# Contents

# Introduction

This article focuses on CLIs applicable to troubleshooting specific subscriber(s) issues. Whether there is just a known single or group of subscribers experiencing an issue, or an unknown (at first) group of subscribers, there are a number of CLIs that can help pinpoint the issue. Use them in combination with (non-subscriber specific) statistics CLIs in the troubleshooting process. Obviously not all of these commands would apply to every situation since some of them are protocol specific, while others are generic enough to apply to all subscribers. Some apply to user-plane (passing of data back and forth between subscriber and network) while others apply to call control plane (setting up of the call), while some could apply to both.

Example snippets are provided in a number of places to help make points clear. All IP addresses and identifying information have been changed.

# Commands

## monitor subscriber (mon sub)

This is probably one of the most well known commands on the platform and the most amount of time is spent here documenting and explaining its usage. Depending on the settings chosen, it has the potential to display all of a particular subscriber's control/signaling and payload data for all interfaces, services, protocols, etc. Some considerations in running the command and interpreting output include the following:

- Based on investigation up to a point in time, if a problem is suspected but a particular subscriber having an issue is not yet known, then attempting capture by "next-call", possibly trying many times, may result in capturing a failure if the issue is frequent enough. If the problem is rare, this approach may not be feasible.
- For known call types (Closed RP, Open RP, Evolution Data Optimized (EVDO), 1X-EVDO, Layer 2 Tunnelling Protocol (L2TP), Home Agent (HA), Long Term Evolution (LTE), etc.), especially those that are a low percentage of the overall volume, or those where the peer Packet Control Function (PCF) or peer L2TP Access Concentrator (LAC) is where the problem is suspected to be, then the monitor subscriber menu option allows qualifying the next call by such criteria, which will increase hit rate significantly. If all calls on the node are of the same type, then this approach adds no value (except for the peer address versions just mentioned) since doing so doesn't narrow down the possibilities.
- There are various levels of verbosity 1 to 5. Do not turn on higher levels of verbosity if not needed, as it makes reading the trace (quickly) more difficult. Usually increasing to verbosity 2 (default = 1) is sufficient.
- By default, most, but not all, of the protocols that would be interesting to view are turned ON by default
- Besides the actual packet data, sometimes special CONTROL messages are displayed that may explain what action is being taken under the covers – this information is often useful. This includes the call statistics displayed at the end of a call. Here is an example control message:

- If Enhanced Charging Service (ECS) is configured on the gateway nodes, then turning on option 34 (CSS Data) allows for viewing all packets being sent to and from the ECS module, which can be helpful for troubleshooting packet drops and Network Address Translation (NAT). For example here is a subscriber Internet Control Message Protocol (ICMP) packet that is NAT'd by ECS from private IP 10.251.88.68 to public IP 209.165.201.1

- If it is not obvious from the trace why the ASR is exhibiting a particular behavior, then viewing the internal processing for the subscriber might have value (interpreting such output which includes state machine info and the like is difficult but can be done by engineering), and so logging monitor or logging trace commands may be considered (discussed later).
- The timestamps displayed are fairly accurate, but, because various facilities are all writing to the screen real-time, it cannot be authoritatively concluded that the order of packets displayed is the actual order that the packets are being processed in, but it will be close.
- On the ingress side for Packet Data Switching Network (PDSN) or High Rate Packet Data Serving Gateway (HSGW) nodes, in order to view all of the A11 messaging (if that is

important to view in the troubleshooting scenario, maybe it is not), monitor by Mobile Station Identification (MSID) instead of username, because the username is not yet known (has not yet been presented) at the beginning of the call and so cannot be displayed. If the MSID is not known, then take an initial trace which reveals it, then start over again monitoring by that MSID.

Here is an example where monitoring by MSID captures closer to the start of the call (A11 Response) versus at the point of the Mobile IP (MIP) Registration Request or even Radius Authentication when monitoring by username. In the username case, the call is caught at the FA service point, whereas in the MSID monitor it is caught earlier at the PDSN service point.

- Turning on User L3 (19) in many scenarios will not yield more information than would otherwise be captured, but rather it results in duplicates of many packets.
- Turning on certain protocols will result in duplicate packets, for example for Mobile IP, MIP packets display twice, as both Point-to-Point Protocol (PPP) and as MIP.
- The output reads much better with a non-proportional font such as courier because the columns line up perfectly, so do analysis using such a font.
- The output that passes through a particular interface should line up with a packet capture on that interface, the difference being that the monitor subscriber output would be a subset because not every single field in an IP packet will be displayed, as it is not necessarily relevant in troubleshooting the protocol in question. For example, most fields from IP headers are not displayed. If those fields are needed, then turn on HEX/ASCII option.
- A lot of the output will be interpreted according to the standard, so instead of displaying an actual integer value, the system prints a textual representation of the value. Turn on verbosity 3 and/or the hex/ascii dump to see the raw data.

Here is example output of verbosity 3 vs. 2, followed by HEX/ASCII for an entire A11 packet:

- Not all fragmented packets are displayed because the Network Processor Unit (NPU) combines fragments received from the wire before giving them to sessmgr process that handles calls and where the monitor subscriber output it generated. Similarly for the outbound direction, fragmenting done by the NPU is not displayed.
- On a Combo Foreign Agent (FA) / HA chassis, the output from only one of the user sessions is displayed. For example, if radius authentication on the FA is seen, it does not display on the HA part of the call. Use monitor protocol in these situations, if feesible, for the specific protocols to be captured.
- When troubleshooting issues between nodes (i.e. FA and HA), take a trace on both chassis if the problem spans across them or if doing so could help eliminate some possibilities.

For example here is the same packet sent from the FA to the HA:

- Packets sent out and received from the egress interface of the Packet Data Network (PDN) (this does not include the egress of an FA for example, because the egress is an FA-HA IP tunnel), are NOT displayed per the architecture of the system of NOT displaying packets on untunneled interfaces. If a packet comes in the ingress and then a response is sent out the ingress, then that implies that the packet made it to its destination and back (including if the destination was the chassis itself). But if no response is sent out the ingress and it was expected, then it needs to be determined if it did get sent out the egress to eliminate the ASR as a culprit, and if so, was a response ever received on the egress? This applies to both directions actually. Packet sniffers on the respective ingress or egress interfaces and other

points in the transport network, including logging at various points in the transport including the termination points (User equipment or network/internet server), may be helpful in pinpointing the cause of non-response.

Here is an ICMP request and response on an FA and HA where the packet is only shown on the ingress (FA-HA tunnel) side of the HA, but on both the ingress and egress sides of the FA, since both interfaces are tunneled. Note the only field that changes between the FA and HA is the Time to Live (TTL) value as it traverses network nodes:

* There is no built-in packet sniffer on the ASR interfaces that customers can access, but TAC has some capability in this area depending on the protocol (user data cannot be captured nomatter what)

When analyzing the mon sub output, consider the following:

- are there packets missing that are expected to be seen (i.e. responses from outside the chassis or requests from the chassis or forwarded packets from the chassis)
- can packets be seen going in the opposite direction than is being troubleshot (to confirm at least one direction is working)
- are packets being sent/received at expected intervals realtime and/or according to specification/configured timer values
- are packets being sent/received in expected order per the protocol (see caveat earlier about ordering)
- are the various fields in packets containing the correct/expected values (port numbers, ip addresses, etc.)
- for TCP/IP, is the connection properly setup and torn down. Identification of TCP flags used by mon sub includes S (SYN), . followed by Ack on line (Acknowledgement), S followed by Ack later on line (SYN Ack), P (Push), R (Reset), F (FIN)
- is the problem consistently happening or randomly
- is there any pattern with respect to subscriber call control type, subscriber id (username, msid, imsi, etc.), Private or NAT IP pool or address range, UDP/TCP port numbers, network server (endpoint) address, type of user traffic (HTTP, SMS, FTP, UDP, etc.), peer call control node addresses (Ex: FA, HA, PCF, Policy & Charging Rules Function (PCRF), Serving Gateway (SGW), Diameter server, etc.), etc. Leave no stone unturned.
- familiarity with rules and custom protocol behaviors the service provider has put into place that may or may not be published/revealed - ask questions!!!

## logging monitor

This is actually a global config command versus a runtime executive command used to monitor specific users. There are two advantages to using this command:

- there is no need to keep a CLI session open because all output is saved to logs
- it automatically saves debug level logs for all facilities for the subscriber, including the output that normally would appear with monitor subscriber. Though debug is a lot more than may be

needed, no information is missed, and it is not intrusive to the system as turning on logging or monitor protocol would be for various facilities (since doing so would pull information for all subscribers using the monitored facilities).

- output may not be as easy/quick to read as that generated by monitor subscriber. Typically TAC and/or engineering would need to interpret the output.
- in order to capture the details of protocol messages as would be captured by monitor subscriber (logging monitor only saves the first few lines of any protocol message), either run a monitor subscriber session simultaneously and later reference the output as needed when analyzing the logging monitor output, OR, turn on full event verbosity for logging (global config command "logging display event-verbosity full"). The latter approach does not require any additional work later because all of the output is already contiguous and complete.

### logging trace

As opposed to logging monitor, this approach uses exec mode level access, but at the same time also requires the device to be already connected. This is useful to troubleshoot user data (and/or further call control events after the point of running the command) as opposed to call setup because the call needs to be already setup in order for this to work (otherwise is reports "No calls match the specified criteria" and achieves nothing). Similar to logging monitor, "show logs" displays all captured data.

### monitor protocol

This command monitors all protocol exchange on a chassis for the specified protocol(s) (call control, data-plane) and the output is a similar style as monitor subscriber

- This should only be a last resort on a production chassis because of the potential load exerted, dependent on the protocol and packet volume for the protocol.
- Requires Administrator CLI access to run
- To get the output for a specific subscriber, it would need to be filtered by identifying type of information, such as username/MSID, callid, etc..

### active or runtime logging

This captures output for specified facilities at specified level (range from error to debug)
- This has the same issues as with monitor protocol with regards to system load and filtering subscriber output
- Likely requires running/configuring a syslog server depending on the desire of facilities, debug level, and timeframe to go back, or else data could be overwritten by the time it is attempted to be retrieved on the chassis.

# Subscriber commands

For all of the below subscriber commands, not only is the information for a particular subscriber available, but the hit list can be narrowed to a group of subscribers by any number of criteria, such as call control service they are attached to (PDSN, FA, HA, LAC, L2TP Network Server (LNS), ECS, LTE etc.) or entity that are communicating (peered) with (PCF, FA, HA, LAC, LNS, SGW, etc.), Packet Switching Card (PSC) attached to, connected or idle time left or session time left (greater/less than), amount of data received or sent (greater/less than), associated IP pool name, dormant/active, etc., or even various combinations of these and many other parameters. Using the online help to list out the possibilities and then to experiment with them is a great way to learn.

As mentioned earlier, it is not required to always know the specific subscriber to track. Rather knowing the category that the subscribers falls into leads to being able to obtain a list of the subscribers in the category, from which one can further narrow/analyze and choose particular subscribers to analyze. See the CLI auto-complete help for "show subscribers".

When it does come time to choose a particular subscriber, qualification with one of the keywords such as username, International Mobile Subscriber Identitiy (IMSI), MSID, Mobile Station ISDN (MSISDN), etc. will be necessary.

## show subscribers full

This is probably the number one subscriber command that exists and should be captured for every subscriber issue. It includes a TON of information for the specified subscriber and can be very useful for troubleshooting subscriber issues. While it is not feasible to discuss every field here, some fields obviously are commonly checked and referenced more than others, though each scenario is different depending on what is being troubleshot. Some things to keep in mind are:

- Some fields are not relevant depending on the call technology. For instance:- the Domain Named Server (DNS) address on an HA is not relevant because the DNS is given out from the PDSN/FA.
- Dormancy only has meaning on the access node and is always set to active on the gateway
- Some fields could be listed more than once
- Some fields may indicate one value but in fact another value ends up getting used. For instance, the RADIUS server that gets used may change if there are connectivity issues to the primary one
- For LTE and others, one output for each connected bearer per subscriber is displayed. So for example, if a subscriber is connected with three Application Point Names (APNs) where one APN has two bearers, then there would be four separate outputs one after the other.
- The various fields should be able to be correlated to the output of other CLIs including the configuration as necessary.

Interesting fields for PDSN/FA (Access node(s)) and HA (HA is a gateway type of node) node types, also applicable mostly to all the call types, include:

- Status - Dormant or Active.
- Access Type/Tech - technology on the ingress side of the call
- Network Type - technology on the egress side of the call
- Username, MSID, ip address, NAT ip address - ways to identify the subscriber.

Note: msid is not always msid. For example on a PGW it is IMSI.

- Callid - 8 hex digit ID used to track all activity for every session. A unique Callid exists for each APN on a Packet Data Network Gateway (PGW) or Multimedia Management Entity (MME)
- Sessmgr Instance - sessmgr instance handling the session (show task resources will list the sessmgrs)
- Card/Cpu - PSC or Data Processing Card (DPC) on which the sessmgr resides
- PCF, HA, FA, DNS addresses, etc. - self explanatory
- connected time - when the call connected
- call duration - how long the call has been connected.
  Note: May be different between FA and HA if subscriber has roamed, since the new FA node would not know the total life the original call has been up for
- idle time - how long user data (control packets are not counted) has not been exchanged
- session time left - how much longer the session can last before being terminated (controlled by hard-coded configuration, returned in authentication, and/or negotiated amongst nodes)
- MIP FA / MIP HA - various values for the MIP session
- Input Pkts/Bytes - # of user Packets/Bytes received from the subscriber via the ingress side
- Output Pkts/Bytes - # of user Packets/Bytes sent towards the subscriber via the ingress side.
  Notes:
    - These counters apply to the ingress side. There are no counters on the egress side!!
    - There should be a close correlation of these counts and the packets sent to/from ECS but there might not be an exact match
- input pkts dropped/output pkts dropped - note that packets may actually get dropped outside of ECS, such as multi-cast packets, or dropped by an Access Control List (ACL) in the context (so don't assume all packet drops are in ECS).

Gateway nodes:

- ip pool name - IP pool from which IP addressed are retrieved. Relevant only on call endpoint (gateway) since other nodes (i.e. PDSN) have no way to know the pool name, only the address.
- ECS Rulebase - rulebase in Active Charging Service (ACS) containing rules to apply to subscriber packets
- Nat ip address - publicly routable IP address which NATs the subscribers privately assigned IP address
- NAT Realm - grouping of associated NAT IP pools used in ECS service
- (on-demand) - whether NAT address is permanently or temporarily assigned to the subscriber (per pool configuration)
- (NAT IP pool name) - NAT pool name
- Nexthop ip address - next hop address of IP pool to where packets should be forwarded
- Nat port chunks allocated - number of ports available and used and range of those ports for NATing with NAT IP
- Downlink CSS Information/Uplink CSS Information - Counts for uplink (input) and downlink (output) directions for packets processed by ECS service

The following is an abbreviated output (some "less important" fields removed) for "show sub full" taken at the same time for the same subscriber on both a PDSN and HA, making it easy to correlate the output between the two including the packet counts.

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
```

```
Username: 9782577072@cisco.com          Status: Dormant
  Access Type: pdsn-mobile-ip         Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT             Access Network Peer ID: n/a
  callid: 3ee822d2                    msid: 111119782577072
  Card/Cpu: 15/0                      Sessmgr Instance: 212
  state: Connected                    PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s                idle time left: 02h02m30s
  session time left: 23h44m25s        ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source       destination context: destination
  AAA context: source               AAA domain: cisco.com
  AAA start count: 1                AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                   Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s            Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                     output pkts: 229
  input bytes: 24088                  output bytes: 129012
input pkts dropped: 0                 output pkts dropped: 0
   dormancy total: 11                 handoff total: 0
Num Auxiliary A10s:1
  PCF Address     SR_ID
10.211.17.207      1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com          Status: Online/Active
  Access Type: ha-mobile-ip           Network Type: IP
  Access Tech: Other                  Access Network Peer ID: n/a
  callid: 4a6ae475                    msid: n/a
  Card/Cpu: 2/0                       Sessmgr Instance: 329
  state: Connected                    FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s                idle time left: n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                  destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1   RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135        Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL             active output acl: ECS_ACL
  ECS Rulebase: 201                   Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int     Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                    FA Address/Port: 203.0.113.1/434
    Home-Address: 10.251.88.68         HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                Remaining Life: 01h49m32s
    Revocation Negotiated: Yes         Revocation I Bit Negotiated: Yes
    MN-HA-Key-Present: TRUE            MN-HA-SPI:300
```

```
       FA-HA-Key-Present: TRUE                FA-HA-SPI:8832
    Proxy DNS Intercept List: ROAMINGDNS
    Downlink CSS Information
      Service/ACL Names: /ECS_ACL
        downlink pkts to svc: 229          downlink pkts from svc: 229
    Uplink CSS Information
      Service/ACL Names: /ECS_ACL
        uplink pkts to svc: 254            uplink pkts from svc: 252
    input pkts: 254                                    output pkts: 229
    input bytes: 24088                                 output bytes: 129012
```

Based on the following ICMP Request/Response packet exchange between FA and HA nodes
(there were actually 4 ICMP exchanges, only one shown here), the ensuing packet/byte counts
tracked by "show sub full" are shown:

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com        Status: Dormant
  Access Type: pdsn-mobile-ip         Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT             Access Network Peer ID: n/a
  callid: 3ee822d2                    msid: 111119782577072
  Card/Cpu: 15/0                      Sessmgr Instance: 212
  state: Connected                   PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s               idle time left: 02h02m30s
  session time left: 23h44m25s       ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source        destination context: destination
  AAA context: source                AAA domain: cisco.com
  AAA start count: 1                 AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                     Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s            Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                             output pkts: 229
  input bytes: 24088                          output bytes: 129012
input pkts dropped: 0                  output pkts dropped: 0
   dormancy total: 11                  handoff total: 0
Num Auxiliary A10s:1
  PCF Address      SR_ID
10.211.17.207        1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com        Status: Online/Active
  Access Type: ha-mobile-ip           Network Type: IP
  Access Tech: Other                  Access Network Peer ID: n/a
  callid: 4a6ae475                    msid: n/a
  Card/Cpu: 2/0                       Sessmgr Instance: 329
  state: Connected                   FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s               idle time left:  n/a
  session time left: 23h49m32s
```

```
ip address: 10.251.88.68
ip pool name: MIP_Private
ha-service name: HA1
source context: HA                       destination context: XGWout
Acct-session-id: A414F3F6
RADIUS Auth Server IP: 198.51.100.1    RADIUS Acct Server IP: n/a
NAS IP Address: 10.208.148.135         Nexthop IP Address: 209.165.200.230
active input acl: ECS_ACL              active output acl: ECS_ACL
ECS Rulebase: 201                      Firewall-and-Nat Policy: MIP
 Nat Realm: MIP_NAT_Int      Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
 Nexthop ip address: 209.165.200.230
Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
Max NAT port chunks used: 1
HA binding care-of-addr(s): 203.0.113.1
MIPHA binding 1:  Care-of-Address: 203.0.113.1
                  FA Address/Port: 203.0.113.1/434
  Home-Address: 10.251.88.68           HA-Address: 203.0.113.2
  Lifetime: 02h00m00s                  Remaining Life: 01h49m32s
  Revocation Negotiated: Yes           Revocation I Bit Negotiated: Yes
  MN-HA-Key-Present: TRUE              MN-HA-SPI:300
  FA-HA-Key-Present: TRUE              FA-HA-SPI:8832
 Proxy DNS Intercept List: ROAMINGDNS
 Downlink CSS Information
   Service/ACL Names: /ECS_ACL
     downlink pkts to svc: 229          downlink pkts from svc: 229
 Uplink CSS Information
   Service/ACL Names: /ECS_ACL
     uplink pkts to svc: 254            uplink pkts from svc: 252
input pkts: 254                                    output pkts: 229
input bytes: 24088                                 output bytes: 129012
```

The following example snippet is for a Voice over LTE (VoLTE) call. Interpreting can be tricky because there are two subscribers listed and the differentiation is not crystal clear between them.

- The first one listed is the default IP Multimedia System (IMS) bearer and the second is the dedicated (VoLTE) bearer, both part of the same APN
- The Acct-session-id: is a differentiator.
- The input/output pkts/bytes are different between the two bearers, and because the dedicated bearer would be sending many more (voice) packets, one could assume that the subscriber with the higher count would be the dedicated bearer, meanwhile ... packet counts to / from ECS is listed the same for both (the amount used by the default bearer)
- The connect time display for both displays the default bearer connection time even though the dedicated connected later.
- The way to get more useful and accurate, less tricky information for PGW calls is with "show pgw-only full" (discussed later)

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com        Status: Dormant
  Access Type: pdsn-mobile-ip         Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT             Access Network Peer ID: n/a
  callid: 3ee822d2                    msid: 111119782577072
  Card/Cpu: 15/0                      Sessmgr Instance: 212
  state: Connected                    PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s                idle time left: 02h02m30s
  session time left: 23h44m25s       ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
```

```
    home-agent:  203.0.113.2
    fa-service name: FA9  (context destination)
    source context: source        destination context: destination
   AAA context: source                AAA domain: cisco.com
   AAA start count: 1                  AAA stop count: 0
   AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
   AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                     Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s             Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                          output pkts: 229
  input bytes: 24088                       output bytes: 129012
input pkts dropped: 0                      output pkts dropped: 0
    dormancy total: 11             handoff total: 0
Num Auxiliary A10s:1
  PCF Address      SR_ID
10.211.17.207       1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com         Status: Online/Active
  Access Type: ha-mobile-ip            Network Type: IP
  Access Tech: Other                   Access Network Peer ID: n/a
  callid: 4a6ae475                     msid: n/a
  Card/Cpu: 2/0                        Sessmgr Instance: 329
  state: Connected                     FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s                idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                   destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1  RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135       Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL            active output acl: ECS_ACL
  ECS Rulebase: 201                    Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int     Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                   FA Address/Port: 203.0.113.1/434
    Home-Address: 10.251.88.68         HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                Remaining Life: 01h49m32s
    Revocation Negotiated: Yes         Revocation I Bit Negotiated: Yes
    MN-HA-Key-Present: TRUE            MN-HA-SPI:300
    FA-HA-Key-Present: TRUE            FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
    Service/ACL Names: /ECS_ACL
      downlink pkts to svc: 229        downlink pkts from svc: 229
  Uplink CSS Information
    Service/ACL Names: /ECS_ACL
      uplink pkts to svc: 254          uplink pkts from svc: 252
  input pkts: 254                          output pkts: 229
  input bytes: 24088                       output bytes: 129012
```

# show subscribers (hsgw-only | pgw-only | ggsn-only | mme-only | sgw-only | sgsn-only) full

Some of these have very useful information that is specifically tailored to the call type than just normal show subscriber full (which is more generic where many fields apply to all call types, though some fields still are specific to certain call types)

- In the case of hsgw-only and ggsn-only, there is no difference in output compared to normal "show sub full" except that the qualifier automatically limits the hit list to calls of the specified type.
- MSISDN effectively lists the device phone number
- Field name IMSI is explicitly and correctly listed
- Note that Bearers from the same APN have the same Callid
- Bearer Type and Bearer-ID - distinguish between the various bearers
- QCI - Quality of Service Identifier (ranges from 1 to 9). In this case QCI 1 is for voice and QCI 5 is for IMS control
- c-teid, u-teid - Terminal Endpoint Identifiers for Control and User plane are necessary for identifying what bearer to associate data packets with
- S5/S8/S2b-APN, SGi-APN - The APN of the bearer
- input pkts/output pkts - packet counts are for the bearer itself
- MBR/GBR Uplink/Downlink - Maximum and Guaranteed Bit rates in both directions. Note 38000 bits/sec for VoLTE which is about the bitrate for the VoLTE codecs.

The following example snippet is for the same Voice over LTE (VoLTE) call as shown with "show sub full" above, taken around the same time (see timestamp), so that useful comparisons of output can be made if interested. It also includes the Internet APN that was also connected at the time:

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com          Status: Dormant
  Access Type: pdsn-mobile-ip          Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT              Access Network Peer ID: n/a
  callid: 3ee822d2                     msid: 111119782577072
  Card/Cpu: 15/0                       Sessmgr Instance: 212
  state: Connected                     PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s                 idle time left: 02h02m30s
  session time left: 23h44m25s         ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source        destination context: destination
  AAA context: source                  AAA domain: cisco.com
  AAA start count: 1                   AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                        Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s               Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                      output pkts: 229
```

```
   input bytes: 24088                       output bytes: 129012
input pkts dropped: 0                   output pkts dropped: 0
   dormancy total: 11                    handoff total: 0
Num Auxiliary A10s:1
  PCF Address      SR_ID
10.211.17.207       1


[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com        Status: Online/Active
  Access Type: ha-mobile-ip            Network Type: IP
  Access Tech: Other                   Access Network Peer ID: n/a
  callid: 4a6ae475                     msid: n/a
  Card/Cpu: 2/0                        Sessmgr Instance: 329
  state: Connected                     FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s                 idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                   destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1   RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135        Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL             active output acl: ECS_ACL
  ECS Rulebase: 201                     Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int       Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                    FA Address/Port: 203.0.113.1/434
   Home-Address: 10.251.88.68          HA-Address: 203.0.113.2
   Lifetime: 02h00m00s                 Remaining Life: 01h49m32s
   Revocation Negotiated: Yes          Revocation I Bit Negotiated: Yes
   MN-HA-Key-Present: TRUE             MN-HA-SPI:300
   FA-HA-Key-Present: TRUE             FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
   Service/ACL Names: /ECS_ACL
     downlink pkts to svc: 229          downlink pkts from svc: 229
  Uplink CSS Information
   Service/ACL Names: /ECS_ACL
     uplink pkts to svc: 254            uplink pkts from svc: 252
  input pkts: 254                               output pkts: 229
  input bytes: 24088                             output bytes: 129012
```

## show active-charging sessions full

This is probably the second most important subscriber command behind "show sub full", even more important on the gateways if troubleshooting ECS-related issues such as packet drops, online charging, IMS (PCRF) authorization.

- Uplink and Downlink Packets and Bytes should match those reportedly sent to/from ECS in "show sub pgw-only"
- Be aware of the various fields that track dropped packets

- Dynamic-Rule-Name entries are rules returned by the PCRF via Gx interaction at initial and ongoing PCRF interaction. The packet counts matching the rule are listed along with their definitions
- For charging rule definitions (in this example it's the dedicated VoLTE bearer), quota, usage, and time are also listed

To be consistent, the following example snippet is for the same Voice over LTE (VoLTE) call as shown with "show sub full" and "show sub pgw-only full" above, taken around the same time (see timestamp), so that useful comparisons of output can be made if interested.

- Additionally shown is the Internet APN which captures online charging data
- rule 0_0 is for the voice (Realtime Transport Protocol (RTP)) data, and 0_1 is for Realtime Control Protocol (RCP) - which is used to communicate the quality of the link and voice over that link over time. No packets have passed over RCP bearer at the time this CLI was run.

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com        Status: Dormant
  Access Type: pdsn-mobile-ip        Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT            Access Network Peer ID: n/a
  callid: 3ee822d2                    msid: 111119782577072
  Card/Cpu: 15/0                      Sessmgr Instance: 212
  state: Connected                   PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s               idle time left: 02h02m30s
  session time left: 23h44m25s       ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9   (context destination)
  source context: source        destination context: destination
  AAA context: source               AAA domain: cisco.com
  AAA start count: 1                AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                  Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68      HA-Address: 203.0.113.2
    Lifetime: 02h00m00s             Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                     output pkts: 229
  input bytes: 24088                  output bytes: 129012
input pkts dropped: 0              output pkts dropped: 0
    dormancy total: 11               handoff total: 0
Num Auxiliary A10s:1
  PCF Address       SR_ID
10.211.17.207        1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com        Status: Online/Active
  Access Type: ha-mobile-ip          Network Type: IP
  Access Tech: Other                 Access Network Peer ID: n/a
  callid: 4a6ae475                    msid: n/a
  Card/Cpu: 2/0                       Sessmgr Instance: 329
  state: Connected                   FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
```

```
   idle time: 00h02m23s                  idle time left:  n/a
   session time left: 23h49m32s
   ip address: 10.251.88.68
   ip pool name: MIP_Private
   ha-service name: HA1
   source context: HA                    destination context: XGWout
   Acct-session-id: A414F3F6
   RADIUS Auth Server IP: 198.51.100.1   RADIUS Acct Server IP: n/a
   NAS IP Address: 10.208.148.135        Nexthop IP Address: 209.165.200.230
   active input acl: ECS_ACL             active output acl: ECS_ACL
   ECS Rulebase: 201                     Firewall-and-Nat Policy: MIP
    Nat Realm: MIP_NAT_Int     Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
    Nexthop ip address: 209.165.200.230
   Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
   Max NAT port chunks used: 1
   HA binding care-of-addr(s): 203.0.113.1
   MIPHA binding 1:  Care-of-Address: 203.0.113.1
                     FA Address/Port: 203.0.113.1/434
     Home-Address: 10.251.88.68          HA-Address: 203.0.113.2
     Lifetime: 02h00m00s                 Remaining Life: 01h49m32s
     Revocation Negotiated: Yes          Revocation I Bit Negotiated: Yes
     MN-HA-Key-Present: TRUE             MN-HA-SPI:300
     FA-HA-Key-Present: TRUE             FA-HA-SPI:8832
   Proxy DNS Intercept List: ROAMINGDNS
   Downlink CSS Information
     Service/ACL Names: /ECS_ACL
       downlink pkts to svc: 229         downlink pkts from svc: 229
   Uplink CSS Information
     Service/ACL Names: /ECS_ACL
       uplink pkts to svc: 254           uplink pkts from svc: 252
   input pkts: 254                                output pkts: 229
   input bytes: 24088                             output bytes: 129012
```

## show active-charging firewall statistics

This is the little sister of "show active-charging sessions full" and could provide more information
on the reason for packet drops.

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com        Status: Dormant
  Access Type: pdsn-mobile-ip         Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT             Access Network Peer ID: n/a
  callid: 3ee822d2                    msid: 111119782577072
  Card/Cpu: 15/0                      Sessmgr Instance: 212
  state: Connected                   PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s               idle time left: 02h02m30s
  session time left: 23h44m25s       ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source      destination context: destination
  AAA context: source                AAA domain: cisco.com
  AAA start count: 1                 AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                 Care-of-Address: 203.0.113.1
```

```
     Home-Address: 10.251.88.68      HA-Address: 203.0.113.2
     Lifetime: 02h00m00s             Remaining Life: 01h49m25s
     Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
   input pkts: 254                       output pkts: 229
   input bytes: 24088                    output bytes: 129012
input pkts dropped: 0                 output pkts dropped: 0
   dormancy total: 11                 handoff total: 0
Num Auxiliary A10s:1
  PCF Address      SR_ID
10.211.17.207      1


[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com          Status: Online/Active
  Access Type: ha-mobile-ip            Network Type: IP
  Access Tech: Other                   Access Network Peer ID: n/a
  callid: 4a6ae475                     msid: n/a
  Card/Cpu: 2/0                        Sessmgr Instance: 329
  state: Connected                     FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s                idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                   destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1  RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135       Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL            active output acl: ECS_ACL
  ECS Rulebase: 201                    Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int      Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                    FA Address/Port: 203.0.113.1/434
     Home-Address: 10.251.88.68         HA-Address: 203.0.113.2
     Lifetime: 02h00m00s                Remaining Life: 01h49m32s
     Revocation Negotiated: Yes         Revocation I Bit Negotiated: Yes
     MN-HA-Key-Present: TRUE            MN-HA-SPI:300
     FA-HA-Key-Present: TRUE            FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
    Service/ACL Names: /ECS_ACL
      downlink pkts to svc: 229       downlink pkts from svc: 229
  Uplink CSS Information
    Service/ACL Names: /ECS_ACL
      uplink pkts to svc: 254         uplink pkts from svc: 252
  input pkts: 254                          output pkts: 229
  input bytes: 24088                       output bytes: 129012
```

## show subscribers data-rate [high/low]

Captures data rates / throughput for a subscriber or group of subscribers

- This is most useful when applying to a group of subscribers that are suspected to have data issues in either/both directions compared to normal or other groups - i.e. subscribers in a particular IP pool that is having issues

The following output is for the same VoLTE subscriber taken at the same time as the previous commands.

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com         Status: Dormant
  Access Type: pdsn-mobile-ip          Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT              Access Network Peer ID: n/a
  callid: 3ee822d2                     msid: 111119782577072
  Card/Cpu: 15/0                       Sessmgr Instance: 212
  state: Connected                     PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s                idle time left: 02h02m30s
  session time left: 23h44m25s        ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source        destination context: destination
  AAA context: source                 AAA domain: cisco.com
  AAA start count: 1                  AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                   Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s            Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                      output pkts: 229
  input bytes: 24088                   output bytes: 129012
input pkts dropped: 0                  output pkts dropped: 0
  dormancy total: 11                   handoff total: 0
Num Auxiliary A10s:1
  PCF Address      SR_ID
10.211.17.207       1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com         Status: Online/Active
  Access Type: ha-mobile-ip            Network Type: IP
  Access Tech: Other                   Access Network Peer ID: n/a
  callid: 4a6ae475                     msid: n/a
  Card/Cpu: 2/0                        Sessmgr Instance: 329
  state: Connected                     FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s                idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                   destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1   RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135        Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL            active output acl: ECS_ACL
  ECS Rulebase: 201                    Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int     Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
```

```
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                    FA Address/Port: 203.0.113.1/434
    Home-Address: 10.251.88.68           HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                  Remaining Life: 01h49m32s
    Revocation Negotiated: Yes           Revocation I Bit Negotiated: Yes
    MN-HA-Key-Present: TRUE              MN-HA-SPI:300
    FA-HA-Key-Present: TRUE              FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
    Service/ACL Names: /ECS_ACL
      downlink pkts to svc: 229          downlink pkts from svc: 229
  Uplink CSS Information
    Service/ACL Names: /ECS_ACL
      uplink pkts to svc: 254            uplink pkts from svc: 252
  input pkts: 254                                 output pkts: 229
  input bytes: 24088                              output bytes: 129012
```

## show subscribers debug-info

This command has mostly information that could be helpful for TAC or Engineering in their efforts to support the customer, though there is information here that the curious customer might find interesting.

The same VoLTE example is used here:

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com        Status: Dormant
  Access Type: pdsn-mobile-ip          Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT              Access Network Peer ID: n/a
  callid: 3ee822d2                     msid: 111119782577072
  Card/Cpu: 15/0                       Sessmgr Instance: 212
  state: Connected                     PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s                 idle time left: 02h02m30s
  session time left: 23h44m25s         ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source        destination context: destination
  AAA context: source                  AAA domain: cisco.com
  AAA start count: 1                   AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                    Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s            Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                          output pkts: 229
  input bytes: 24088                       output bytes: 129012
input pkts dropped: 0                 output pkts dropped: 0
  dormancy total: 11                 handoff total: 0
Num Auxiliary A10s:1
  PCF Address       SR_ID
```

```
10.211.17.207        1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com          Status: Online/Active
  Access Type: ha-mobile-ip            Network Type: IP
  Access Tech: Other                   Access Network Peer ID: n/a
  callid: 4a6ae475                     msid: n/a
  Card/Cpu: 2/0                        Sessmgr Instance: 329
  state: Connected                     FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s                 idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                   destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1  RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135       Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL            active output acl: ECS_ACL
  ECS Rulebase: 201                    Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int     Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                    FA Address/Port: 203.0.113.1/434
    Home-Address: 10.251.88.68         HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                Remaining Life: 01h49m32s
    Revocation Negotiated: Yes         Revocation I Bit Negotiated: Yes
    MN-HA-Key-Present: TRUE            MN-HA-SPI:300
    FA-HA-Key-Present: TRUE            FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
    Service/ACL Names: /ECS_ACL
      downlink pkts to svc: 229         downlink pkts from svc: 229
  Uplink CSS Information
    Service/ACL Names: /ECS_ACL
      uplink pkts to svc: 254           uplink pkts from svc: 252
  input pkts: 254                             output pkts: 229
  input bytes: 24088                          output bytes: 129012
```

## show subscribers aaa-configuration

This is a huge list of all AAA and configuration (even non-AAA related) related information for a subscriber, regardless of whether AAA is even used or was ever accessed or not. It is useful to see what the chassis assigned to the subscriber without having to necessarily analyze AAA authentication packets exchanges, subscriber profiles or make assumptions about the default chassis settings.

## show subscribers activity

This graphs activity level of a subscriber

## show active-charging flows ip-address

This is a list of all flows by flow id for all sessions connected to the given egress ip address, along with the number of bytes sent in both directions. Monitor subscriber must be used first to see what addresses that a subscriber is trying to access and then confirm whether any packets are received from that address.

- Detailed information about the flow id of interest can be retrieved with show active-charging flows full flow-id, identifying the proper flow by the MS IP field (IP address of the subscriber which is known at this point from mon sub output).

## show subscribers policy

This lists the subscriber's current policies assigned

## show [mipfa | mipha] full

This lists detailed MIP-related information about a subscriber

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com          Status: Dormant
  Access Type: pdsn-mobile-ip           Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT               Access Network Peer ID: n/a
  callid: 3ee822d2                      msid: 111119782577072
  Card/Cpu: 15/0                        Sessmgr Instance: 212
  state: Connected                      PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s                  idle time left: 02h02m30s
  session time left: 23h44m25s          ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source       destination context: destination
  AAA context: source                   AAA domain: cisco.com
  AAA start count: 1                     AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                     Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                       output pkts: 229
  input bytes: 24088                    output bytes: 129012
input pkts dropped: 0                   output pkts dropped: 0
  dormancy total: 11                    handoff total: 0
Num Auxiliary A10s:1
```

```
   PCF Address      SR_ID
10.211.17.207      1


[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com          Status: Online/Active
  Access Type: ha-mobile-ip            Network Type: IP
  Access Tech: Other                   Access Network Peer ID: n/a
  callid: 4a6ae475                     msid: n/a
  Card/Cpu: 2/0                        Sessmgr Instance: 329
  state: Connected                     FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s                  idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                    destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1   RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135        Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL             active output acl: ECS_ACL
  ECS Rulebase: 201                     Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int      Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                    FA Address/Port: 203.0.113.1/434
    Home-Address: 10.251.88.68          HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                 Remaining Life: 01h49m32s
    Revocation Negotiated: Yes          Revocation I Bit Negotiated: Yes
    MN-HA-Key-Present: TRUE             MN-HA-SPI:300
    FA-HA-Key-Present: TRUE             FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
    Service/ACL Names: /ECS_ACL
      downlink pkts to svc: 229         downlink pkts from svc: 229
  Uplink CSS Information
    Service/ACL Names: /ECS_ACL
      uplink pkts to svc: 254           uplink pkts from svc: 252
  input pkts: 254                                output pkts: 229
  input bytes: 24088                             output bytes: 129012
```

## show [mipfa |mipha] counters

This reports on various MIP related counters for a subscriber:

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com        Status: Dormant
  Access Type: pdsn-mobile-ip         Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT             Access Network Peer ID: n/a
  callid: 3ee822d2                    msid: 111119782577072
  Card/Cpu: 15/0                      Sessmgr Instance: 212
  state: Connected                    PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s               idle time left: 02h02m30s
  session time left: 23h44m25s       ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
```

```
    Secondary DNS Address: 209.165.200.226
    home-agent:  203.0.113.2
    fa-service name: FA9  (context destination)
    source context: source      destination context: destination
    AAA context: source              AAA domain: cisco.com
    AAA start count: 1              AAA stop count: 0
    AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
    AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
    NAS IP Address: 10.208.148.133
MIPFA Session:                 Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68    HA-Address: 203.0.113.2
    Lifetime: 02h00m00s              Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
   input pkts: 254                      output pkts: 229
   input bytes: 24088                   output bytes: 129012
input pkts dropped: 0                   output pkts dropped: 0
    dormancy total: 11                  handoff total: 0
Num Auxiliary A10s:1
  PCF Address       SR_ID
10.211.17.207        1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com          Status: Online/Active
  Access Type: ha-mobile-ip          Network Type: IP
  Access Tech: Other                 Access Network Peer ID: n/a
  callid: 4a6ae475                   msid: n/a
  Card/Cpu: 2/0                      Sessmgr Instance: 329
  state: Connected                   FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s              idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                 destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1   RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135      Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL           active output acl: ECS_ACL
  ECS Rulebase: 201                   Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int     Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                  FA Address/Port: 203.0.113.1/434
    Home-Address: 10.251.88.68         HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                Remaining Life: 01h49m32s
    Revocation Negotiated: Yes         Revocation I Bit Negotiated: Yes
    MN-HA-Key-Present: TRUE            MN-HA-SPI:300
    FA-HA-Key-Present: TRUE            FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
    Service/ACL Names: /ECS_ACL
      downlink pkts to svc: 229       downlink pkts from svc: 229
  Uplink CSS Information
    Service/ACL Names: /ECS_ACL
      uplink pkts to svc: 254         uplink pkts from svc: 252
  input pkts: 254                      output pkts: 229
  input bytes: 24088                   output bytes: 129012
```

# show ppp [full]

This reports detailed PPP related information about a subscriber.
- The full version is not a superset of the normal version.

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com        Status: Dormant
  Access Type: pdsn-mobile-ip         Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT             Access Network Peer ID: n/a
  callid: 3ee822d2                    msid: 111119782577072
  Card/Cpu: 15/0                      Sessmgr Instance: 212
  state: Connected                    PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s               idle time left: 02h02m30s
  session time left: 23h44m25s       ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source        destination context: destination
  AAA context: source                AAA domain: cisco.com
  AAA start count: 1                 AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                     Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68      HA-Address: 203.0.113.2
    Lifetime: 02h00m00s             Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                       output pkts: 229
  input bytes: 24088                    output bytes: 129012
input pkts dropped: 0                 output pkts dropped: 0
  dormancy total: 11                  handoff total: 0
Num Auxiliary A10s:1
  PCF Address      SR_ID
10.211.17.207       1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com         Status: Online/Active
  Access Type: ha-mobile-ip            Network Type: IP
  Access Tech: Other                   Access Network Peer ID: n/a
  callid: 4a6ae475                     msid: n/a
  Card/Cpu: 2/0                        Sessmgr Instance: 329
  state: Connected                     FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s                idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                  destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1   RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135       Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL            active output acl: ECS_ACL
```

```
  ECS Rulebase: 201                          Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int      Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                    FA Address/Port: 203.0.113.1/434
    Home-Address: 10.251.88.68         HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                Remaining Life: 01h49m32s
    Revocation Negotiated: Yes         Revocation I Bit Negotiated: Yes
    MN-HA-Key-Present: TRUE            MN-HA-SPI:300
    FA-HA-Key-Present: TRUE            FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
    Service/ACL Names: /ECS_ACL
      downlink pkts to svc: 229        downlink pkts from svc: 229
  Uplink CSS Information
    Service/ACL Names: /ECS_ACL
      uplink pkts to svc: 254          uplink pkts from svc: 252
  input pkts: 254                              output pkts: 229
  input bytes: 24088                           output bytes: 129012
```

## show rp full


This reports detailed A11 (RP interface) related information about a subscriber
- "show rp counters" is a subset of this command

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com        Status: Dormant
  Access Type: pdsn-mobile-ip         Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT             Access Network Peer ID: n/a
  callid: 3ee822d2                    msid: 111119782577072
  Card/Cpu: 15/0                      Sessmgr Instance: 212
  state: Connected                   PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s                idle time left: 02h02m30s
  session time left: 23h44m25s        ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source        destination context: destination
  AAA context: source               AAA domain: cisco.com
  AAA start count: 1                AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                    Care-of-Address: 203.0.113.1
   Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s            Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                      output pkts: 229
  input bytes: 24088                   output bytes: 129012
input pkts dropped: 0            output pkts dropped: 0
   dormancy total: 11             handoff total: 0
```

```
Num Auxiliary A10s:1
  PCF Address     SR_ID
10.211.17.207      1


[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com          Status: Online/Active
  Access Type: ha-mobile-ip             Network Type: IP
  Access Tech: Other                    Access Network Peer ID: n/a
  callid: 4a6ae475                      msid: n/a
  Card/Cpu: 2/0                         Sessmgr Instance: 329
  state: Connected                      FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s                  idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                    destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1   RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135        Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL             active output acl: ECS_ACL
  ECS Rulebase: 201                     Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int       Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                    FA Address/Port: 203.0.113.1/434
    Home-Address: 10.251.88.68          HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                 Remaining Life: 01h49m32s
    Revocation Negotiated: Yes          Revocation I Bit Negotiated: Yes
    MN-HA-Key-Present: TRUE             MN-HA-SPI:300
    FA-HA-Key-Present: TRUE             FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
    Service/ACL Names: /ECS_ACL
      downlink pkts to svc: 229         downlink pkts from svc: 229
  Uplink CSS Information
    Service/ACL Names: /ECS_ACL
      uplink pkts to svc: 254           uplink pkts from svc: 252
  input pkts: 254                                output pkts: 229
  input bytes: 24088                             output bytes: 129012
```

## show l2tp sessions full


This reports detailed l2tp related information about a subscriber
- note the Rx and Tx data Pkts counts for the LAC side of the call (0s) do not appear correct when compared to the LNS side of the call

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com          Status: Dormant
  Access Type: pdsn-mobile-ip           Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT               Access Network Peer ID: n/a
  callid: 3ee822d2                      msid: 111119782577072
  Card/Cpu: 15/0                        Sessmgr Instance: 212
  state: Connected                      PCF address: 10.211.17.207
```

```
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s              idle time left: 02h02m30s
  session time left: 23h44m25s      ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source      destination context: destination
  AAA context: source              AAA domain: cisco.com
  AAA start count: 1               AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                    Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s            Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                      output pkts: 229
  input bytes: 24088                   output bytes: 129012
input pkts dropped: 0                 output pkts dropped: 0
    dormancy total: 11                handoff total: 0
Num Auxiliary A10s:1
  PCF Address       SR_ID
10.211.17.207       1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com        Status: Online/Active
  Access Type: ha-mobile-ip          Network Type: IP
  Access Tech: Other                 Access Network Peer ID: n/a
  callid: 4a6ae475                   msid: n/a
  Card/Cpu: 2/0                      Sessmgr Instance: 329
  state: Connected                   FA address: 66.174.112.72
  connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
  idle time: 00h02m23s              idle time left:  n/a
  session time left: 23h49m32s
  ip address: 10.251.88.68
  ip pool name: MIP_Private
  ha-service name: HA1
  source context: HA                 destination context: XGWout
  Acct-session-id: A414F3F6
  RADIUS Auth Server IP: 198.51.100.1   RADIUS Acct Server IP: n/a
  NAS IP Address: 10.208.148.135     Nexthop IP Address: 209.165.200.230
  active input acl: ECS_ACL          active output acl: ECS_ACL
  ECS Rulebase: 201                  Firewall-and-Nat Policy: MIP
   Nat Realm: MIP_NAT_Int      Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
   Nexthop ip address: 209.165.200.230
  Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
  Max NAT port chunks used: 1
  HA binding care-of-addr(s): 203.0.113.1
  MIPHA binding 1:  Care-of-Address: 203.0.113.1
                    FA Address/Port: 203.0.113.1/434
    Home-Address: 10.251.88.68         HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                Remaining Life: 01h49m32s
    Revocation Negotiated: Yes         Revocation I Bit Negotiated: Yes
    MN-HA-Key-Present: TRUE            MN-HA-SPI:300
    FA-HA-Key-Present: TRUE            FA-HA-SPI:8832
  Proxy DNS Intercept List: ROAMINGDNS
  Downlink CSS Information
    Service/ACL Names: /ECS_ACL
      downlink pkts to svc: 229        downlink pkts from svc: 229
  Uplink CSS Information
```

```
    Service/ACL Names: /ECS_ACL
        uplink pkts to svc: 254                uplink pkts from svc: 252
    input pkts: 254                                      output pkts: 229
    input bytes: 24088                                   output bytes: 129012
```

## show rsvp counters

This lists detailed rsvp counters for a subscriber

## show ims-authorization sessions full

This lists detailed information about the PCRF session

This example shows PCRF information for two APNs, APN1 and APN2

- Note the SGSN IP-Address is actually the SGW address

```
PDSN> show sub full username 9782577072@cisco.com
Monday May 18 23:56:20 UTC 2015
Username: 9782577072@cisco.com          Status: Dormant
  Access Type: pdsn-mobile-ip           Network Type: Mobile-IP
  Access Tech: CDMA 1xRTT               Access Network Peer ID: n/a
  callid: 3ee822d2                      msid: 111119782577072
  Card/Cpu: 15/0                        Sessmgr Instance: 212
  state: Connected                      PCF address: 10.211.17.207
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m35s
  idle time: 00h02m30s                  idle time left: 02h02m30s
  session time left: 23h44m25s          ip address: 10.251.88.68
  Primary DNS Address: 209.165.200.225
  Secondary DNS Address: 209.165.200.226
  home-agent:  203.0.113.2
  fa-service name: FA9  (context destination)
  source context: source        destination context: destination
  AAA context: source                   AAA domain: cisco.com
  AAA start count: 1                     AAA stop count: 0
  AAA interim count(RADIUS+GTPP): 0  Acct-session-id: 69A9CDEB
  AAA RADIUS group: aaa-cisco.com
RADIUS Auth Server IP: 198.51.100.1
RADIUS Acct Server IP: 198.51.100.1
  NAS IP Address: 10.208.148.133
MIPFA Session:                  Care-of-Address: 203.0.113.1
    Home-Address: 10.251.88.68     HA-Address: 203.0.113.2
    Lifetime: 02h00m00s                 Remaining Life: 01h49m25s
    Revocation Negotiated: yes Revocation I Bit Negotiated: Yes
  input pkts: 254                       output pkts: 229
  input bytes: 24088                    output bytes: 129012
input pkts dropped: 0                   output pkts dropped: 0
  dormancy total: 11                    handoff total: 0
Num Auxiliary A10s:1
  PCF Address       SR_ID
10.211.17.207       1

[local]HA> show sub full username 9782577072@cisco.com
Monday May 18 23:56:14 UTC 2015
Username: 9782577072@cisco.com          Status: Online/Active
  Access Type: ha-mobile-ip             Network Type: IP
```

```
Access Tech: Other                        Access Network Peer ID: n/a
callid: 4a6ae475                          msid: n/a
Card/Cpu: 2/0                             Sessmgr Instance: 329
state: Connected                          FA address: 66.174.112.72
connect time: Mon May 18 23:45:54 2015 call duration: 00h10m28s
idle time: 00h02m23s                   idle time left:  n/a
session time left: 23h49m32s
ip address: 10.251.88.68
ip pool name: MIP_Private
ha-service name: HA1
source context: HA                        destination context: XGWout
Acct-session-id: A414F3F6
RADIUS Auth Server IP: 198.51.100.1    RADIUS Acct Server IP: n/a
NAS IP Address: 10.208.148.135         Nexthop IP Address: 209.165.200.230
active input acl: ECS_ACL              active output acl: ECS_ACL
ECS Rulebase: 201                      Firewall-and-Nat Policy: MIP
 Nat Realm: MIP_NAT_Int       Nat ip address: 170.200.132.0   (on-demand) (MIP_NAT_Int04)
 Nexthop ip address: 209.165.200.230
Nat port chunks allocated[start - end]: (1 chunk) [6464 - 6495]
Max NAT port chunks used: 1
HA binding care-of-addr(s): 203.0.113.1
MIPHA binding 1:  Care-of-Address: 203.0.113.1
                  FA Address/Port: 203.0.113.1/434
  Home-Address: 10.251.88.68           HA-Address: 203.0.113.2
  Lifetime: 02h00m00s                  Remaining Life: 01h49m32s
  Revocation Negotiated: Yes           Revocation I Bit Negotiated: Yes
  MN-HA-Key-Present: TRUE              MN-HA-SPI:300
  FA-HA-Key-Present: TRUE              FA-HA-SPI:8832
Proxy DNS Intercept List: ROAMINGDNS
Downlink CSS Information
  Service/ACL Names: /ECS_ACL
    downlink pkts to svc: 229          downlink pkts from svc: 229
Uplink CSS Information
  Service/ACL Names: /ECS_ACL
    uplink pkts to svc: 254            uplink pkts from svc: 252
input pkts: 254                               output pkts: 229
input bytes: 24088                            output bytes: 129012
```

## Non-Subscriber specific commands

Although the commands "show port npu counters" and "show port datalink counters" apply to an entire interface, if trying to see if the system is processing data for a particular subscriber out the egress interface (see mention above of limitation of monitor subscriber), and the the subscriber can be controlled, then try to send very large packets through the network, and see if the interface counters increment by the number of packets sent in the short window during which they are sent. Being able to do this with confidence in the results requires making sure the counters for the packet size chosen are not normally incrementing very frequently before running the test.