



LTE MBMS Gateway

Version: 2025-06-13

Table of Contents

1	Introduction	1
2	Features	2
3	Requirements	3
3.1	Hardware requirements	3
3.2	Software requirements	3
4	Installation	4
4.1	Linux setup	4
4.1.1	Packages	4
4.1.2	OpenSSL	4
4.2	License key installation	4
4.3	Initial testing	5
5	Configuration reference	6
5.1	Configuration file syntax	6
5.2	Properties	6
6	Remote API	13
6.1	Messages	13
6.2	Startup	14
6.3	Errors	15
6.4	Sample nodejs program	15
6.5	Common messages	15
6.6	LTE messages	19
7	Log file format	20
7.1	M2AP and GTP-U layers	20
8	Change history	21
8.1	Version 2024-09-13	21
8.2	Version 2024-06-14	21
8.3	Version 2023-12-15	21
8.4	Version 2023-06-10	21
8.5	Version 2023-03-17	21
8.6	Version 2022-12-16	21
8.7	Version 2022-06-17	21
8.8	Version 2021-12-17	21
8.9	Version 2021-09-17	21
9	License	22
	Abbreviations	23

1 Introduction

LTEMBMSGW is a LTE MBMS Gateway. It can easily be used with the Amarisoft LTE eNodeB to build an LTE MBMS test system.

2 Features

- User configurable list of service and multicast components.
- M2AP protocol support.
- Generate one stream per service over the M1 interface (GTP + SYNC protocols).
- Built-in test RTP packet generator.
- Remote API using WebSocket.

3 Requirements

3.1 Hardware requirements

- LTEBMSGW can run on the same PC as the Amarisoft eNodeB if a simple and compact solution is needed. Otherwise, any reasonably recent PC with at least one Gigabit Ethernet port is acceptable.

3.2 Software requirements

- A 64 bit Linux distribution. Fedora 39 is the officially supported distribution. The following distributions are known as compatible:
 - Fedora 22 to 39
 - Cent OS 7
 - Ubuntu 14 to 22

Your system requires at least GLIBC 2.17.

4 Installation

We assume that the Fedora distribution is running and that the network access thru the Gigabit Ethernet port is correctly configured.

LTEMBMSGW can be run directly from the directory when it was unpacked. No need for explicit installation.

4.1 Linux setup

4.1.1 Packages

LTEMBMSGW uses the SCTP protocol for which the necessary packages are not usually installed. In order to install them, do as root user:

- Fedora

```
dnf install lksctp-tools kernel-modules-extra
```

- Ubuntu

```
sudo apt-get install lksctp-tools linux-image-extra-3.13.0-24-generic
```

Note that linux-image-extra package name may differ depending on your kernel version.

To verify that SCTP kernel module is running, do as root user:

```
checksgtp
```

If it reports that the protocol is not supported,

- check if you have a `/etc/modprobe.d/sctp-blacklist.conf` file
- edit it to comment the 'blacklist sctp' line

Then reboot the PC in case the Linux kernel was upgraded too.

4.1.2 OpenSSL

LTEMBMSGW has been compiled against openssl version 1.1.1w.

If your system does not have compatible version installed you may have this error message at startup:

```
error while loading shared libraries: libssl.so.1.1: cannot open shared object file: No such file or directory
```

To overcome this problem, you may:

- Copy `libssl.so.1.1` and `libcrypto.so.1.1` from `libs` subdirectory of your release tarball. If you have installed software with automatic install script, this should have been done automatically.
- Compile and install proper openssl version yourself

In case of persisting issue, raise a ticket from our support site at <https://support.amarisoft.com/> with the information provided by below commands executed in LTEMBMSGW directory:

```
uname -a
ls -l
ldd ./ltembmsgw
openssl version
```

4.2 License key installation

LTEMBMSGW needs a LTEMME license key to run. Please refer to the `ltemme` documentation.

4.3 Initial testing

- Start the eNodeB with the example MBMS configuration:
`./lteenb config/enb-mbms.cfg`
- Start the program as root with the default configuration. This configuration contains several MBMS services. For each service, RTP dummy streams are generated:
`./ltembmsgw config/mbmsgw.cfg`
- Verify that the MBMS GTP data is correctly received by the eNodeB with the `mbms` command in the eNodeB monitor. You should see a non zero bitrate for each service and zero packet error.
- Verify that you can receive the corresponding services on your LTE device. The exact setup depend on your device.

When this basic test work, you can customize the eNodeB and MBMS Gateway configuration to use your own generated multicast services.

5 Configuration reference

5.1 Configuration file syntax

The main configuration file uses a syntax very similar to the Javascript Object Notation (JSON) with an extension to support complex numbers and a few mathematical operations. The supported types are:

- Numbers (64 bit floating point). Notation: 13.4
- Complex numbers. Notation: 1.2+3*I
- Strings. Notation: "string"
- Booleans. Notation: true or false.
- Objects. Notation: { field1: value1, field2: value2, }
- Arrays. Notation: [value1, value2,]

The basic operations +, -, * and / are supported with numbers and complex numbers.

The numbers 0 and 1 are accepted as synonyms for the boolean values false and true.

5.2 Properties

log_filename

String. Set the log filename. If no leading /, it is relative to the configuration file path. See [Log file format], page 19.

log_options

String. Set the logging options as a comma separated list of assignments.

- *layer.level=verbosity*. For each layer, the log verbosity can be set to **none**, **error**, **info** or **debug**. In debug level, the content of the transmitted data is logged.
- *layer.max_size=n*. When dumping data content, at most **n** bytes are shown in hexa. For ASN.1, NAS or Diameter content, show the full content of the message if **n > 0**.
- *layer.payload=[0|1]*. Dump ASN.1, NAS, SGsAP or Diameter payload in hexadecimal.
- *layer.key=[0|1]*. Dump security keys (NAS and RRC layers).
- *layer.crypto=[0|1]*. Dump plain and ciphered data (NAS and PCDP layers).
- *time=[sec|short|full]*. Display the time as seconds, time only or full date and time (default = time only).
- *time.us=[0|1]*. Dump time with microseconds precision.
- *file=cut*. Close current file log and open a new one.
- *file.rotate=now*. Move and rename to the same directory or to the directory pointed by **file.path** and open a new log file (Headers are kept).
- *file.rotate=size*. Every time log file size reaches *size* bytes, move and rename to the same directory or to the directory pointed by **file.path**, and open a new log file (Headers are kept).
Size is an integer and can be followed by K, M or G.
- *file.rotate=#count*. Everytime number of logs in log file reaches *count*, move and rename to the same directory or to the directory pointed by **file.path**, and open a new log file (Headers are kept).
Size is an integer and can be followed by K, M or G.

- `file.path=path`. When log rotation is enabled (`file.rotate` set), rename and move current log to this path instead of initial log path.
- `append=[0|1]`. (default=0). If 0, truncate the log file when opening it. Otherwise, append to it.

Available layers are: `gtpu`, `m2ap`

<code>log_sync</code>	Optional boolean (default = false). If true, logs will be synchronously dumped to file. Warning, this may lead to performances decrease.
<code>com_addr</code>	Optional string. Address of the WebSocket server remote API. See [Remote API], page 12. If set, the WebSocket server for remote API will be enabled and bound to this address. Default port is 9004. Setting IP address to <code>::</code> will make remote API reachable through all network interfaces.
<code>com_name</code>	Optional string. Sets server name. MBMSGW by default
<code>com_ssl_certificate</code>	Optional string. If set, forces SSL for WebSockets. Defines CA certificate filename.
<code>com_ssl_key</code>	Optional string. Mandatory if <code>com_ssl_certificate</code> is set. Defines CA private key filename.
<code>com_ssl_peer_verify</code>	Optional boolean (default is false). If <code>true</code> , server will check client certificate.
<code>com_ssl_ca</code>	Optional string. Set CA certificate. In case of peer verification with self signed certificate, you should use the client certificate.
<code>com_log_lock</code>	Optional boolean (default is false). If <code>true</code> , logs configuration can't be changed via <code>config_set</code> remote API.
<code>com_log_us</code>	Optional boolean (default is false). If <code>true</code> , logs sent by <code>log_get</code> remote API response will have a <code>timestamp_us</code> parameters instead of <code>timestamp</code>
<code>com_auth</code>	Optional object. If set, remote API access will require authentication. Authentication mechanism is describe in [Remote API Startup], page 14, section.
<code>passfile</code>	Optional string. Defines filename where password is stored (plaintext). If not set, <code>password</code> must be set
<code>password</code>	Optional string. Defines password. If not set, <code>passfile</code> must be set.
<code>unsecure</code>	Optional boolean (default false). If set, allow password to be sent plaintext. NB: you should set it to true if you access it from a Web Browser (Ex: Amarisoft GUI) without SSL (https) as your Web Browser may prevent secure access to work.

com_log_count

Optional number (Default = 8192). Defines number of logs to keep in memory before dropping them.
Must be between 4096 and 2097152).

sim_events

Array of object. Each element defines a remote API request ([Remote API], page 12) except that **message** field is replaced by **event**.

sim_events_loop_count

If set, will define **loop_count** for each event of **sim_events**, See [loop-count], page 13.

sim_events_loop_delay

If set, will define **loop_delay** for each event of **sim_events**, See [loop-delay], page 13.

license_server

Configuration of the Amarisoft license server to use.
Object with following properties:

server_addr

String. IP address of the license server.

name Optional string. Text to be displayed inside server monitor or remote API.

tag Optional string. If set, server will only allow license with same tag.

Example:

```
license_server: {
  server_addr: "192.168.0.20",
  name: "My license"
}
```

gtp_bind_addr

String. Set source IP address (and an optional port) of the GTP-U packets. The default value is "0.0.0.0:2152".

Syntax:

- "1.2.3.4" (use default port)
- "1.2.3.4:5678" (use explicit port)
- "2001:db8:0:85a3::ac1f:8001" (IPv6 address and default port)
- "[2001:db8:0:85a3::ac1f:8001]:5678" (IPv6 address and explicit port)

m2ap_bind_addr

Optional string. IP address and optional port on which the M2AP SCTP connection is bound. The default port is 36443.

mce_id Integer. Range: 0 to 65535. Global MCE Identifier used in M2 signaling.

enb_time_offset

Optional integer (default = 0). Offset in ms applied to the MBMSGW International Atomic Time (TAI) so as to generate a time that should match the eNB RF time. The current value can be retrieved by typing the **time** monitor command in eNB or MBMSGW prompt. This is used to synchronize the two components so as to have meaningful timestamps in the SYNC packets (indicating the start of the MCH Scheduling Periods).

Note: the MBMSGW derives the TAI from the UTC OS clock and the **right/UTC** OS time zone.

time_offset

Integer. Default time offset in ms added to all the SYNC timestamps. Can be overridden by the **time_offset** property of each service. It is recommended to set it to at least 2 MCH Scheduling Period to avoid having the eNB dropping SYNC packets due to a timestamp equal to the current MCH Scheduling Period.

Note: the MBMS Gateway uses the system real time clock as clock source. If synchronous transmission is needed, it should be synchronized to the eNodeB RF time.

services

Array of objects. Contain the definition of each service.

Property of each service:

tmgi Object. Service identifier (only used for error reporting). Contain the following fields:

plmn String (5 or 6 digits). PLMN identity of the service.

service_id
Integer. 24 bit service identity.

service_area_id
Integer. Range: 0 to 65535. MBMS service area identifier for this service.

session_id
Optional integer. Range: 0 to 255. MBMS session identifier for this service.

gtp_addr String. IP address (and optional port) to which the GTP packets are sent. It is normally a multicast address. Several services can share the same IP address if they have a different TEID.

gtp_teid 32 bit integer. GTP TEID on which the GTP packets are sent.

autostart
Optional boolean (default = true). Indicates if service is automatically started when the eNB connects to the MBMS Gateway or if it should be manually launched with the **service_start** command.

scheduling_period
Range: from 4 to 1024. Must be a power of two. Duration of the scheduling period in 10 ms units. Must match the corresponding MCH scheduling period configured in the eNodeB.

time_offset
Optional integer. Time offset in ms added to the SYNC timestamps. If not provided, the default time offset is used.

forward_mode
Optional boolean (default = false). If set, gateway won't add sync headers and only forward packet to the eNB.

tos Optional integer (default = 0). IPv4 header TOS field (6 bits DSCP + 2 bits ECN).

traffic_class	Optional integer (default = 0). IPv6 header traffic class field (6 bits DSCP + 2 bits ECN).																
ttl	Optional integer (default = 64). IP header TTL field.																
components	<p>Array of object. A service contains several components. Each component is the data coming from a given IP address (usually multicast).</p> <p>Component properties:</p> <tr> <td>ip_addr</td><td>String. Destination IPv4/v6 address and port for the component.</td></tr> <tr> <td>if_addr</td><td>Optional string (default = "0.0.0.0"). IP address of the network interface for the multicast join.</td></tr> <tr> <td>sim</td><td>Optional boolean (default = false). If true, RTP packets coming from ip_addr are generated using a RTP payload of rtp_payload_len bytes and a bitrate of bitrate.</td></tr> <tr> <td>rtp_payload_len</td><td>Optional integer. Only meaningful if sim = true. RTP payload length in bytes (default = 1460 for IPv4 of 1440 for IPv6).</td></tr> <tr> <td>bitrate</td><td>Optional integer. Only meaningful if sim = true. Bitrate in bit/s of the generated RTP stream. The bitrate includes the size of the IP, UDP and RTP headers.</td></tr>	ip_addr	String. Destination IPv4/v6 address and port for the component.	if_addr	Optional string (default = "0.0.0.0"). IP address of the network interface for the multicast join.	sim	Optional boolean (default = false). If true, RTP packets coming from ip_addr are generated using a RTP payload of rtp_payload_len bytes and a bitrate of bitrate .	rtp_payload_len	Optional integer. Only meaningful if sim = true. RTP payload length in bytes (default = 1460 for IPv4 of 1440 for IPv6).	bitrate	Optional integer. Only meaningful if sim = true. Bitrate in bit/s of the generated RTP stream. The bitrate includes the size of the IP, UDP and RTP headers.						
ip_addr	String. Destination IPv4/v6 address and port for the component.																
if_addr	Optional string (default = "0.0.0.0"). IP address of the network interface for the multicast join.																
sim	Optional boolean (default = false). If true, RTP packets coming from ip_addr are generated using a RTP payload of rtp_payload_len bytes and a bitrate of bitrate .																
rtp_payload_len	Optional integer. Only meaningful if sim = true. RTP payload length in bytes (default = 1460 for IPv4 of 1440 for IPv6).																
bitrate	Optional integer. Only meaningful if sim = true. Bitrate in bit/s of the generated RTP stream. The bitrate includes the size of the IP, UDP and RTP headers.																
area_info_list	<p>Array of object. Each object defines the parameters of one MBSFN area:</p> <tr> <td>area_id</td><td>Range: 0 to 255. Area identifier.</td></tr> <tr> <td>non_mbsfn_region_length</td><td>Enumeration: 1, 2. Number of CCH symbols. For 1.4 MHz downlink, only 2 is allowed.</td></tr> <tr> <td>mcch_config</td><td> <p>Object. MCCH configuration:</p> <tr> <td>mcch_repetition_period</td><td>Range: 32 to 256, power of two. MCCH repetition period (in 10 ms frames).</td></tr> <tr> <td>mcch_offset</td><td>Range: 0 to 10. MCCH offset.</td></tr> <tr> <td>mcch_modification_period</td><td>Enumeration: 512, 1024. (in 10 ms frames).</td></tr> <tr> <td>mcch_sf_alloc</td><td>Bit string. Length = 6 (1 frame). In FDD, the bits correspond to subframes 1, 2, 3, 6, 7, 8. In TDD, the bits correspond to subframes 3, 4, 7, 8, 9.</td></tr> <tr> <td>signalling_mcs</td><td>Enumeration: 2, 7, 13, 19. MCS for MCCH and MCHSI transmission. MCCH and MCHSI are critical to decode the MBMS data (MTCH), so their MCS should be lower than the one of the data.</td></tr> </td></tr>	area_id	Range: 0 to 255. Area identifier.	non_mbsfn_region_length	Enumeration: 1, 2. Number of CCH symbols. For 1.4 MHz downlink, only 2 is allowed.	mcch_config	<p>Object. MCCH configuration:</p> <tr> <td>mcch_repetition_period</td><td>Range: 32 to 256, power of two. MCCH repetition period (in 10 ms frames).</td></tr> <tr> <td>mcch_offset</td><td>Range: 0 to 10. MCCH offset.</td></tr> <tr> <td>mcch_modification_period</td><td>Enumeration: 512, 1024. (in 10 ms frames).</td></tr> <tr> <td>mcch_sf_alloc</td><td>Bit string. Length = 6 (1 frame). In FDD, the bits correspond to subframes 1, 2, 3, 6, 7, 8. In TDD, the bits correspond to subframes 3, 4, 7, 8, 9.</td></tr> <tr> <td>signalling_mcs</td><td>Enumeration: 2, 7, 13, 19. MCS for MCCH and MCHSI transmission. MCCH and MCHSI are critical to decode the MBMS data (MTCH), so their MCS should be lower than the one of the data.</td></tr>	mcch_repetition_period	Range: 32 to 256, power of two. MCCH repetition period (in 10 ms frames).	mcch_offset	Range: 0 to 10. MCCH offset.	mcch_modification_period	Enumeration: 512, 1024. (in 10 ms frames).	mcch_sf_alloc	Bit string. Length = 6 (1 frame). In FDD, the bits correspond to subframes 1, 2, 3, 6, 7, 8. In TDD, the bits correspond to subframes 3, 4, 7, 8, 9.	signalling_mcs	Enumeration: 2, 7, 13, 19. MCS for MCCH and MCHSI transmission. MCCH and MCHSI are critical to decode the MBMS data (MTCH), so their MCS should be lower than the one of the data.
area_id	Range: 0 to 255. Area identifier.																
non_mbsfn_region_length	Enumeration: 1, 2. Number of CCH symbols. For 1.4 MHz downlink, only 2 is allowed.																
mcch_config	<p>Object. MCCH configuration:</p> <tr> <td>mcch_repetition_period</td><td>Range: 32 to 256, power of two. MCCH repetition period (in 10 ms frames).</td></tr> <tr> <td>mcch_offset</td><td>Range: 0 to 10. MCCH offset.</td></tr> <tr> <td>mcch_modification_period</td><td>Enumeration: 512, 1024. (in 10 ms frames).</td></tr> <tr> <td>mcch_sf_alloc</td><td>Bit string. Length = 6 (1 frame). In FDD, the bits correspond to subframes 1, 2, 3, 6, 7, 8. In TDD, the bits correspond to subframes 3, 4, 7, 8, 9.</td></tr> <tr> <td>signalling_mcs</td><td>Enumeration: 2, 7, 13, 19. MCS for MCCH and MCHSI transmission. MCCH and MCHSI are critical to decode the MBMS data (MTCH), so their MCS should be lower than the one of the data.</td></tr>	mcch_repetition_period	Range: 32 to 256, power of two. MCCH repetition period (in 10 ms frames).	mcch_offset	Range: 0 to 10. MCCH offset.	mcch_modification_period	Enumeration: 512, 1024. (in 10 ms frames).	mcch_sf_alloc	Bit string. Length = 6 (1 frame). In FDD, the bits correspond to subframes 1, 2, 3, 6, 7, 8. In TDD, the bits correspond to subframes 3, 4, 7, 8, 9.	signalling_mcs	Enumeration: 2, 7, 13, 19. MCS for MCCH and MCHSI transmission. MCCH and MCHSI are critical to decode the MBMS data (MTCH), so their MCS should be lower than the one of the data.						
mcch_repetition_period	Range: 32 to 256, power of two. MCCH repetition period (in 10 ms frames).																
mcch_offset	Range: 0 to 10. MCCH offset.																
mcch_modification_period	Enumeration: 512, 1024. (in 10 ms frames).																
mcch_sf_alloc	Bit string. Length = 6 (1 frame). In FDD, the bits correspond to subframes 1, 2, 3, 6, 7, 8. In TDD, the bits correspond to subframes 3, 4, 7, 8, 9.																
signalling_mcs	Enumeration: 2, 7, 13, 19. MCS for MCCH and MCHSI transmission. MCCH and MCHSI are critical to decode the MBMS data (MTCH), so their MCS should be lower than the one of the data.																

mbsfn_area_configuration

Object. MBSFN area configuration. Most of the content of this object is transmitted in the MCCH.

common_sf_alloc

Array of object. Defines the subframes dedicated to this MBSFN area. Each object has the following fields:

radio_frame_allocation_period

Range: 1 to 32, power of two. Allocation period (in 10 ms frames).

radio_frame_allocation_offset

Range: 0 to 7. offset in the allocation period (in 10 ms frames).

subframe_allocation

Bit string. Length = 6 (1 frame) or 24 (4 frames). In FDD, the bits correspond to subframes 1, 2, 3, 6, 7, 8. In TDD, the bits correspond to subframes 3, 4, 7, 8, 9.

common_sf_alloc_period

Range: 4 to 256, power of two. Common subframe allocation period (in 10 ms frames). The PMCH are allocated consecutively during this period.

pmch_info_list

Array of objects. List of PMCH. Each PMCH has the following properties:

pmch_config

Object. PMCH physical parameters.

sf_alloc_count

Integer ≥ 1 . Number of subframes allocated to this PMCH per common period.

data_mcs Range: 0 to 28. MCS used for the MBMS data (MTCH).

data_mcs2

Optional integer. Range: 0 to 27. If provided, **data_mcs** is ignored and an alternate MCS table is used to allow 256QAM MBMS. Note: 256QAM MBMS is an optional release 12 feature, so not all UEs can receive a PMCH using **data_mcs2**.

mch_scheduling_period

Range: 4 to 1024, power of two. Scheduling period (in 10 ms frames) for the MCH. MCHSI is transmitted with this periodicity. Must be \geq **common_sf_alloc_period**. For

the first PMCH, must be \leq `mcch_repetition_period`. Note: only release 12 UEs support the value 4, so the effective range to support all UEs is 8 to 1024.

`mbms_session_info_list`

Array of objects. List of sessions in this PMCH. Each session has the following properties:

`tmgi` Object. Temporary Mobile Group Identity.

`plmn` String (5 or 6 digits).
PLMN identity.

`service_id`
24 bit integer. Service identity.

`logical_channel_identity`

Range: 0 to 28. MAC logical channel identity. Must be different for each session in the PMCH. 0 is reserved for the MCCH in the first PMCH.

6 Remote API

You can access LTEMBMSGW via a remote API.

Protocol used is WebSocket as defined in RFC 6455 (<https://tools.ietf.org/html/rfc6455>).

Note that Origin header is mandatory for the server to accept connections. This behavior is determined by the use of `noopoll` library. Any value will be accepted.

To learn how to use it, you can refer to our the following tutorial (<https://tech-academy.amarisoft.com/RemoteAPI.html>).

6.1 Messages

Messages exchanged between client and LTEMBMSGW server are in strict JSON format.

Each message is represented by an object. Multiple message can be sent to server using an array of message objects.

Time and delay values are floating number in seconds.

There are 3 types of messages:

- Request

Message sent by client.

Common definition:

message String. Represent type of message. This parameter is mandatory and depending on its value, other parameters will apply.

message_id

Optional any type. If set, response sent by the server to this message will have same message_id. This is used to identify response as WebSocket does not provide such a concept.

start_time

Optional float. Represent the delay before executing the message. If not set, the message is executed when received.

absolute_time

Optional boolean (default = false). If set, **start_time** is interpreted as absolute.

You can get current clock of system using **time** member of any response.

standalone

Optional boolean (default = false). If set, message will survive WebSocket disconnection, else, if socket is disconnected before end of processing, the message will be cancelled.

loop_count

Optional integer (default = 0, max = 1000000). If set, message will be repeated **loop_count** time(s) after **loop_delay** (From message beginning of event). Response will have a **loop_index** to indicate iteration number.

loop_delay

Optional number (min = 0.1, max = 86400). Delay in seconds to repeat message from its **start_time**. Mandatory when **loop_count** is set > 0.

- **Response**

Message sent by server after any request message as been processed.
Common definition:

message String. Same as request.

message_id

Optional any type. Same as in request.

time Number representing time in seconds since start of the process.
Usefull to send command with absolute time.

utc Number representing UTC seconds.

- **Events**

Message sent by server on its own initiative.
Common definition:

message String. Event name.

time Number representing time in seconds.
Usefull to send command with absolute time.

6.2 Startup

When WebSocket connections is setup, LTEMPBMSGW will send a first message with name set to **com_name** and type set to **MBMSGW**.

If authentication is not set, message will be **ready**:

```
{
  "message": "ready",
  "type": "MBMSGW",
  "name": <com_name>,
  "version": <software version>,
  "product": <Amarisoft product name (optional)>
}
```

If authentication is set, message will be **authenticate** :

```
{
  "message": "authenticate",
  "type": "MBMSGW",
  "name": <com_name>,
  "challenge": <random challenge>
}
```

To authenticate, the client must answer with a **authenticate** message and a **res** parameter where:

```
res = HMAC-SHA256( "<type>:<password>:<name>", "<challenge>" )
```

res is a string and HMAC-SHA256 refers to the standard algorithm (<https://en.wikipedia.org/wiki/HMAC>)

If the authentication succeeds, the response will have a **ready** field set to **true**.

```
{
  "message": "authenticate",
```



```

    "message_id": <message id>,
    "ready": true
}

```

If authentication fails, the response will have an **error** field and will provide a new challenge.

```

{
  "message": "authenticate",
  "message_id": <message id>,
  "error": <error message>,
  "type": "MBMSGW",
  "name": <name>,
  "challenge": <new random challenge>
}

```

If any other message is sent before authentication succeeds, the error "Authentication not done" will be sent as a response.

6.3 Errors

If a message produces an error, response will have an error string field representing the error.

6.4 Sample nodejs program

You will find in this documentation a sample program: **ws.js**.

It is located in **doc** subdirectory.

This is a nodejs program that allow to send message to LTEMBMSGW.

It requires nodejs to be installed:

```

dnf install nodejs npm
npm install nodejs-websocket

```

Use relevant package manager instead of NPM depending on your Linux distribution.

Then simply start it with server name and message you want to send:

```

./ws.js 127.0.0.1:9004 '{"message": "config_get"}'

```

6.5 Common messages

config_get

Retrieve current config.

Response definition:

type	Always "MBMSGW"
name	String representing server name.
logs	Object representing log configuration. With following elements:
layers	Object. Each member of the object represent a log layer configuration:
layer name	Object. The member name represent log layer name and parameters are:
level	See [log_options], page 6,

	max_size	See [log_options], page 6,
	key	See [log_options], page 6,
	crypto	See [log_options], page 6,
	payload	See [log_options], page 6,
	count	Number. Number of bufferizer logs.
	rotate	Optional number. Max log file size before rotation.
	rotate_count	Optional number. Max log count before rotation.
	path	Optional string. Log rotation path.
	bcch	Boolean. True if BCCH dump is enabled (eNB only).
	mib	Boolean. True if MIB dump is enabled (eNB only).
locked		Optional boolean. If true , logs configuration can't be changed with config_set API.
config_set		
Change current config.		
Each member is optional.		
Message definition:		
	logs	Optional object. Represent logs configuration. Same structure as config_get (See [config_get logs member], page 15). All elements are optional. Layer name can be set to all to set same configuration for all layers. If set and logs are locked, response will have logs property set to locked .
log_get		
Get logs.		
This API has a per connection behavior. This means that the response will depend on previous calls to this API within the same WebSocket connection.		
In practice, logs that have been provided in a response won't be part of subsequent request unless connection is reestablished. To keep on receiving logs, client should send a new log_get request as soon as the previous response has been received.		
If a request is sent before previous request has been replied, previous request will be replied right now without considering specific min/max/timeout conditions.		
Message definition:		
	min	Optional number (default = 1). Minimum amount of logs to retrieve. Response won't be sent until this limit is reached (Unless timeout occurs).
	max	Optional number (default = 4096). Maximum logs sent in a response.
	timeout	Optional number (default = 1). If at least 1 log is available and no more logs have been generated for this time, response will be sent.
	allow_empty	Optional boolean (default = false). If set, response will be sent after timeout, event if no logs are available.
	rnti	Optional number. If set, send only logs matching rnti.
	ue_id	Optional number. If set, send only logs with matching ue_id.

layers	Optional Object. Each member name represents a log layer and values must be string representing maximum level. See [log_options], page 6. If <i>layers</i> is not set, all layers level will be set to <i>debug</i> , else it will be set to <i>none</i> . Note also the logs is also limited by general log level. See [log_options], page 6.
short	Optional boolean (default = false). If set, only first line of logs will be dumped.
headers	Optional boolean. If set, send log file headers.
start_timestamp	Optional number. Is set, filter logs older than this value in milliseconds.
end_timestamp	Optional number. Is set, filter logs more recent than this value in milliseconds.
max_size	Optional number (default = 1048576, i.e. 1MB). Maximum size in bytes of the generated JSON message. If the response exceeds this size, the sending of logs will be forced independently from other parameters.

Response definition:

logs	Array. List of logs. Each item is a an object with following members:
data	Array. Each item is a string representing a line of log.
timestamp	Number. Milliseconds since January 1st 1970. Not present if <i>com_log_us</i> is set in configuration.
timestamp_us	Number. Microseconds since January 1st 1970. Only present if <i>com_log_us</i> is set in configuration.
layer	String. Log layer.
level	String. Log level: <i>error</i> , <i>warn</i> , <i>info</i> or <i>debug</i> .
dir	Optional string. Log direction: <i>UL</i> , <i>DL</i> , <i>FROM</i> or <i>TO</i> .
ue_id	Optional number. UE.ID.
cell	Optional number (only for PHY layer logs). Cell ID.
rnti	Optional number (only for PHY layer logs). RNTI.
frame	Optional number (only for PHY layer logs). Frame number (Subframe is decimal part).
channel	Optional string (only for PHY layer logs). Channel name.
src	String. Server name.
idx	Integer. Log index.
headers	Optional array. Array of strings.

	discontinuity	Optional number. If set, this means some logs have been discarded due to log buffer overflow.
	microseconds	Optional boolean. Present and set to true if <code>com_log_us</code> is set in configuration file.
log_set	Add log. Message definition:	
	log	Optional string. Log message to add. If set, <i>layer</i> and <i>level</i> are mandatory.
	layer	String. Layer name. Only mandatory if <i>log</i> is set.
	level	String. Log level: <i>error</i> , <i>warn</i> , <i>info</i> or <i>debug</i> . Only mandatory if <i>log</i> is set.
	dir	Optional string. Log direction: <i>UL</i> , <i>DL</i> , <i>FROM</i> or <i>TO</i> .
	ue_id	Optional number. UE_ID.
	flush	Optional boolean (default = false). If set, flushes log file.
	rotate	Optional boolean (default = false). If set, forces log file rotation.
	cut	Optional boolean (default = false). If set, forces log file reset.
log_reset	Resets logs buffer.	
license	Retrieves license file information. Response definition:	
	products	String. List of products, separated by commas.
	user	String. License username.
	validity	String. License end of validity date.
	id	Optional string. License ID.
	id_type	Optional string. License ID type. Can be <code>host_id</code> or <code>dongle_id</code>
	uid	Optional string. License unique ID.
	filename	Optional string. License filename.
	server	Optional string. License server URL.
	server_id	Optional string. License server ID.
quit	Terminates ltembmsgw.	
help	Provides list of available messages in <i>messages</i> array of strings and events to register in <i>events</i> array of strings.	
stats	Report statistics for LTEMBSGW. Every time this message is received by server, statistics are reset. Warning, calling this message from multiple connections simultaneously will modify the statistics sampling time. Response definition:	
	cpu	Object. Each member name defines a type and its value cpu load in % of one core.

`instance_id`

Number. Constant over process lifetime. Changes on process restart.

6.6 LTE messages

`service_start`

Start a service.

Message definition:

`service_id`

Integer. Identifier of service to start.

`service_stop`

Stop a service.

Message definition:

`service_id`

Integer. Identifier of service to stop.

7 Log file format

7.1 M2AP and GTP-U layers

When a message is dumped, the format is:

```
time layer - message
```

When a data PDU is dumped (debug level), the format is:

```
time layer dir ip_address short_content
      long_content
```

time Time using the selected format.

layer Indicate the layer ([M2AP] or [GTPU] here).

dir Direction: TO or FROM.

ip_address
 source or destination IP address, depending on the **dir** field.

short_content
 Single line content.

long_content

- M2AP: full ASN.1 content of the M2AP message if `layer.max_size > 0`.
- GTPU: hexadecimal dump of the message if `layer.max_size > 0`.

8 Change history

8.1 Version 2024-09-13

- added `license` remote API
- `com_logs_lock` parameter is renamed to `com_log_lock`. `com_logs_lock` is still supported for backward compatibility
- added `com_log_us` parameter

8.2 Version 2024-06-14

- OpenSSL library is upgraded to 1.1.1w

8.3 Version 2023-12-15

- added `loop_count` and `loop_delay` to remote API messages
- added `sim_events`, `sim_events_loop_count` and `sim_events_loop_delay`
- added `com_ssl_ca` parameter for SSL verification

8.4 Version 2023-06-10

- `com_logs_lock` parameter added to disable logs configuration change via remote API

8.5 Version 2023-03-17

- `com_addr` parameter now uses `::` address instead of `0.0.0.0` in the delivered configuration file to allow IPv6 connection

8.6 Version 2022-12-16

- `utc` parameter is added to remote API response messages

8.7 Version 2022-06-17

- OpenSSL library is upgraded to 1.1.1n
- `m2ap_bind_addr` parameter description is added
- `start_timestamp` and `end_timestamp` are added to `log_get` API

8.8 Version 2021-12-17

- `license` monitor command is added

8.9 Version 2021-09-17

- the minimum GLIBC version is now 2.17
- logs can be displayed with microseconds precision

9 License

`ltembmsgw` is copyright (C) 2012-2025 Amarisoft. Its redistribution without authorization is prohibited.

`ltembmsgw` is available without any express or implied warranty. In no event will Amarisoft be held liable for any damages arising from the use of this software.

For more information on licensing, please refer to `license.pdf` file.

Abbreviations

MBMS	Multimedia Broadcast Multicast Service
SYNC	MBMS synchronisation protocol
TMGI	Temporary Mobile Group Identity