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Version 12 Machu Picchu

12.0 Machu Picchu ¹⁾

Changes in version 12.0

1. Changed: switch to DPDK 22.11 LTS
2. Added: parsing of 'Chaos Protection' header to QUIC IETF
3. Added: cold parameter `nat_transcode_cidr`, which specifies CIDR of provider's public addresses. It is possible to use 2 CIDR parameters when re-coding from public to private for NAT 1:1. Any public address can be assigned to the private address for NAT 1:1.
4. Changed: hash function for distribution by worker threads: ($\text{crc}(\text{ip_src}) \% \text{nthread} + \text{crc}(\text{ip_dst}) \% \text{nthread}$) \% nthread
5. Changed: public address allocation algorithm for CG-NAT: $\text{crc}(\text{private}) \% \text{nthread} + \text{crc}(\text{public}) \% \text{nthread}$
6. Changed: the message '[NFLW] very long operation' is always displayed no matter how many times the message is repeated
7. Changed: the name of the file record directory - added stream
8. Added: information output statistics for sending NetFlow/IPFIX

```
[STAT      ][2022/11/20-17:55:03:213770] Statistics on NFLW_export :  
{a/b/c%/d/e}
```

a - the number of cycles of sending executed
b - the number of cycles of sending, when the time spent on sending exceeded the period of execution of cycles
c - percentage of exceeding the number of the cycles: $100 * b/a$
d - time of the maximum duration of the cycle microseconds
e - time of the period of sending statistics, microseconds
(`'netflow_timeout'` parameter value (is set in seconds))

E.g. :
[STAT][2022/11/20-17:55:03:213770] Statistics on NFLW_export :
{7/0/0.00%/45297us/30008163us}

9. [PCRF][PPPoE] Fixed: previously, if Radius responded with an IPv6 address instead of a prefix, we did not make the prefix from the address, which led to recreation of the acct-sessions. Newly created acct-sessions used to be without login and other important attributes for ISPs.
10. [BRAS][L3-AUTH] Changed: Framed-Route is no longer applied to PD-prefix
11. [PCRF][ACCT] Fixed: previously, when an entry was unlinked from a multisession, the IP addresses for the multisession were not corrected. Unlink occurs during aggregation. As a result, other entries, which had no relation to this multisession, may have been bound to it later.
12. [PCRF][DCHPv6-Pool] Fixed: Forming the Link-Address field for Relay-Fwd when sending a request to a specific DCHPv6 server
13. [BRAS][PPPoE-IP6] IPv6 address request from Framed-IPv6-Pool is performed when the first IP6CP Cfg-Req comes from the client
14. [CLI][ACCT] Added: fastdpi-server NAS attributes output in `pcrf acct show` commands

15. [BRAS][DHCP] Fixed: Sending a NAK to a DHCP-Request for another server
16. Added: support for DDP profiles for Intel 700-series NICs (i40e driver) for PPPoE/GTP/MPLS tunnel balancing when using `dpdk_engine=2`. DDP is loaded from `/lib/firmware/intel/i40e/ddp/i40e.pkg` file during i40e ports initialization. Lifetime of the loaded DDP profile: until the server is rebooted.
17. Changed: algorithm for selecting a server for recording SDS
18. [CLI] Added: setting `L2 subs_id` in the `subs prop set` command
19. [BRAS][DHCP-Relay] Added: support for `L2 subs_id`
20. [BRAS][AUTH] Added: support for `l2subs_id` for L3-authorization, since the L3 auth response from the Radius may indicate that it is an L2 subscriber
21. [BRAS][ARP-AUTH] Added: support for `l2subs_id`
22. [BRAS][PPPoE][CLI] Added: `l2lan_id` attribute for PPPoE sessions
23. [BRAS][PPPoE] Removed support for MAC authorization, without login and password, removing `bras_ppp_mac_auth` option
24. [PPPoE][CLI] Added: support for the `subs_id` parameter that identifies the PPPoE session
25. [BRAS] Added: `l2lan_id` class - L2 network identifier. `l2lan_id` is intended for separating subscribers by VLAN. The `l2lan_id` is derived from the `l2subs_id`, i.e. its formation is set by the same `bras_subs_id` option. Basically, `l2lan_id` is a VLAN prefix from `l2subs_id`.
26. [BRAS][DHCP] All internal DHCP session databases now consider `l2lan_id` - it is included in their MAC and Client-Id key. That is, two subscribers with the same MAC-address, but in different VLANs, are considered different subscribers (if `bras_subs_id` is set to consider VLANs). Opt82 and Q-in-Q secondary keys do not consider `l2lan_id`. Read more about `bras_subs_id`
27. Added: configuration parameter `rx_dispatcher` flow hashing method by worker threads; 0 - old method is used by default (`ip_src+ipdst)%N`) & `ip_mask`; 1 - new method is used with recoding support for NAT1:1 (`CRC(IP_SRC)%N+CRC(IP_DST)%N)%N`
28. [Radius monitor] Added: support for exporting NAS address and port and other attributes
29. [Radius monitor] Added: connection of service 12
30. [BRAS] Added: setting `bras_ppp_lcp_start_timeout`

Changes in version 12.1

1. Added: NAT diagnostic information
2. Added: On-Stick mode support
3. Minor changes in CG-NAT
4. Support for [service 12](#) ²⁾ on VCHANNEL
5. Support for protocols with names that can be downloaded from the cloud
6. SDS: transfer data in pcapng format

Changes in version 12.2

1. Corrections to the CG-NAT utilization statistics output
2. Parsing the new GQUIC versions
3. New service 16 - allow list (captive portal) without access of subscribers to the Internet (due to failure of uplinks, subscriber in long-term blocking, etc.)
4. New `dpdkinfo` utility. [Description](#)

Changes in version 12.3

1. Added: [VRF support in router](#)
2. PPPoE authorization management service based on Service-name field. Description under [PPPoE Authorization Setup](#)

```
fdpi_cli help vlan group
vlan group : manage <add|delete|show> vlan group authorization policy
  vlan group <group-id> ...           - manage <group-id>
  vlan group 2 ...                   - manage <group-id> = <2>
  vlan group 2 deny auth pppoe    - deny authorization by pppoe and
  delete all its properties
  vlan group 2 allow auth pppoe   - allow authorization by pppoe
  vlan group 2 show auth pppoe    - show policy for authorization by
  pppoe
  vlan group 2 show auth all     - show policy for all authorization
  protocols
  vlan group 2 show all           - show all properties for group
  vlan group 0 show all           - show all properties for all groups
- full scan and print udr
  vlan group 2 auth pppoe allow add service-name name=sname delay=3 - 
  allow authorization by pppoe for service-name sname with podo-delay=3
  vlan group 2 auth pppoe deny add service-name name=sname delay=3 - 
  deny authorization by pppoe for service-name vlan group 2 auth pppoe
  delete service-name name=sname - delete service-name sname and its
  properties
  vlan group 2 auth pppoe show service-name all - show
  service-name policy for authorization by pppoe
  vlan group 2 drop               - drop packet without any analysis
  vlan group 2 pass               - passthrough packet without any
  analysis
```

3. Added: support for sending heartbeat for external bypass
4. Added: extract and transfer to IPFIX of cookies from Set-Cookie
5. Improved: blocking of the short TCP protocol freezes in IPFIX threads via additional user timeout setting (in addition to the standard tcp keep alive mechanism)
6. Added: performant rx_dispatcher=2 with even balancing over an arbitrary number of flows (but no support for nat1:1 with the requirement to assign specific addresses). Description under [Settings and management](#)
7. [BRAS][PPPoE] Fixed: dual-stack: adding IP addresses to an existing acct session
8. [PCRF] Fixed: switch persist queue to "connected" mode
9. [CLI] Added CLI command fdpi_cli pcrf persist queue reconnect, which allows to make a reconnect to fastDPI without resetting the queue. Can be applied to a specific connection or to all connections. Description under [FastPCRF Management](#)
10. [PCRF][PPPoE][Framed-Pool] Fixed: create acct-session with session_id announced during authorization
11. Added support for pcapng format for recording to storage
12. [CoA] Added processing of CoA Update by l2subs_id. Description under [RADIUS CoA](#)
13. Added: saving ICMP protocol translations in NAT exports
14. Changed: [nat_exclude_private](#) parameter and corresponding support: int
nat_exclude_private;

Bitmask to avoid NAT for private addresses:

0 - always do private → public conversion

1 - do not do NAT for private addresses (ip_src and ip_dst are private or are in psz_prms_user_private)

2 - ip_src is private given psz_prms_user_private and AS for dst_ip = local

4 - ip_src - private with prms_user_private and AS for dst_ip = peer. Description under [Settings and management](#)

15. [CoA] Added processing of CoA Reauth by l2subs_id. Description under [RADIUS CoA](#)

16. [CoA] Added CoA Disconnect processing by l2subs_id. Description under [RADIUS CoA](#)

17. [fDPI] Maximal number of clusters increased from 10 to 12

18. [PCRF][ACCT] Added: pass VasExperts-L2-SubsId attribute to Acct Start/Interim/Stop. Description under [RADIUS Attributes](#)

19. [DPDK] Added: disable Ethernet Flow Control on port startup

20. [PCRF][DHCPv6-POOL] Fixed generation of Client-DUID when composing DHCP6-RENEW for Framed-IPv6-Pool

The Client-DUID must be immutable throughout the DHCPv6 session, otherwise the DHCPv6 server may issue a **different** IPv6 prefix on Renew, resulting in PPPoE session closure. To achieve immutability, the Client-DUID is now formed from the subscriber's l2subs_id.

21. [PCRF][DHCP-POOL] Fixed 'request-response' identification when working with DHCP pools.

The identifier used is:

For DHCPv4 - subscriber MAC address (chaddr) + request xid \| For DHCPv6 - Client-Id option and xid of the request.

The server is required to pass the Client-Id option in the response, unlike other request options.

22. [BRAS] Added CLI command `dhcp show stat vrf`

Display the number of DHCP subscribers by VRF

23. [PCRF] Added CLI-command `pcrf radius enable/disable`

24. [PCRF] Added CLI command `pcrf radius ping`

25. [PCRF] Added CLI command `pcrf radius status`

26. Changed: if session has no public address - CG-NAT is enabled.

27. Added: if service 11 is removed, NAT is disabled and resources are released. Occurs only if there is read data on flow

28. [BRAS][DHCP] Use the subscriber MAC address from DHCP request for l2subs_id.

The srcMAC from the ethernet header of the packet is used to generate the L2 subscriber ID (see bras_subs_id). In case DHCP requests go through DHCP Relay, the srcMAC in the ethernet header of the DHCP packet is no longer the MAC address of the subscriber. DHCP requests of all subscribers passing through DHCP Relay have the same MAC in the ethernet header and the same subs_id.

Solution: to generate the L2 identifier, the subscriber's MAC address is now taken from the DHCP packet, chaddr field.

29. [PCRF] watchdog - new Radius server monitor. Description under [Full List of Parameters](#)

New fastpcrf.conf parameters:

- Radius-servers ping timeout, in seconds.

If there are no authorization requests, fastPCRF periodically pings Radius servers by sending a Server-Status or Access-Request. If the server responds, it is considered available. The default value is 60 seconds. `radius_keepalive=60`

- User-Name (`radius_ping_user_name`) and Password

(`radius_ping_user_password`) of the pseudo-subscriber for ping requests. FastPCRF attempts to maintain a connection to all described Radius servers by periodically sending a ping request to the servers.

A ping request is a Status-Server request (if Radius supports it) or a regular Access-

Request with User-Name and Password specified. These parameters set User-Name and Password for Access-Request ping requests (Server-Status does not use these parameters). For the FastDPI process, the fact itself that the server responds to the ping request is important, the content of the response (Access/Reject and their attributes) is not analyzed. If User-Name and Password data are not specified – the Access-Request ping request will still be sent, but without User-Name and Password attributes. There are no default values. The `radius_revive_period` parameter has been removed for unnecessary.

30. Modified: For flow the sign `p_flow_ → cmn.bts_check_ip |= ntconnt::bts_nat_must_whip` is set.

The sign indicates that a call is coming from a private address and a public address is required for this flow. If no public address is assigned – attempts to allocate a public address continue (For TCP – only if SYN). This is because requests may come from a private address and only then service 11 appears, but the flow already exists and will never work.

31. Modified: If a public address is set for flow, the presence of 11 services is checked. If there is no service, the public address is released.

32. [Router] Added: error message in `fastdpi_alert.log` "VRF has no TAP"

If VRF does not have any device – it is impossible to announce address in such VRF. This error is displayed in `fastdpi_alert.log` not more than once per hour for each VRF

33. Added: `fdpi_cli` commands: `nat dump transcode`, `nat dump translater [profile name]`, `nat dump translater data [profile name]`

34. New policing profile name – `BV###NNNNNNN[#MMMM] [#++++--]`, where NNNNNN - incoming traffic rate in kbps, MMMM - outgoing traffic rate in kbps, + - class enabled, - class disabled. Description under [Subscriber authorization attributes](#)

35. [PCRF] Added: new `chaddr@opt60` value for `radius_user_name_dhcp` option

Example: `radius_user_name_dhcp=chaddr@opt60`, User-Name in Access-Request is formed from MAC-address of DHCP packet header (chaddr field) and option 60 if this option is in DHCP-request. Description under [DHCP Radius proxy - Access-Request](#)

36. Changed: improved FACEBOOK VIDEO detection

37. Fixed: when parsing `quic_ietf` for the first CRYPTO packet, if `offset==0` is set - checks for possible fragmentation

38. Added: parsing changes - minding the changes in Google QUIC versions: before version 34 there was an additional field "Private Flags". The SSG did not parse such packets. Since version 39 - changed byte order for "Data Length" record

39. Added policing and service 16 on values from profile name. Description under [Subscriber authorization attributes](#)

40. [BRAS] Added: new `bras_ip_filtering` option

[hot] Traffic filtering (bitmask) is disabled (=0) by default.

Allowed flags: `0x0001` - controlling IP spoofing (restricting forged traffic). The packet on subs → inet path is dropped if subscriber's IP address (srcIP) is unknown for L2 BRAS and `bras_term_by_as = 0` and subscriber's AS is not local. `bras_ip_filtering=0`

41. [BRAS] Added: `bras_vrf_isolation` option - isolation at VRF level. Description under [Soft-Router](#)

Added new `fastdpi.conf` option: [hot] VRF Isolation. By default (0), L2 BRAS does not isolate subscribers from different VRFs: If this mode is enabled (1), subscribers from different VRFs will be isolated from each other: for a subscriber from VRF1: the gateway must also be in VRF1, `local_interconnect` will only work for subscribers from the same VRF1.

`bras_vrf_isolation=0`

When this option is enabled:

- 1. ARP subscriber to gateway - processed by fastDPI only if subscriber and gateway are in the same VRF

- 2. ICMP ping of gateway - processed by fastDPI only if the subscriber and gateway are in the same VRF
- 3. local interconnect - applied only if both subscribers are in the same VRF.

42. Fixed: error messages for client should not contain LF in json

43. [BRAS][ARP] Modified: ARP processing to gateway. Respond to ARP request to gateway only if sender and gateway VRFs match (sender and GW are in the same VRF).

44. [VRF] Modified: VRF name assignment via service 254 (Radius only). Description under [Soft-Router](#)

45. [BRAS][DHCP-Proxy] Session-Timeout and Lease-Time for Framed-Pool.
 If an address is issued from Framed-Pool for a small amount of time (small lease-time) and a large session-timeout is specified during authorization, then all Renew/Rebind requests from the subscriber must be sent to the DHCP server via PCRF to renew the license, otherwise the DHCP server may think that the address is free. Reauthorization is done only when session-timeout is reached

46. Added: support for service 16 - processing SYN requests and subsequent forwarding without transmitting packets to the Internet. Description under [Subscriber authorization attributes](#)

47. [Router] Added: shared neighbor cache for VRF.
 Added: `router_vrf { [cold][optional]` option to VRF configuration.
 String is the default ARP cache name for this VRF, each VRF has its own ARP/Neighbor cache isolated from others.
 If you want several different VRFs to share a common ARP/Neighbor cache, you should set the same value of the `neighbor_cache` option in the description of these VRFs.
`neighbor_cache=... }`. Description under [Soft-Router](#)

48. [PCRF] fastpcrf.conf option `radius_user_name_dhcp` - added new value `opt61@opt60:radius_user_name_dhcp=opt61@opt60`. Description under [DHCP Radius proxy - Access-Request](#)
 User-Name in Access-Request is generated from DHCP options 61 and 60 if these options are present in the DHCP request.
 New fastpcrf.conf options - in which attributes to pass DHCP options to Access-Request
 [hot] Specify attributes in which DHCP options are passed. Assignment format:
`attr_dhcp_opt43=vendorId.attrId` where vendorId is the vendor id, a number from 0 to $2^{32}-1$.
 If `vendorId !=0`, the value is passed in the VSA attribute.
 If `vendorId == 0`, then the value is passed in the regular Radius attribute (non-VSA)
`attrId` - attribute id, a number between 1 and 255
 Attributes are assumed to be of type octets (passed as is in binary form)
 Value 0.0 - do not pass this attribute to the Radius server.
 Default values are as follows: `attr_dhcp_opt43=0.0, attr_dhcp_opt60=43823.34 # VasExperts-DHCP-ClassId, attr_dhcp_opt61=43823.33 # VasExperts-DHCP-ClientId`

49. Added: support for service 16 and corresponding profile - job, delete, view via `fdpi_ctrl`
 profile matches the structure for service 5
 Example of setting: `fdpi_ctrl load profile -service 16 -profile.name portal_info_1 -profile.json '{ "ip_list" : "/var/lib/dpi/ip_list_1.bin", "redirect" : "http://info.test.ru" }'` parameter `max_profiles_serv16` - sets the maximum number of profiles. The default is 32. Description under [Subscriber authorization attributes](#)

50. [DHCP-Proxy] Introduced CoA Disconnect processing modes. Description under [Radius CoA](#)
 Added new `bras_dhcp_disconnect` option, which is a bitmask of the following flags:

- 0x0001 - disable acct stop, do not immediately send acct stop for a disconnected DHCP subscriber

- 0x0002 - disable L3 auth, do not perform L3 authorization for disconnected DHCP subscriber
- 0x0004 - block traffic - block all traffic from disconnected subscriber (i.e. on sub → inet path)
- 0x0008 - respond to DHCP Request → NAK
- 0x0010 - ignore DHCP Request (wait for DHCP Discovery)

51. [DHCP-Proxy] Added: control of subscriber IP address change
If a subscriber is given a different IP address, the former IP address should be de-announced

52. [VRF][CLI] VRF support added to all router CLI commands

Changes in version 12.4

DPI

1. Added: support for individual session rate limiting protocols and definition of traffic classes at the channel and subscriber levels. Description under [Policing by session and overriding traffic classes](#)

```
#to support this service additional RAM will be required (compared to
standard requirements), it is reserved by setting
support_service_18=1 #in /etc/dpi/fastdpi.conf

speedtest cs1
default keep
cat dscp_prof_1.txt|lst2dscp /tmp/dscp_prof_1.dscp

speedtest tbf rate 16mbit inbound.rate 16mbit
bittorrent tbf rate 8Mbit
signal tbf rate 1kbit inbound.rate 2kbit
TCP Unknown tbf rate 8Mbit burst 1Mbit inbound.rate 8Mbit inbound.burst
1Mbit

cat tbf_prof_1.txt|lst2tbf /tmp/tbf_prof_1.tbf
#reverse conversion tbf2lst /tmp/tbf_prof_1.tbf

fdpi_ctrl load profile --service 18 --profile.name test_dscp --
profile.json '{ "dscp" : "/tmp/dscp_prof_1.dscp", "tbf" :
"/tmp/tbf_prof_1.tbf" }'
fdpi_ctrl load --service 18 --profile.name test_dscp --login DEMO
#or/and
fdpi_ctrl load --service 18 --profile.name test_dscp --vchannel 1
```

2. Added management of traffic processing levels at the VLAN level. The hide command allows you to do a traffic drop with pre-analysis. Description under [Handling traffic by VLAN](#)

```
fdpi_cli vlan group <id> drop
fdpi_cli vlan group <id> pass
```

```
fdpi_cli vlan group <id> hide
```

3. Fixed: when binding an IP to a login, check if this IP is already bound to this login. The `mtd_bind_ip_login` function for binding IP to login was unconditionally performing `unbind` before binding, without checking the current binding. `unbind` clears current services, including service 9 data (netflow, accounting), which led to quiet resetting of acct counters on subscriber reauthorization if auth and acct synchronization in `fastpcrf` is disabled. This commit adds a check: if IP is already associated with a valid login - `bind/unbind/rebind` does not need to be done, `mtd_bind_ip_login` function just returns "ok" result.
4. Added "DTLS", "RTCP", "LIGHTWAY", "GOOGLE_MEET", "JITSY", "WECHAT", "DOT", "META_CALLS" protocols
5. Improved Skype detection in STUN
6. Added `radmin-port` protocol signature
7. Added support for IPv6 channels (with reload). Description under [Policing of Virtual Channel \(vChannel\) — setting for CIDR](#)

Example of an assignment:

```
fe80::0/8 1
cat ipchannels6.txt | as2bin6 /etc/dpi/ipchannels6.bin
```

8. Added blocking of all IPv6 when service 4 and `block_options=4` are enabled
9. Fixed bug in `TELEGRAM_TLS` detector causing over-detection
10. Added support of reload for IPv6 channels
11. Added LiveU protocol. Changed the name of the protocol `radmin-port` to `radmin`. List of new protocol identifiers:

DoT	49281
RTCP	49282
LIGHTWAY	49283
GOOGLE_MEET	49284
JITSY	49285
WECHAT	49286
DTLS	49287
META_CALLS	49288
LIVEU_LRT	49289

12. Added `vchannels_default=` setting to put traffic unallocated on other channels into a separate channel (but not 0!). Description under [Policing of Virtual Channel \(vChannel\) — Setting up](#)
13. Fixed: building structures to divert traffic to TAP (Error of sorting IPv4-address array).
14. Added support for 18 services for vchannels
15. Added support for 49 services for channels and subscribers: IPv6 traffic blocking. Description under [Management — Activation of IPv6 traffic blocking service](#)

```
fdpi_ctrl load --service 49 --login DEMO
fdpi_ctrl load --service 49 --vchannel 1
```

16. Renamed protocol JITSY → JITSI
17. Fixed: for virtual channels DSCP is defined only if `support_service_18` parameter is set. Description under [Policing by session and overriding traffic classes — SSG Configuration](#)
18. ASN number accounting for GOOGLE MEET detection based on DTLS
19. Added: WECHAT protocol definition

20. Fixed: whatsapp_voice definition for TCP transport protocol
21. Fixed definition of custom protocols based on IPv6 addresses/CIDR
22. Improved recognition of openvpn, holavpn, signal
23. Added the ability to supplement the definition of a signal
24. Added possibility to use CIDR, addresses and ports for IPv4 and IPv6 in black and white lists. If CIDR or address is set, all TCP ports are blocked (UDP with the setting `udp_block=3`). Description under [File format with a list of IP addresses to block](#)
25. Added utilities to check for blacklisting `checklock` and custom protocol `checkproto`. The address or port address must be specified on the command line.
26. Fixed: stun processing for TCP
27. Changed definition by realm: if another protocol is specified - the protocol is changed at once.
28. Added: service 17 (no profile) - mirroring traffic to a specified VLAN. Description under [PCAP Record Management and VLAN Mirroring — Mirroring on a VLAN](#)

```
#Parameters in fastdpi.conf:


```

BRAS

1. Added extracting information from Radius avp `framed-ipv6-prefix`. Added sending `framed-ipv6-prefix` and `delegated-ipv6-prefix` over IPFIX
2. Fixed: VLAN translation for ARP packets `inet→subs`
3. Fixed bug with AS numbers in IPFIX
4. Fixed framed-pool support bug
5. Added: parameter `netflow_tos_format`, IPFIX TOS field data format:
`netflow_tos_format=0` (default value), 3 bit (priority only), 1 6-bit (full DSCH). Description under [Full NetFlow export format](#)
6. Added: in `ipfix fullflow` added passing an additional field - [original TOS from the IP header](#), it will be possible to build reports on external markup
7. Fixed: `dhcp nak` issue
8. Fixed channel detection in IPFIX for IPv6
9. Adding opt125 with pool name as the first option. Reason: KEA parses only the first vendor when defining the client class (opt125). Description under [IPv4 Pools Support — FastPCRF Configuration](#)
10. Closing DHCP sessions after CoA Disconnect. If after PoD (CoA Disconnect) there is no DHCP request before the lease time expires, the session should be closed by sending a deanonc and acct stop. It should be taken into account that the subscriber's session type may change from DHCP to StaticIP or PPPoE; in this case, the DHCP session should be closed without deanonc and acct stop. Description under [Radius CoA — Disconnect-Request](#)
11. CLI: new parameter `ts_lease_expired` — lease end time — was added to the output of the `dhcp show` command.
12. Added option `acct_disable_interim_update` — prohibit sending Interim-Update. Do not send Interim-Update: `acct_disable_interim_update=1`. Default `acct_disable_interim_update=0` (Interim-Update is sent). Description under [FastPCRF](#)

settings

13. Added IPv6 support for CoA. Command -Code=1 - search for acct session by IP. The acct session can be searched by IPv6 prefix attributes **Framed-IPv6-Prefix** or **Delegated-IPv6-Prefix**. The command response specifies all known IP addresses of the found acct-session - **Framed-IP-Address**, **Framed-IPv6-Prefix**, **Delegated-IPv6-Prefix**. Description under [Radius CoA — Accounting session request for given IP address](#)
14. Fixed: cli-command `dhcp show stat vrf`. Subscriber's `subs_id` was not checked when determining session "liveliness" - transfer of IP address to another subscriber may break this statistics
15. Fixed: `update lease expired` for address from **Framed-Pool**
16. Added: Huawei vendor-specific support tag 1. The value is interpreted as **ADSL-Forum-Circuit-Id**. If PPPoE packet contains **Circuit-Id** and Huawei tag 1, **Circuit-Id** is preferred, Huawei tag1 is ignored. [Access-Request format for the PPPoE networks — Support Huawei vendor-specific tag 1](#)
17. Fixed: deanonymization of the previous address if a new one is given to the client

NAT

1. Fixed: crusting when public address is highlighted (rare event: when removing NAT service at the moment of public highlighting)

SDS

1. Automatic UUID generation and saving in `/var/lib/dpi/sdsuuid.dat` file

¹⁾

Machu Picchu the "Lost City of the Incas", located in the southern Peru on a 2,430-meter mountain ridge, a UNESCO World Heritage Site

²⁾

Record subscriber traffic in PCAP file