



Connecting devices **at** **cloud-speed**

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Connectivity Management Platform

Data Warehouse Events

Version 5.000

Revision M



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1 Overview

The system generates floLIVE Data Warehouse (DWH) events for device activities such as Update Location, SMS-MO, etc.

The purpose of this document is to provide a detailed description of all supported DWH events.

2 API

JSON files represent FloLIVE Data Warehouse (DWH) events. Each JSON file uses human-readable text to transmit data regarding one event. The file includes pairs of attributes and values bounded in curly brackets. A comma separates each pair, and there is a colon within each pair between attribute and value. Values can be strings, integers, real numbers, and even a JSON file. As noted, the system will send each event in a different JSON file.

The system can parse JSON files that include only some of these attribute and value pairs. However, the system expects each JSON file to have a timestamp, action, and action id. So each JSON file **must** have at least the “ts”, “act” and “aid” attributes.

2.1 Attributes and Value Descriptions

The following are tables of attribute and value pairs that you can expect to find in the JSON file.

2.1.1 Action Type (Attribute: act)

Value	Action Title	Transmit/Receive	Comments
1	Send Authentication Info	Rx	
2	Update Location	Rx	
3	Purge MS	Rx/Tx	Delete roamer
4	Restore Data	Rx	Add a subscriber to VLR
5	Cancel Location	Rx	
6	Alert Service Center	Rx	
7	PSI	Rx/Tx	
8	SRI	Rx/Tx	
9	PRN	Rx/Tx	
10	SRI For SM	Rx/Tx	
11	Report SM Delivery Status	Tx	
12	NA	Rx	
13	MO SMS	Rx/Tx	
14	MT SMS	Rx/Tx	
17	IDP	Rx	
18	Ready For SM	Tx	
19	Update GPRS Location	Rx	
20	insertSubscriberData	Tx	Change profile
21	USSD	Rx/Tx	
22	Authentication Failure Report	Rx	
23	deleteSubscriberData	Tx	Change profile
24	IMS Register		
25	IMS Network unregister		
26	IMS User Unregister		
27	IMS Authentication		
28	IMS Location Info		
29	IMS User Authorization		
30	Create PDP	Rx	
31	Close PDP	Rx	

Value	Action Title	Transmit/Receive	Comments
32	GGSN keep alive (Interim)	Rx	
33	GGSN modify bearer	Rx	
40	AAA Access request	Rx	
41	AAA Accounting		
50	API		
100	Offline Data Consumption		Used by the BSS for offline charging
101	Offline SMS Consumption		Used by the BSS for offline charging

2.1.2 Nodes Table (Attribute: node)

Node	Node ID	Comments
HLR Registration	1	Only for Registrations
HLR/HSS	2	For all other
VLR	3	
SMSC	4	
SCP	5	
USSD	6	
API	7	HTTP Billing APIs, AAA
GGSN/PGW	8	

2.1.3 Results Table (Attribute: code)

HLR/HSS/SMSC/GMSC error codes

Result description	Error code
Success	0
unknownSubscriber	1
unknownMSC	3
unidentifiedSubscriber	5
absentSubscriberSM	6
unknownEquipment	7
roamingNotAllowed	8
illegalSubscriber	9
bearerServiceNotProvisioned	10
teleserviceNotProvisioned	11
illegalEquipment	12
callBarred	13
forwardingViolation	14
cug-Reject	15
illegalSS-Operation	16
ss-ErrorStatus	17
ss-NotAvailable	18
ss-SubscriptionViolation	19

Result description	Error code
ss-Incompatibility	20
facilityNotSupported	21
ongoingGroupCall	22
noHandoverNumberAvailable	25
subsequentHandoverFailure	26
absentSubscriber	27
incompatibleTerminal	28
shortTermDenial	29
longTermDenial	30
subscriberBusyForMT-SMS	31
sm-DeliveryFailure	32
messageWaitingListFull	33
systemFailure	34
dataMissing	35
unexpectedDataValue	36
pw-RegistrationFailure	37
negativePW-Check	38
noRoamingNumberAvailable	39
tracingBufferFull	40
targetCellOutsideGroupCallArea	42
numberOfPW-AttemptsViolation	43
numberChanged	44
busySubscriber	45
noSubscriberReply	46
forwardingFailed	47
or-NotAllowed	48
ati-NotAllowed	49
noGroupCallNumberAvailable	50
resourceLimitation	51
unauthorizedRequestingNetwork	52
unauthorizedLCSCClient	53
positionMethodFailure	54
unknownOrUnreachableLCSCClient	58
mm-EventNotSupported	59
atsi-NotAllowed	60
atm-NotAllowed	61
informationNotAvailable	62
unknownAlphabet	71
ussd-Busy	72
system error	255

PGW/GGSN error codes

Result description	Error code
Reserved	1
Local Detach	2
Complete Detach	3
RAT changed from 3GPP to Non-3GPP	4

Result description	Error code
ISR deactivation	5
Error Indication received from RNC/eNodeB/S4-SGSN/MME	6
IMSI Detach Only	7
Reactivation Requested	8
PDN reconnection to this APN disallowed	9
Access changed from Non-3GPP to 3GPP	10
PDN connection inactivity timer expires	11
PGW not responding	12
Network Failure	13
QoS parameter mismatch	14
Spare. This value range shall be used by Cause values in an initial/request message.	15
Request accepted	16
Request accepted partially	17
New PDN type due to network preference.	18
New PDN type due to single address bearer only.	19
This value range shall be used by Cause values in an acceptance response/triggered message. Rejection in a Response /triggered message.	20 to 63 Spare
Context Not Found	64
Invalid Message Format	65
Version not supported by next peer	66
Invalid length	67
Service not supported	68
Mandatory IE incorrect	69
Mandatory IE missing	70
Shall not be used. See NOTE 2 and NOTE 3.	71
System failure	72
No resources available	73
Semantic error in the TFT operation	74
Syntactic error in the TFT operation	75
Semantic errors in packet filter(s)	76
Syntactic errors in packet filter(s)	77
Missing or unknown APN	78
Shall not be used. See NOTE 2 and NOTE 3.	79
GRE key not found	80
Relocation failure	81
Denied in RAT	82
Preferred PDN type not supported	83
All dynamic addresses are occupied	84
UE context without TFT already activated. See NOTE 6.	85
Protocol type not supported	86
UE not responding. See NOTE 7.	87
UE refuses	88
Service denied. See NOTE 7.	89
Unable to page UE	90
No memory available	91
User authentication failed	92
APN access denied – no subscription	93
Request rejected (reason not specified)	94
P-TMSI Signature mismatch	95

Result description	Error code
IMSI/IMEI not known	96
Semantic error in the TAD operation	97
Syntactic error in the TAD operation	98
Shall not be used. See NOTE 2 and NOTE 3.	99
Remote peer not responding	100
Collision with network initiated request	101
Unable to page UE due to Suspension	102
Conditional IE missing	103
APN Restriction type Incompatible with currently active PDN connection	104
Invalid overall length of the triggered response message and a piggybacked initial message	105
Data forwarding not supported	106
Invalid reply from remote peer	107
Fallback to GTPv1	108
Invalid peer	109
Temporarily rejected due to handover/TAU/RAU procedure in progress	110
Modifications not limited to S1-U bearers	111
Request rejected for a PMIPv6 reason (see 3GPP TS 29.275 [26]).	112
APN Congestion	113
Bearer handling not supported	114
UE already re-attached. See NOTE 7.	115
Multiple PDN connections for a given APN not allowed	116
Target access restricted for the subscriber	117
Shall not be used. See NOTE 2 and NOTE 3.	118
MME/SGSN refuses due to VPLMN Policy	119
GTP-C Entity Congestion	120
Late Overlapping Request	121
Timed out Request	122
UE is temporarily not reachable due to power saving	123
Relocation failure due to NAS message redirection	124
UE not authorised by OCS or external AAA Server	125
Multiple accesses to a PDN connection not allowed	126
Request rejected due to UE capability	127
S1-U Path Failure	128
5GC not allowed	129
Spare for future use	130 - 239
Spare for future use	240 – 255
DDOS on session	250

Diameter error codes

Result description	Error code
Diameter success	2001
diameter limited success	2002
unsupported command	3001
unable to deliver	3002
realm not served	3003
too busy	3004

Result description	Error code
loop detected	3005
Redirect Indication	3006
Application unsupported	3007
Invalid HDR Bits	3008
Invalid AVP Bits	3009
unknown peer	3010
Diameter user unknown	5001
Diameter identities dont match	5002
Diameter identity not registered	5003
Diameter roaming not allowed	5004
Diameter identity already registered	5005
Diameter auth scheme not supported	5006
Diameter in assignment type	5007
Diameter too much data	5008
Diameter not supported user data	5009
Diameter feature unsupported	5011
Diameter user data not recognized	5100
Diameter operation not allowed	5101
Diameter user data cannot be read	5102
Diameter user data cannot be modified	5103
Diameter user data cannot be notified	5104
Diameter transparent data out of sync	5105
Diameter subs data absent	5106
Diameter no subscription to data	5107
Diameter dsai not available	5108
Diameter unknown eps subscription	5420
Diameter rat not allowed	5421
Diameter equipment unknown	5422
Diameter unkown serving node	5423
Diameter user no non 3gpp subscription	5450
Diameter user no apn subscription	5451
Diameter rat type not allowed	5452

2.1.4 NSAPI (Attribute: nsapi)

Network layer Service Access Point Identifier (NSAPI) is the ID that identifies a PDP context of a subscriber. It's Part of the PGW sessions messages.

Value	Title
1	ActSendAuthenticationInfo
2	ActUpdateLocation
3	ActPurgeMS
4	ActRestoreData
5	ActCancelLocation
6	ActAnyTimeInterrogation
7	ActPSI
8	ActSRI

Value	Title
9	ActPRN
10	ActSRIForSM
11	ActReportSMDeliveryStatus
12	ActAlertSC
13	ActMOSMS
14	ActMTSMS
17	ActIDP
18	ActReadyForSM
19	ActUpdateGPRSLocation
21	ActUSSD
30	ActCreatePDP
31	ActClosePDP
50	ActAPI

2.1.5 Attribute and Values Table

Attribute	Name in JSON file	Value
Time of the event	ts	String, date-time
Node	node	Integer, see Node ID
Account ID	aid	Integer, minimum 0
Access Point Name	apn	String
Charge ID	charge_id	String, ^[0-9]+\$
Core Network Name	cn	String
Device ID	did	Integer, minimum 0
Direction (transmitted or received)	dir	{"const":0, "title":"DirRX"}, or, {"const":1, "title":"DirTX"}
MME, Mobility Management Entity address	mme	String, the MME ID
Downlink	dl	Integer, minimum 0
Uplink	ul	Integer, minimum 0
Integrated Circuit Card Identifier (ICCID)	iccid	String, ^[0-9]+\$
International Mobile Subscriber Identity (IMSI)	imsi	String, ^[0-9]+\$
Mobile Station International Subscriber Directory Number	msisdn	String, ^[0-9]+\$
PDP IP	pdp_ip	String, ip address
Reason	reason	String, includes error message from the core network
SGSN Serving GPRS Support Node address	sgsn	String, ip address
IMEI	imei	String, IMEI of the device
Routing Number	rtn	Integer
Extra Info	info	Integer
RAT Type	rattype	Integer, see RAT Type Mapping
MCC MNC	mccmnc	String, the MCC MNC connected
SCCP Signaling Connection Control Part	sccp	String
NSAPI, Network Service Access Point Identifier code	Nsapi	Integer, see NSAPI mapping
Called number	Called	String, MSISDN number used for SMS MO/MT
Location Information	Uli	JSON, properties:
		mcc Integer

Attribute	Name in JSON file	Value	
		mnc	Integer
		tac	Integer
		lac	Integer
		ci	Integer
		sac	Integer
		rac	Integer
		enb	Integer
AAA Accounting mode	status_type	1 – Start. 2 – Stop. 3 – Interim.	
Data	Data	String, optional field that holds SMS payload	
UPF C	upfc	IP address of the used UPF C (Control) used for the current data session.	
UPF U	upfu	IP address of the used UPF U (User) used for the current data session.	

2.1.6 RAT Type Mapping

RAT Rype used by HSS/HLR

Value	RAT Type
1000	UTRAN
1001	GERAN
1002	GAN
1003	HSPA Evolution
1004	EUTRAN
1005	EUTRAN NB IoT
1006	NR
1007	LTE-M
1008	NR-U
1011	WB-EUTRAN(LEO)
1012	WB-EUTRAN(MEO)
1013	WB-EUTRAN(GEO)
1014	WB-EUTRAN(OTHERSAT)
1021	NB-IoT(LEO)
1022	NB-IoT(MEO)
1023	NB-IoT(GEO)
1024	NB-IoT(OTHERSAT)
1031	LTE-M(LEO)
1032	LTE-M(MEO)
1033	LTE-M(GEO)
1034	LTE-M(OTHERSAT)

RAT Rype used by AAA/GGSN/PGW

Value	RAT Type
0	<reserved>
1	UTRAN
2	GERAN
3	WLAN
4	GAN
5	HSPA Ecolution
6	EUTRAN (WB-E-UTRAN)
7	Virtual
8	EUTRAN NB IoT
9	LTE-M
10	NR

2.2 Some API Examples

2.2.1 Update Location Message

```
{
  "act": 2,
  "aid": 189,
  "cn": "",
  "did": 0,
  "dir": 0,
  "iccid": "",
  "imei": "12345678901733",
  "imsi": "374130600000111",
  "mccmnc": "22610",
  "mme": "mme301.epc.mnc001.mcc425.3gppnetwork.org",
  "msisdn": "+999130600000508",
  "node": 1,
  "ratttype": 1004,
  "reason": 0,
  "ts": "2020-02-24T14:05:33.172Z"
}
```

2.2.2 SRI for SM Message

```
{
  "act": 10,
  "aid": 189,
  "cn": "",
  "did": 0,
  "dir": 0,
  "iccid": "",
  "imsi": "374130600000111",
  "mccmnc": "",
  "msisdn": "999130600000508",
  "node": 2,
  "reason": 0,
  "sccp": "+972559900030",
  "ts": "2020-02-25T13:58:37.497Z"
}
```

2.2.3 MO SMS Message

```
{  
  "act": 13,  
  "aid": 189,  
  "called": "+972559996692",  
  "cn": "",  
  "did": 0,  
  "dir": 0,  
  "iccid": "",  
  "imsi": "374130600000111",  
  "node": 4,  
  "reason": 0,  
  "ts": "2020-02-25T13:58:37.528Z"  
}
```

2.2.4 MT SMS Message

```
{  
  "act": 14,  
  "aid": 189,  
  "called": "+972559996692",  
  "cn": "",  
  "did": 0,  
  "dir": 1,  
  "iccid": "",  
  "imsi": "374130600000111",  
  "node": 3,  
  "reason": 0,  
  "ts": "2020-02-25T13:58:37.287Z"  
}
```

2.2.5 GGSN/PGW Create PDP Message

```
{
  "act": 30,
  "aid": 189,
  "apn": "flolive.net",
  "charge_id": "59186",
  "cn": "",
  "did": 0,
  "dir": 0,
  "dl": 0,
  "error": 0,
  "iccid": "",
  "imei": "12345678901733",
  "imsi": "374130600000111",
  "msisdn": "999130600000508",
  "node": 8,
  "nsapi": 5,
  "pdp_ip": "10.21.1.96",
  "sgsn": "10.82.7.55",
  "ts": "2020-02-24T14:20:12.687Z",
  "upfc": "10.244.0.1",
  "upfu": "144.244.2.1",
  "ul": 0,
  "uli": {
    "enb": 20496400,
    "mcc": 226,
    "mnc": 10,
    "tac": 4113
  }
}
```

2.2.6 GGSN/PGW Close PDP Message

```
{
  "act": 31,
  "aid": 189,
  "apn": "flolive.net",
  "charge_id": "58874",
  "cn": "",
  "did": 0,
  "dir": 0,
  "dl": 12521700,
  "error": 0,
  "iccid": "",
  "imei": "12345678901733",
  "imsi": "374130600000111",
  "msisdn": "999130600000508",
  "node": 8,
  "nsapi": 5,
  "pdp_ip": "10.21.0.101",
  "sgsn": "10.82.7.55",
  "ts": "2020-02-24T14:18:14.964Z",
  "ul": 327440,
  "uli": {
    "enb": 20484112,
    "mcc": 226,
    "mnc": 10,
    "tac": 4113
  }
}
```

2.2.7 GGSN/PGW Keep Alive PDP Message

```
{
  "act": 32,
  "aid": 189,
  "apn": "flolive.net",
  "charge_id": "59186",
  "cn": "",
  "did": 0,
  "dir": 0,
  "dl": 0,
  "error": 0,
  "iccid": "",
  "imei": "12345678901733",
  "imsi": "374130600000111",
  "msisdn": "999130600000508",
  "node": 8,
  "nsapi": 5,
  "pdp_ip": "10.21.1.96",
  "sgsn": "10.82.7.55",
  "ts": "2020-02-24T14:20:12.687Z",
  "ul": 0,
  "uli": {
    "enb": 20496400,
    "mcc": 226,
    "mnc": 10,
    "tac": 4113
  }
}
```

2.2.8 AAA Access Request

```
{
  "ts": "2022-02-24T09:00:41.355Z",
  "imsi": "425012234000001",
  "iccid": "",
  "node": 7,
  "act": 40,
  "dir": 0,
  "cn": "aaa01",
  "msisdn": "9990130909556786",
  "sgsn": "192.168.114.160",
  "imei": "1234567890123456",
  "apn": "gigsky-02",
  "charge_id": "2600161068",
  "session_id": "C0A872A09AFB4F2C",
  "mccmnc": "42519",
  "reason": 0
}
```

2.2.9 AAA Accounting Start

```
{  
  "ts":"2022-02-24T09:00:41.363Z",  
  "imsi":"425012234000001",  
  "iccid":"12345678901234567890",  
  "node":7,  
  "act":41,  
  "dir":0,  
  "cn":"aaa01",  
  "status_type":1,  
  "msisdn":"9990130909556786",  
  "sgsn":"127.0.0.2",  
  "imei":"1234567890123456",  
  "apn":"gigsky-02",  
  "charge_id":"2600161068",  
  "session_id":"C0A872A09AFB4F2C",  
  "mccmnc":"42519",  
  "reason":0  
}
```