

Contents

[Introduction](#)

[Explanation via Examples](#)

[Count dedicated and default bearers for a VoLTE subscriber](#)

[Count dedicated and default bearers which share the same callid](#)

[Mix of qualifiers that apply to dedicated/default bearers versus all subscribers](#)

Introduction

This document describes what appears to be an inconsistency in subscriber counts reported with the "show sub summary" command. Normally the count of all the subscriber types from "show sub summary" add up to the "Total Subscribers" count at the top. However, the existence of both dedicated and default bearers for subscribers and use of certain qualifiers can result in the counts of various subscriber types that do not match what is expected for the "Total Subscribers".

Explanation via Examples

Count dedicated and default bearers for a VoLTE subscriber

In the case of Voice over Long Term Evolution (VoLTE), there is a dedicated and default bearer for the IP Multimedia System (IMS) Application Point Name (APN) that is essential for the setup of all VoLTE calls. "Show sub summ" increments by one for the "Total Subscribers" field for each unique subscriber, even though each subscriber has two bearers. But, the fact that each subscriber has two bearers IS captured in the subsections of the CLI. For example, note here that the count of pgw-gtp-ipv6 represents the count of both the dedicated and default bearers for the IMS APN, while the Total count only captures the fact that both of the bearers are for the same IMS APN. This is further confirmed by the pgw-only qualifier which actually lists out the individual bearers, but like the non pgw-only version, only counts a subscriber once per APN via the Total field.

These examples are taken from a Packet Data Network Gateway (PGW) that includes both LTE and Enhanced High Rate Packet Data (eHRPD) call types.

Note that pgw-gtp-ipv6 (LTE) + pgw-pmip-ipv6 (eHRPD) - Total Dedicated Bearers = Total Subs

This principal even applies to "show sub" summ without any qualifiers.

$65 + 1567327 + 285074 + 235124 + 1653 = 3430145 - 547 \text{ (dedicated bearers)} = 3429598 \approx 3429614$

This is even clearer when you qualify by just VoLTE subscribers that pass voice data using QCI = 1 via the dedicated bearer. In this case note that the pgw-gtp-ipv6 is roughly double the Total Subscribers, since it counts both the dedicated and default bearers for each VoLTE subscriber.

Count dedicated and default bearers which share the same callid

A related example is when you list subscribers by callid. A single callid represents all the bearers of a given APN, while all the bearers (2) that share that callid get listed/counted individually. Meanwhile the Total field only increments once in order to represent all those bearers of an APN. In this example, the IMS default bearer ID = 5 and the IMS dedicated bearer ID = 7.

Mix of qualifiers that apply to dedicated/default bearers versus all subscribers

Finally, probably the most confusing example is where multiple qualifiers are used in succession that apply at the bearer level as well as to the subscriber overall. In this example, a third qualifier is added to narrow subscribers that have been connected for greater than a day (86400 seconds). Since this example also uses the QCI 1 that represents VoLTE subscribers, it might be expected that the hit list would be empty because how many people are on a call for greater than 24 hours? But the result is not a true AND operation as might be expected. That is, the result is not the IMS VoLTE sessions that have been connected for greater than a day, as that number is likely 0. Instead, the result is all IMS subscribers that have a VoLTE session and where either the default IMS or dedicated (VoLTE) IMS session has been up for greater than a day (the former of which would not be uncommon).

In this output, the connected-time greater-than qualifier does limit the output to subscribers that have been connected greater than a day over the default IMS bearer, compared to without the qualifier which does not consider call connected time.

Here is an example with full output for a given subscriber that meets the criteria of the connected time greater than a day.

Note: The connect time for the Internet APN default is within a few minutes after you enter the command, so you can be sure that it is the default IMS bearer that meets the criteria of connected greater than a day (connected Fri Aug 7 20:01:23) which results in this subscriber being reported.

```
[local]PGW> show sub apn ims qci 1 connected-time greater-than 86400
Monday August 10 12:04:29 UTC 2015
vvvvvv CALLID    MSID                USERNAME                IP                        TIME-
IDLE
-----
YTCNAT 00eff501 320490127668665 0320490127668665@nai.epc.mnc490.mcc320.3gppnetwork.org
2600:5555:8001:9ccb::eff5:101 00h00m00s
```

```
[local]PGW> show sub pgw-only full imsi 320490127668665
Monday August 10 12:06:38 UTC 2015
```

```
Username: 0320490127668665@nai.epc.mnc490.mcc320.3gppnetwork.org
Subscriber Type : Home
Status          : Online/Active
State           : Connected
Connect Time    : Fri Aug 7 20:01:23 2015

Auto Delete     : No

Idle time       : 00h00m00s
MS TimeZone     : -4:00                Daylight Saving Time: +1 hour

Access Type: gtp-pdn-type-ipv6      Network Type: IPv6
Access Tech: eUTRAN                 pgw-service-name: PGW1
Callid: 00eff501                    IMSI: 320490127668665
MSISDN: 16036860864
```

Interface Type: S5S8GTP Low Access Priority: N/A
Emergency Bearer Type: N/A
IMS-media Bearer: No
S6b Auth Status: Enabled
Access Peer Profile: default
Acct-session-id (C1): 42AE14C2013B7181
ThreeGPP2-correlation-id (C2): 01C250B4 / 0t-G0QsS
Card/Cpu: 1/1 Sessmgr Instance: 4

Bearer Type: Default Bearer-Id: 5
Bearer State: Active
IP allocation type: N/A
IPv6 allocation type: local pool
IP address: 2600:5555:8001:9ccb::eff5:101

...

S5/S8/S2b/S2a-APN: ims
SGi-APN: ims

Bearer QoS:
QCI: 5

...

Username: 0320490127668665@nai.epc.mnc490.mcc320.3gppnetwork.org

Subscriber Type : Home
Status : Online/Active
State : Connected
Connect Time : Mon Aug 10 11:52:51 2015

Auto Delete : No

Idle time : 00h00m00s
MS TimeZone : -4:00 Daylight Saving Time: +1 hour

Access Type: gtp-pdn-type-ipv6 Network Type: IPv6
Access Tech: eUTRAN pgw-service-name: PGW1
Callid: 00eff501 IMSI: 320490127668665
MSISDN: 16036860864
Interface Type: S5S8GTP Low Access Priority: N/A
Emergency Bearer Type: N/A
IMS-media Bearer: Yes
S6b Auth Status: Enabled
Access Peer Profile: default
Acct-session-id (C1): 42AE14C2013E4AF6
ThreeGPP2-correlation-id (C2): 01C250B4 / 0t-G0QsS
Card/Cpu: 1/1 Sessmgr Instance: 4

Bearer Type: Dedicated Bearer-Id: 7
Bearer State: Active
IP allocation type: N/A
IPv6 allocation type: local pool
IP address: 2600:5555:8001:9ccb::eff5:101

...

S5/S8/S2b/S2a-APN: ims
SGi-APN: ims

Bearer QoS:
QCI: 1

Username: 0320490127668665@nai.epc.mnc490.mcc320.3gppnetwork.org

Subscriber Type : Home
Status : Online/Active
State : Connected
Connect Time : Mon Aug 10 11:51:24 2015

Auto Delete : No
Idle time : 00h15m14s
MS TimeZone : -4:00 Daylight Saving Time: +1 hour

Access Type: gtp-pdn-type-ipv4-ipv6 Network Type: IPV4+IPV6
Access Tech: eUTRAN pgw-service-name: PGW1
Callid: 00f2c514 IMSI: 320490127668665
MSISDN: 15556860864
Interface Type: S5S8GTP Low Access Priority: N/A
Emergency Bearer Type: N/A
IMS-media Bearer: No
S6b Auth Status: Enabled
Access Peer Profile: default
Acct-session-id (C1): 42AE14C2013E4AC5
ThreeGPP2-correlation-id (C2): 01C520A2 / 0umaajjh
Card/Cpu: 1/1 Sessmgr Instance: 4

Bearer Type: Default Bearer-Id: 6
Bearer State: Active
IP allocation type: local pool
IPv6 allocation type: local pool
IP address: 2600:5555:b027:b408::f2c5:1401, 100.84.110.26

...
S5/S8/S2b/S2a-APN: internet
SGi-APN: internet

Bearer QoS:
QCI: 8
ARP: 0x069

Total subscribers matching specified criteria: 3