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SSG changelog and update

DPI/BNG Versions Update



As of version 12.0, DPI is only installed on CentOS 8.x and [VEOS](#)!

If you have version of CentOS 6.x or CentOS 8.x installed, switch the repository once with the command:

```
sed -i -e '/^mirrorlist=http:\\\\d' -e 's/^#  
*baseurl=http:\\\\mirror.centos.org/baseurl=http:\\\\vault.centos.org/'  
/etc/yum.repos.d/CentOS-*.repo
```

Then run updates as usual:

```
yum update fastdpi
```



If the error `Module yaml error` appears during the upgrade, you should upgrade the module `dnf upgrade libmodulemd`.

After updating, restart the DPI:

```
service fastdpi restart
```

and other dependent processes (PCRF/Radius), but only if they are actually used and their configuration is valid:

```
service fastpcrf restart  
service fdpi_radius restart
```

You can update the operating system components **Do not update the kernel version and its dependent utilities!**

For CentOS 6.x:

```
yum --exclude=kernel*,util-linux-ng,libuuid,libblkid update
```

For CentOS 8.x:

```
yum update
```

Note for users running the DPI in a virtual environment, using old CPU (release of 2009) and AMD CPU:

Run the following command before the update:

```
touch /etc/dpi/noprioadj
```

and it causes the DPI process to be launched with normal priority (not the realtime), thus significantly reducing the consumption of CPU system (sys) resources, but slightly increasing the latency on the platform.



Customers using BRAS functionality should note the changes when upgrading SSG to the new version.

DPI platform update to version 13.0 Congo

13.0 Congo ¹⁾

You can check the current installed version with the command:

```
yum info fastdpi
```

Rollback to 12.4:

```
yum downgrade fastdpi-12.4-0 fastpcrf-12.4-0
```

After an update or version change, a restart of the service is required:

```
service fastdpi restart
```



If PCRF and/or Radius are used, they should also be restarted. The following order is preferred for restarting PCRF:

```
service fastdpi stop  
service fastpcrf restart  
service fastdpi start
```




Do not perform Linux kernel upgrades. Newer versions of the kernel may break binary compatibility with the Kernel ABI and the network driver will not load after the upgrade. If you do upgrade, set the GRUB boot loader to load the previous version of the kernel: set the default=1 parameter in the /etc/grub.conf file while the problem is being resolved.

If the update displays a message that the update was not found or there are dependency issues, run the command before updating:

```
yum clean all
```

Changes in version 13.0

DPI

1. On-stick support for LAG/LACP. [Description](#)
2. Transition to DPDK 23.11
3. Modified: for QUIC and QUIC_IETF: if no SNI is detected - check by AS
4. Modified: when analyzing STUN, AS from Facebook is checked - define FACEBOOK_VIDEO, not WHATSAPP_VOICE
5. Setting RSS hash flags for UDP and TCP
6. Modified: openvpn protocol definition
7. Fixed: SIGHUP processing only if fastDPI is fully initialized. Possible crash if SIGHUP is received during fastDPI startup process
8. Trace/debug packet recording moved to new API
9. Added: wechat protocol support for UDP
10. Support for additional markup of autonomous systems mark1, mark2, mark3. [Description](#)
11. Prioritize SNI detection in custom signatures for autonomous systems marked as mark1. [Description](#)
12. Prioritize more specific custom SNI signatures.
Example: for host a.b.c.d, if the signatures *.d, *.c.d and *.b.c.d are present, the protocol defined by the signature *.b.c.d will be selected  works only for signatures with *. [Description](#)
13. Support for hard locks (despite hostname/SNI) - set in an additional field in the address blacklist, example: 1.1.1.1 443 hard. [Description](#)
14. Improved detection of YOUTUBE, SIGNAL
15. Added the DPITUNNEL protocol, which includes traffic anomalies commonly used for DPI traversal
16. Updating dpiutils
17. New protocols VK_CDN_VIDEO, META_CHAT
18. Improved signatures of FACEBOOK_VIDEO, META_CALLS protocols
19. Fixed protocol name VK_CDN_VIDEO
20. Fixed: SNI decoding in QUIC IETF and possibility of crusting in exceptional cases
21. Fixed: clearing search structures when deleting CUSTOM protocols
22. Added ability to add comments (#) and blank lines in input files for utilities [lst2dscp](#), [lst2tbf](#)
23. Added protocols QUIC_UNKNOWN - QUIC without SNI and QUIC_UNKNOWN_MARKED - QUIC without SNI and AS labeled MARK2. [Description](#)
24. Fixed: stun character definition for TCP
25. Modified: if the stun packet viewing limit is reached - set this protocol with AS in mind
26. Updated utilities to support new protocols
27. Improvements in QUIC_UNKNOWN, QUIC_UNKNOWN_MARKED, SIGNAL, DpiTunnel protocols
28. SNI/HOST embedded protocol definitions are cloud-based, SNI/IP prioritization is supported
29. Modified: SNI comparison is case-insensitive
30. Added LANTERN_WEAK protocol signature
31. Improved IMAP protocol recognition
32. Corrects LPM when selecting channel by IP/CIDR
33. Added: to DNS text file record format - format vchnl - virtual channel number.
34. Added: to the IPFIX data transfer template for DNS channel number. [Description](#)
35. Fixed: crash on DNS trace
36. Improved VIBER_VSTREAMS protocol definition

37. Fixed: fastDPI does not accept or process any ctl requests during fastDPI stop process
38. Added SSTP protocol (49296)
39. Added ANYDESK protocol (54273)
40. LANTERN recognition improved

BRAS

1. Added: accounting of DHCP packets from subscriber in billing statistics: subscriber CPE (i.e. Wi-Fi router) without clients (e.g. at night) - sends only license renewal requests. Since these requests were intercepted by BRAS and were not included in the accounting, the session was terminated by idle timeout
2. Corrected: actions when QinQ/VLAN is changed for a subscriber
3. Fixed: `framed-pool renew`
In some cases, incorrect DHCP responses were generated. Added trace to DHCP packets log for `framed-pool renew`.
4. Fixed: receiving packets from relay. Previously it was checked that relay was on the `fc::/7` network. Now this check is unnecessary and has been removed - relay can have any address.
5. Fixed: DHCPv6 options parsing from Radius
6. The `subs prop show active` command has been added. The command outputs a dump of L2 properties of all active (not-expired) subscribers. [Description](#)
7. Modified: Prohibit calling CLI commands while stopped
8. Fixed: idle-timeout for session. For PPPoE sessions idle timeout should be taken from the `bras_ppp_idle_timeout` setting if not explicitly set in the authorization response (Idle-Timeout attribute).
9. Added priority forwarding with DSCP translation. [Description](#)
10. Corrected: Adding unnecessary option 61 (Client-Id) to fastDPI response when distributing address from Framed-Pool
11. Fixed: Logging of DHCP server IP addresses
12. Fixed: Enabling services with profiles. The ``VasExperts-Service-Profile`` attribute (service profile name, implicitly enables the service) has higher priority than ``VasExperts-Enable-Service`` (enabling/disabling a service without specifying a profile).
13. Added `ping inet` command on behalf of subscribers through the entire BRAS/NAT/ROUTER processing chain. The prompt is `fdpi_cli ping inet ?`. [Description](#)
14. Fixed: call of subscriber IP address deannounce when acct idle. Added new flag to router option `router_subs_announce: 0x10000` - deannounce L3 subscriber at acct idle (closing acct session by idle timeout). [Description](#)
15. Added support for specifying the profile of service 18 during authorization. Enabling service 18 in the Access-Accept Radius response is set in the usual way for a service with a mandatory profile (here `serv18` is the profile name):

```
VasExperts-Service-Profile = "18:serv18"
```

16. A search by MAC and `subs_id` has been added to the `subs prop show` command. The result of a search by MAC or `subs_id` can be multi-valued - several different entries for the same MAC/`subs_id`. The result of the `subs prop show active` command has been changed, which may be critical when parsing the command's json wiggle. [Description](#)
17. Fixed: setting link up/down flag for ports that do not support link up/down interrupts (e.g. `af_packet`)
18. The return code of the uptime command. The CLI command `uptime` can be used to check if fastDPI is fully started: it returns `result=0` (Success) only when fastDPI is fully initialized and

all worker threads are started. Upon receiving a response from fastDPI to the `fdpi_cli uptime` command, the `fdpi_cli` utility itself checks the result of the execution and if `result!=0` - sets a non-zero return code.

19. Corrected: If VRF (service 254) was present in Access-Accept, the packet was incorrectly logged as invalid.
20. Restoring UDR operation after calling a command with a large number of parameters

NAT

1. Added a `checknat` utility to check the distribution of white addresses. [Description](#)
2. Fixed online change of `nat_private_cidr` parameter

Load Balancer

1. Added L2 traffic balancer mode. This enhancement allows to use SSG as a traffic balancer based on IP addresses owned by AS and defined as `local` in `asnum.dscp`. [Description](#)
2. Added `mqr_x_lb_engine`, which is activated when `dpdk_engine=2`. [Description](#)

Router

1. Mempool allocation for emit packets: we do not allow the pool to be completely exhausted, there should be at least 256 free elements in the pool
2. The error of route deletion `errno=3` (No record found) has been moved to TRACE to avoid clogging the log
3. Fixed the order of router components termination
4. Changed: system error when clearing route tables. Cleaning of route tables (deleting all entries added by SSG) is done at stop and start of fastDPI. During cleaning process EBUSY error may occur, which is fatal for netlink socket, socket should be closed.
5. Fixed: TAP link down in LAG. If a port enters a lag, TAP this port to Link down state only when ALL LAG ports are down.
6. Fixed: control of selfgen mempool exhaustion
7. Optimization of data readout from TAP
8. Fixed LAG+On-stick: put TAP in link down state. TAP is set to link down only when all ports in LAG are in down state. If there is at least one port in Up state - TAP should be in Link Up state.
9. Corrected: Traffic diversion in router for on-stick device in LAG. When forming VRF topology, it was not taken into account that the LAG includes the base (physical) device, and the on-stick (virtual) device is specified in the router description.
10. Fixed: Read all data from TAP device. At fastDPI startup there were possible situations when router is not fully initialized yet and TAP is already monitored but not read out.
11. The `router_subs_announce` option is made hot (hot)
12. Fixed: mbuf leak on fastDPI startup

SDS

1. The `storage_tag` value is set based on directional priority or protocol priority

Radius

1. Added the ability to work with standard linux interfaces using `libpcap`. [Description](#)

Changes in Version 13.1



Warning! An error has been detected in version 13.1. PPPoE sessions do not close when `idle_timeout` expires. The fix is planned for the next release.

DPI

1. Global code refactoring - discontinued support for `pf_ring`
2. Added: service 19 - DNS response substitution. [Description](#)
3. Modified: minimum PCAP file size to 100 MB. PCAP file rotation on reload [Description](#)
4. Modified: improved DROP event tracing
5. Fixed: erroneous ERROR level message appearing for certain `fdpi_ctrl` requests
6. Fixed: incorrect TLS (SNI) parsing when multiple 'ALPN Protocols' are specified
7. Modified: mechanism for updating AS and IP compliance lists. [Description](#)

BRAS

1. Fixed: subscriber activity control via unicast ARP Request. Previously, it was a broadcast ARP Request, which is not optimal for the network. [Description](#)
2. Added: SHCV (Subscriber Host Connectivity Verification) — DHCP subscriber activity control. Considered scenario for an already "closed" record to prevent repeated SHCV trigger and increase in the 'SHCV: session closed by inactivity' counter. [Description](#)
3. Added: ARP Proxy for known routes (router mode only). This feature is applied only if the ARP request initiator is a known subscriber. A new flag - 0x0004 has been added to the `bras_arp_proxy` option. [Description](#)
4. Fixed: `help()` for IPv6 addresses in the `subs prop show` command
5. Fixed: error in parsing parameters for the `subs prop del` command, which resulted in the inability to delete properties by IP with the error

```
ERROR: Result code=9: No subscriber IP address
```

6. Added: CLI command `dhcp disconnect`. This is a CLI analog of CoA Disconnect. The disconnect mode is set by the `bras_dhcp_disconnect` option.
 1. `dhcp disconnect all` - disconnect all DHCP sessions
 2. `dhcp disconnect [mac=X | ip=X]` - disconnect specified session
7. Fixed: sending L3 reauth for L2 subscriber in advance, not waiting for session timeout
8. Added: number of sessions closed due to inactivity (SHCV) in the `dhcp show stat` CLI command
9. Fixed: error in intercepting and processing ICMPv6 packets, checksum not recalculated in some cases when modifying ICMPv6 packet

NAT

1. Modified: tracing in `vdpi_new_flow_nat_ipv4` is always output
2. Fixed: based on the value of `nat_exclude_private`, additionally checking the pair `CHECK_AS_LOCAL` or `CHECK_AS_PEER` for AS in local interconnect

Router

1. Added: ARP management. [Description](#)
2. Fixed: port selection for recording in a pass-through LAG. If LAG passes through fastDPI, port selection for recording from TAP should consider the Link Up/Down state of both bridge sides of the port
3. Fixed: announcing NAT profile subnets upon addition
4. Added: CLI command `router vrf dump`. The command outputs the list of VRFs set in the system and their properties
5. Fixed: do not consider term by AS when announcing NAT subnets. The `term_by_AS` mode applies to subscribers, not to NAT profiles, hence it should **not** be considered when announcing a NAT subnet
6. Fixed: order of packet interception from the general processing pipeline
7. Fixed: increased number of mbuf in `selfgen mempool` if router enabled: if router disabled: `mempool size=512 * number_of_slaves_in_cluster`, if router enabled: `mempool size=8 * 1024 * number_of_slaves_in_cluster`

LAG

1. Fixed: zeroing the array when building a new list of active ports. The error leads to array overflow and memory corruption
2. Added: logging of the "no mbuf" error when sending LACP

Changes in version 13.2

1. [BRAS][PPPoE] Fixed: ping of inactive client via Echo requests
2. Added: support for service profile 19 (DNS response substitution). For service 19, it is possible to specify AAAA records and use * for domains. [Description](#)
3. Fixed: service profile 18 no longer requires setting both DSCP and TBF simultaneously. [Description](#)
4. Fixed: IP:PORT takes priority over IP and CIDR for custom protocol definitions. [Description](#)
5. Changed: user-defined protocol priority is now higher than cloud-defined ones. [Description](#)
6. Fixed: AAAA record length in service 19
7. Added: `block_options` parameter, mask 8 — do not generate RST packets for blocking and redirection for direction `inet→subs`. [Description](#)
8. [DPI] Improved: analysis of out-of-order packets (now you can set number of buffers for out-of-order handling), decryption of fragmented QUIC. Also eliminated buffer exhaustion for out-of-order packets. [Description](#)
9. [DPI] Fixed: DOT recognition
10. [CTRL] Added: new output format for policing. [Description](#)

```
fdpi_ctrl list profile --policing --profile.name htb_6 --
```

```
outformat=json2
```

11. [CTRL] Added: loading policing profiles with the new format (includes value and unit).
[Description](#)
12. [BRAS][IPv6] Added: when client sends DHCPv6 confirm and session is absent in BRAS DB, reply with NotOnLink status
13. [FastPCRF][DHCPv6] Fixed: issue that caused current IPv6 accounting session to close and reopen when handling client's DHCPv6 lease renew requests
14. [DPI] Added: update of asnum.bin from the cloud, asnum_download parameter matches [federal_black_list](#) in values. [Description](#)
15. Added: mem_ssl_savebl parameter (cold). Sets number of saved buffers for SSL packet parsing. [Description](#)
16. Added: statistics for SSL parsing buffer usage. [Description](#)
17. [BRAS][DHCPv6] Added: ability to extract option 37 and option 38 from client packet
18. [Router][tap] Fixed: bridge status initialization at fastDPI start. TAP device for LAG passthrough is Up if at least one LAG port is Up and its peer bridge port is also Up. Previously bridge status was determined only on link Up/Down events. This patch initializes bridge status at router start based on port states.
19. [BRAS] Fixed: allow local interconnect only if srcIP belongs to a known subscriber. Previously, srcIP was not verified, which could allow IP spoofing and local DDoS with forged subscriber IPs.
20. Added: CLI command permit.
21. [CLI][Ping] Changed: error message when subs IP not found
22. [CLI] Added: boolean flag on_stick in JSON output of dev_xstat command
23. [CLI] Changed: JSON output of dev_info for on-stick devices.
Previously:

```
"pci_address": "on-stick based on 82:00.3"
```

Now:

```
// base device address
"pci_address": "82:00.3"
// on-stick flag
"on-stick": "true|false"
```

24. Removed fake Yandex SNI from TELEGRAM_TLS
25. Added: mem_quic_ietf_savebl parameter. Sets number of buffers for parsing quic_ietf requests (multi-packet). Default is 15% of mem_ssl_parsers. [Description](#)
26. [DPI] Added protocols

```
"HLS_VIDEO"           49298
"ICMP_TUNNEL"         49299
"DNS_TUNNEL"          49300
"FORTICLIENT_VPN"     49301
"CISCO_ANYCONNECT_VPN" 49302
"SHADOWSOCKS_VPN"     49303
"NOT_DNS"             49304
```

27. Added: support for sending DNS query over IPFIX
28. [DPDK] Added read-only engines: RSS and port dispatcher
29. [BRAS][SHCV] Fixed: SHCV was called before pipeline fully started, which could happen in multi-port configs with long pipeline init time

30. [DPDK] Added mempool type output on fastDPI start
31. [Router] Added TAP device statistics to CLI command `router vrf show` — number of packets/bytes read from TAP, written to port, transmitted to TAP, number of events and errors
32. [Router] Changed: packets from TAP now use same thread for 5 seconds to reduce reordering under high load
33. [DPI] Improved detection of DNS TUNNEL, CISCO_ANYCONNECT_VPN, SHADOWSOCKS_VPN, DPITUNNEL, FORTICLIENT_VPN
34. Changed log level for telemetry requests to INFO regardless of outcome
35. [fastPCRF][ACCT] Fixed: Interim-Update sent properly when switching to backup RADIUS server
36. [BRAS][CLI] Fixed: subscribers closed via SHCV are no longer shown by `fdpi_cli subs prop show active`
37. [BRAS][Auth] Optimized service attach/detach
38. [FastRadius] Config file parsing migrated to new engine
39. [BRAS][DHCP] Offer now sent first to bcast 255.255.255.255
40. [BRAS][CLI] Fixed: `dhcp show stat vrf` supported only in Radius proxy mode (previously crashed in DHCP Relay mode)
41. [DPI] Improved recognition of DNS Tunnel and Shadowsocks
42. [Utils] Improved tools. `checkproto`: if IP and SNI are set, result will reflect MARK1 and priority. `ascheckip`: shows DSCP and MARK1
43. [Utils] Added support for hostnames ending with `:` in `url2norm` — allows "any port" for HTTP
44. [CLI] Fixed: `dhcp disconnect` command
45. [DPI] Fixed: allow protocol change via CUSTOM SNI even after builtin signature match
46. [DPI] Added integrity check for AS list file from cloud
47. [DPI] Fixed loading of black and white lists from cloud
48. [utils] Added support for new formats in `bin2ip` for converting black/white lists
49. Fixed potential core crash
50. Support for 128-core CPUs [Description](#)

Changes in version 13.3

1. [DPI] Added protocols:

BIGOTV	49305
SAYHI_CALL	49306
AZARLIVE	49307
LINE_CALL	49308
QQ_CALL	49309
VYKE_CALL	49310
VEEGO_STREAMS	49311
BHABI_CAM	49312
WEPARTY	49313

2. [DPI] Improved Viber recognition
3. [DPI] Reduced false positives for DPI TUNNEL
4. [DPI] Increased packet inspection depth for BIGOTV detection
5. [DPI] Changed FACETIME protocol
6. [DPI] Changed: if protocol is matched by ip/sni/cname, it is no longer overridden by built-in signatures
7. [DPI] Streamlined protocol priority enforcement to avoid unnecessary switching
8. [DPI] Fixed: searching both `'*'` and `'.'` in HTTP domains

9. [DPI] Fixed: virtual channel IP removal on reload
10. [DPI] Fixed: drop ignored when smartdrop is set during SSL parsing errors
11. [BRAS][PPP] Fixed: bras_pppoe_trace_mac now respected for DHCPv6 packets in pcap. Previously only bras_dhcp_trace_mac was used
12. [DPI] Fixed: errors assigning vchannel by IP/CIDR
13. [DPI] Fixed: blocking by IP for DNS over TCP
14. [DPI][PCRF] Changed log level from INFO to WARNING for start/stop messages
15. [DPI Utils] Fixed: checkproto when IP protocol is Unknown
16. [Utils] Fixed: checkproto now respects MARK1 and port presence. checkproto 8.8.8.8 443 www.google.com vs checkproto 8.8.8.8 www.google.com may give different results
17. [Utils] bin2as now accepts multiple input files
18. [Utils] ascheckip supports group checks from stdin
19. [Utils] bgp2bin is a as2bin-like tool but:
 - only accepts /24 and larger subnets
 - supports IP1-IP2 range as in RIPE records
 - later entries take precedence
 - output is slightly larger than as2bin but contains no overlapping ranges
20. [BRAS] L3-auth improvements:
 - On Reject for IP bound to multi-bind login: first unbind IP, then assign services (whitelist, policing)
 - On successful Access-Accept with a login for unbound IP: unbind all services before linking IP with new login
21. [BRAS][PPP] Fixed: mixed dual-stack where one address is specified, the other via framed-pool
22. [BRAS][PPP] Fixed: silently drop broadcast packets
23. [PCRF] Added syslog support. New param syslog_level in fastpcrf.conf — controls alert log to syslog. 0 disables (default)
24. Added: hot param smartdrop = 1 — if drop set for protocol, it's delayed until TLS is parsed or error occurs
25. Fixed: adding HTTP domains ending with ':' (port number)
26. Changed: ASNUM path from VAS Cloud (cloud.vasexperts.ru)
27. Blocking by blacklist in GTP tunnel (with detect_gtp_tunnel enabled)
28. Fixed: https blocking with hard option
29. IPv6 AS reload support
30. Initial alert log to syslog support. Enable with syslog_level=7. Default is off. Notes:
 1. rsyslog replaces tab/newline with codes. To disable, add in /etc/rsyslog.d/fastdpi.conf:

```
global(parser.escapeControlCharactersOnReceive="off")
```

or use journalctl. Example:

```
journalctl -t fastdpi -p 4 --since "1 hour ago" -o verbose --output-fields PRIORITY,MESSAGE
```

2. Logs can be forwarded remotely. Example from /etc/rsyslog.conf:

1. on fastdpi server:

```
*.* action(type="omfwd" target="192.0.0.1" port="10514"
protocol="tcp"
action.resumeRetryCount="100")
```

```
queue.type="linkedList" queue.size="10000")
```

2. on remote server:

```
input(type="imptcp" port="10514"
      ruleset="writeRemoteData")
ruleset(name="writeRemoteData"
        queue.type="fixedArray"
        queue.size="250000"
        queue.dequeueBatchSize="4096"
        queue.workerThreads="4"
        queue.workerThreadMinimumMessages="60000"
      ) {
  action(type="omfile" file="/var/log/fastdpi.log"
        ioBufferSize="64k" flushOnTXEnd="off"
        asyncWriting="on")
}
```

1)

Cradle of mankind: humans have lived here for over 50,000 years