
DEFAULT_PSM_DELTA	60	Describes the default value.
NOTIFICATIONS_STORE	5	Determines how many notifications can LwM2M store for each observe request.
VERSION	1.0	Specifies the OMA specification on which LwM2M client is running.
BINDINGS	Ip_nonip	Supported values are ip, nonip and ip_nonip. This is the binding type to be chosen to specify whether LwM2M client can communicate over ip or non-ip.
LIFETIME_DELTA	5	LwM2M client defines the interval for a registration update as follows:
TRANSPORT_GUARD	30	

		<p>$\Delta = \text{lifetime} * (\text{LifetimeDeltaPercentage}/100)$, that is, Δ is a percentage of the lifetime.</p> <p>LifetimeDeltaPercentage is a configuration parameter with a suggested default value of 5. <input type="checkbox"/></p> <p>Wakeup interval has a range: $[T_{\text{exp}} - \Delta, T_{\text{exp}} - \text{TransportGuardInterval}]$, where T_{exp} is the time at lifetime expiration, and TransportGuardInterval is a configuration parameter with a suggested default value of 30 sec.</p>
PMIN_DELTA	100	<p>PSM optimizations related to information reporting interface are as follows:</p> <p>Wakeup for Pmin:</p> <p>After last report (at time T1), device can wake up in the interval $[T1 + \text{pmin}, T1 + \text{Pmin} + \Delta]$</p> <ul style="list-style-type: none"> - If epmin and epmax are defined, $\Delta = \text{epmax} - \text{epmin}$ - Otherwise, <p>$\Delta = \text{pmin} * (\text{PminDeltaPercentage}/100)$, where PminDeltaPercentage is a configuration parameter with a suggested default value of 100.</p>
PMAX_DELTA	10	<p>Wakeup for Pmax:</p> <p><input type="checkbox"/> LwM2M client must send a report before Pmax expiry (T2) in the interval $[T2 - \Delta, T2]$</p> <ul style="list-style-type: none"> - If epmin and epmax are defined, $\Delta = \text{epmax} - \text{epmin}$ - Otherwise, $\Delta = \text{pmax} * (\text{PmaxDeltaPercentage}/100)$, where PmaxDeltaPercentage is a configuration parameter with a suggested default value of 10.

The following example provides an overview of the lwm2m_cfg file with the options explained in the table above:

```

{
APN=carrier_apn;
RETRY_TIMEOUT=30;
RETRY_EXPONENT_VAL=2;
MAX_RETRY_TIMEOUT=640;
MAX_NO_RETRIES=5;
ACK_TIMEOUT=30;
REG_RETRY_TIMEOUT=60;
REG_RETRY_EXPONENT=2;
REG_RETRY_MAXTIMEOUT=480;
ROAMING_FEAT=1;
PER_REGSTATUS_FEAT=0;
BATTERY_LEVEL_THRESHOLD=20;
REBOOTSTRAP_REG_FAILS_MAX_NO_ATTEMPTS=5;

```

```

CARRIER_TYPE=0;
REG_EP_NAME=4;
BOOTSTRAP_EP_NAME=7;
BOOT_UP_SLEEP_TIME=10;
MAX_NO_OF_FACTORY_RESET_PER_HOUR_BY_SMS=1;
MAX_NO_OF_REG_UPDATE_PER_HOUR_BY_SMS=1;
IP_FAMILY=V4;
WAIT_TIME_TO_TRIGGER_NEXT_REG_CYCLE=86400;
SESSION_TIMEOUT=60;
NOTIFICATIONS_STORE=5;
VERSION=1.0;
ENABLE_PSM=1;
}

```

5.3 carrier_apn_cfg file

The carrier_apn_cfg configuration file contains details about the carrier-specific APN used for each server are as follows:

Option name	Default name	Description
APN_NAME	-	APN to be used for the server with SHORT_SERVER_ID1
APN_CLASS	2	APN class associated with the APN
SHORT_SERVER_ID1	102	Short server ID associated with the APN
BS_IF_REG_FAILS	0	If set to 0, the LwM2M client does not perform bootstrapping on registration failure for this SSID. If set to 1, the LwM2M client performs bootstrapping on registration failure for this SSID
IP_FAMILY	V4	Supported values v4, v6, and v4v6. This is the IP family chosen to connect to the server
BINDINGS	ip_nonip	Supported values are ip, nonip and ip_nonip. This is the binding type to be chosen to specify whether LwM2M client can communicate over ip or non-ip

5.3.1 Add a new carrier APN configuration

Add a semicolon after the existing APN configuration. In the next line, add a new APN configuration, as follows:

```

APN_NAME=carrier_apn1
APN_CLASS=2
BS_IF_REG_FAILS=1
SHORT_SERVER_ID1=102
IP_FAMILY=V4

```

```
BINDINGS=ip_nonip
;
APN_NAME=carrier_apn2
APN_CLASS=3
BS_IF_REG_FAILS=0
SHORT_SERVER_ID1=1000
IP_FAMILY=V6
BINDINGS=ip
;
```

5.4 SSL

Validate the following checkpoints when using security mode:

PSK files corresponding to bootstrap server and diag server must be present in /datatx/ssl.

File should be in the following format:

ssid_server.psk (for example, 100_server.psk for Bootstrap Server)

Resource 0/x/2 decides the security mode. See Appendix E.1 of OMA specification for possible values.

For Verizon, security mode should be enabled always for bootstrap and diag.

5.4.1 Procedure to generate PSK

- (1) Generate random key using PSKTool. The PSK tool path is as follows:
<https://fossies.org/windows/misc/gnutls-3.5.8-w64.zip/>
- (2) Use the following command to generate the .psk file. This command generates "101_server.psk" in the same directory.
psktool.exe -u iot_app_101 -p 101_server.psk -s 32
- (3) Check
https://www.gnutls.org/manual/html_node/psktool-Invocation.html#psktool-invocation for tool usage.
- (4) Copy the < short_server_id >_server.psk file generated in the "datatx/ssl/" directory in alternate file system.

Contact

SIMCom Wireless Solutions Co.,Ltd

Address: Building B, 6F, No.633 Jinzhong Road, Changning District, Shanghai P.R.China 200335

Tel: +86 21 3157 5126

Email: support@simcom.com

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