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# 3 IPFIX export

For Clickstream data analysis (subscribers' http requests) and SIP (VOIP unciphered data) on external systems IPFIX export is available. A list of the correspondence between the Protocol and the port number in netflow5 can be found [here](#).

Any universal IPFIX collector that accepts templates or the [IPFIX Receiver](#) utility is suitable for collecting information in IPFIX format.

To receive, process and store ClickStream, we suggest using the [QoE Store software](#) and [DPIUI2 graphical interface](#).

## ClickStream export Setup

Clickstream experts is configured by following parameters:

```
ipfix_dev=em1
ipfix_udp_collectors=1.2.3.4:1500,1.2.3.5:1501
ipfix_tcp_collectors=1.2.3.6:9418
dbg_log_mask=0x80
```

here

- **em1** - NIC using for export.
- **ipfix\_udp\_collectors** - IP of udp collectors.
- **ipfix\_tcp\_collectors** - IP of tcp collectors.
- **dbg\_log\_mask=0x80** - logging statistics about export.

## IPFIX format template for Clickstream

The format of IPFIX templates for IPV6 differs only in the *IP\_SOURCE* and *IP\_DESTINATION* fields.

No	Size in bytes	Type	IANA	Description	Note
1003	16	IPv6	43823	IP_SOURCE	Sender address
1004	16	IPv6	43823	IP_DESTINATION	Recipient address

### IPFIX format template for Clickstream

No	Size in bytes	Type	IANA	Description	Note
1001	4	int32	43823	TIME_STAMP	
1002	-	string	43823	LOGIN	
1003	4	IPv4	43823	IP_SOURCE	Sender address
1004	4	IPv4	43823	IP_DESTINATION	Recipient address
1005	-	string	43823	HOSTNAME/CNAME	
1006	-	string	43823	PATH	
1007	-	string	43823	REFER	

IPFIX format template for Clickstream					
No	Size in bytes	Type	IANA	Description	Note
1008	-	string	43823	USER_AGENT	
1009	-	string	43823	COOCKIE	
2000	8	int64	43823	SESSION_ID	
1010	8	int64	43823	LOCKED	
1011	1	int8	43823	HOST_TYPE	
1012	1	int8	43823	METHOD	
1013	2	int16	43823	PORT_SOURCE	Sender port
1014	2	int16	43823	PORT_DESTINATION	Recipient port
2016	2	int16	43823	BRIDGE_CHANNEL_NUM	Channel number (vchannel) or bridge. If vchannel is configured in the DPI configuration, then the channel number will be transmitted, otherwise the bridge number. Used in QoEStor.

**ND:**

- LOCKED contains the blocking mark if its value !=0 (0x3 for HTTP, 0x1 for everything else),
- HOST TYPE = 1 in case of HTTP, 2 - CNAME, 3 - SNI, 4 - QUIC
- METHOD = 1 - GET, 2 - POST, 3 - PUT, 4 - DELETE

If the configuration parameter "*http\_parse\_reply=1*" is enabled, information from responses to requests will be additionally transmitted. You can associate them with responses by the session identifier *SESSION\_ID*, taking into account the order.

**Clickstream export template IPFIX format for HTTP responses<sup>1)</sup>**

No	Size in bytes	Type	IANA	Description
1001	4	int32	43823	TIME_STAMP
1002	-	string	43823	LOGIN
1003	4	IPv4	43823	IP_SOURCE
1004	4	IPv4	43823	IP_DESTINATION
1020	4	int32	43823	RESULT_CODE
1021	8	int64	43823	CONTENT_LENGTH
1022	-	string	43823	CONTENT_TYPE
2000	8	int64	43823	SESSION_ID

If the configuration parameter "*ssl\_parse\_reply=1*" is enabled, information from responses to requests will be additionally transmitted. You can associate them with responses by the session identifier *SESSION\_ID*, taking into account the order.

**Clickstream export template IPFIX format for responses over SSL/TLS, HTTPS<sup>2)</sup>**

No	Size in bytes	Type	IANA	Description
1001	4	int32	43823	TIME_STAMP
1002	-	string	43823	LOGIN
1003	4	IPv4	43823	IP_SOURCE
1004	4	IPv4	43823	IP_DESTINATION
2000	8	int64	43823	SESSION_ID

## Clickstream export template IPFIX format for responses over SSL/TLS, HTTPS<sup>2)</sup>

No	Size in bytes	Type	IANA	Description
1030	2	int16	43823	SSL_VERSION
1031	2	int16	43823	CIPHER_SUITE
1032	1	int8	43823	COMPRESSION_METHOD

## Metadata Export Setting

Export of metadata of other protocols for SORM is configured by the following parameters

```
ipfix_dev=em1  
ipfix_meta_udp_collectors=1.2.3.4:1500,1.2.3.5:1501  
ipfix_meta_tcp_collectors=1.2.3.6:9418  
dbg_log_mask=0x80
```

where

- **em1** - network interface name for export
- **ipfix\_meta\_udp\_collectors** - udp addresses of collectors
- **ipfix\_meta\_tcp\_collectors** - tcp addresses of collectors
- **dbg\_log\_mask=0x80** - output of statistical information about export to the log

## IPFIX metadata export template formats

### SIP metadata export template IPFIX format

No	Size in bytes	Type	IANA	Description
1001	4	int32	43823	TIME_STAMP
1002	-	string	43823	LOGIN
1003	4	IPv4	43823	IP_SRC
1004	4	IPv4	43823	IP_DST
2000	8	int64	43823	SESSION_ID
3000	-	string	43823	MSG_CODE
3001	2	int16	43823	STATUS_CODE
3002	-	string	43823	URI
3003	-	string	43823	FROM
3004	-	string	43823	TO
3005	-	string	43823	CALLID
3006	-	string	43823	UAGENT
3007	-	string	43823	CTYPE
3008	-	string	43823	GATEWAYS

### Notes:

IP\_SRC - IP SOURCE

IP\_DST - IP DESTINATION

GATEWAYS - comma separated list of gateways (IP or hostname)

**FTP Metadata Export Template IPFIX Format**

<b>№</b>	<b>Size in bytes</b>	<b>Type</b>	<b>IANA</b>	<b>Description</b>
1001	4	int32	43823	TIME_STAMP
1002	-	string	43823	LOGIN
1003	4	IPv4	43823	IP_SRC
1004	4	IPv4	43823	IP_DST
2000	8	int64	43823	SESSION_ID
3050	-	string	43823	SERVER_NAME
3051	-	string	43823	USER
3052	-	string	43823	PASSWORD
3053	1	int8	43823	MODE
1020	4	int32	43823	RESULT_CODE

**Note:** the MODE field contains the ftp connection type 0 - active, 1 - passive

**Messenger Metadata Export Template IPFIX Format (XMPP)**

<b>№</b>	<b>Size in bytes</b>	<b>Type</b>	<b>IANA</b>	<b>Description</b>
1001	4	int32	43823	TIME_STAMP
1002	-	string	43823	LOGIN
1003	4	IPv4	43823	IP_SRC
1004	4	IPv4	43823	IP_DST
2000	8	int64	43823	SESSION_ID
3100	-	string	43823	IM_LOGIN
3101	-	string	43823	IM_PASSW
3102	-	string	43823	IM_SCREEN_NAME
3103	-	string	43823	IM_UIN
3104	1	int8	43823	IM_PROTOCOL
3105	-	string	43823	IM_RECEIVERS
1020	4	int32	43823	RESULT_CODE

**Note:** the IM\_PROTOCOL field contains the type of protocol used: 0 - ICQ, 7 - XMPP, 106 - ZELLO

**IPFIX format of mail protocol metadata export template (POP,IMAP,SMTP)**

<b>№</b>	<b>Size in bytes</b>	<b>Type</b>	<b>IANA</b>	<b>Description</b>
1001	4	int32	43823	TIME_STAMP
1002	-	string	43823	LOGIN
1003	4	IPv4	43823	IP_SRC
1004	4	IPv4	43823	IP_DST
2000	8	int64	43823	SESSION_ID
3150	-	string	43823	MAIL_SENDER
3151	-	string	43823	MAIL_RECEIVER
3152	-	string	43823	MAIL_CC
3153	-	string	43823	MAIL_SUBJECT
3154	-	string	43823	MAIL_SERVERS
3155	-	string	43823	MAIL_REPLY
3156	1	int8	43823	EVENT
3157	1	int8	43823	ATTACHMENT

### IPFIX format of mail protocol metadata export template (POP,IMAP,SMTP)

№	Size in bytes	Type	IANA	Description
3158	1	int8	43823	MAIL_PROTOCOL
1020	4	int32	43823	RESULT_CODE

**Note:** the EVENT field indicates the event type 1 - send, 2 - receive, ATTACHMENT sign of an attachment, mail\_protocol = 0 - smtp, 1 - pop3, 2 - imap

### The raw unparsed metadata export template IPFIX format

№	Size in bytes	Type	IANA	Description
1001	4	int32	43823	TIME_STAMP
1002	-	string	43823	LOGIN
1003	4	IPv4	43823	IP_SRC
1004	4	IPv4	43823	IP_DST
2000	8	int64	43823	SESSION_ID
2013	1	int8	43823	FLW_DIR
2014	1	int8	43823	DIR_DATA
2015	2	int16	43823	VDPI_PROTO
2900	2	int16	43823	META_PROTO
2901	-	string	43823	RAW_DATA

**Note:** field

- **FLW\_DIR** - direction of packet on interfaces : 0 : subs -> inet, 1 : inet -> subs
- **DIR\_DATA** - direction of the packet by session: for TCP 0 : client -> server, 1 : server -> client, for UDP - from whom the first packet was recorded, he is considered the client
- **VDPI\_PROTO** - protocol that defined dpi
- **META\_PROTO** - internal protocol identifier (3 - SIP, 4 - FTP, 5 - SMTP, 6 - POP3, 7 - IMAP, 8 - XMPP, 9 - ICQ, 10 - RSS, 11 - NNTP, 12 - H323 , 13 - ZELLO)
- **RAW\_DATA** - raw data

Aggregating raw\_data, clickstream, http\_reply and ssl\_reply with session data requires additional processing: or executing a database query with the session\_id key, or support in the rcollector utility.

## DNS

Parameters:

- **ajb\_save\_dns** - flag for writing to a text file
- **ajb\_dns\_ftimeout** - timeout (minutes) for switching to the next file
- **ajb\_dns\_bufsize** - file write buffer
- **ajb\_dns\_fsize** - file size limit
- **ajb\_dns\_path** - path where to write

Switching to the next file occurs when the file size reaches *ajb\_dns\_fsize* or the file is not empty and *ajb\_dns\_ftimeout* has passed

*ajb\_save\_dns\_format* : format for writing to a text file

- **"ts"** - time
- **"ipsrc"** - ip source
- **"ipdst"** - ip destination
- **"ssid"** - session id
- **"login"** - understandable
- **"host"** - the name of which the information was requested
- **"rrtype"** - RR types
- **"rrclass"** - RR class
- **"ttl"** - TTL
- **"rdlen"** - rdata size
- **"rdata"** - the resource itself
- **"psrc"** - port source
- **"pdst"** - port destination
- **"transport"** - how the DNS query was received.

Now:

```
//
// transport for DNS
//
typedef enum en_dns_transport : u_int8_t
{
edns_udp=0
edns_tcp=1,
edns_max = 2,
} en_dns_transport_t;
```

Default: "ts:ssid:login:ipsrc:ipdst:psrc:pdst:transport:host:rrtype:rrclass:ttl:rdlen:rdata";

```
// IPFIX collectors. Format as usual:
ipfix_dns_udp_collectors
ipfix_dns_tcp_collectors
```

*dbg\_log\_mask* for fastdpi - Mainly used for debugging and troubleshooting:

```
enum: uint64_t {
brg_lgmsk_dpi = 0x01, // display dpi statistics
brg_lgmsk_mem_usage = 0x02, // display statistics on memory usage
brg_lgmsk_plc = 0x04, // output policing statistics
brg_lgmsk_clstr_wthr = 0x08, // print statistics on cluster worker threads
brg_lgmsk_ajb = 0x10, // display statistics on the use of ajb buffers
brg_lgmsk_stat_ddos = 0x20, // display statistics on DDOS parameters
brg_lgmsk_call_udr = 0x40, // output to alert the results of the UDR call
function
brg_lgmsk_ipfix = 0x80, // Show IPFIX statistics
brg_lgmsk_flow = 0x100, // Data output by flow (session output)
brg_lgmsk_ip_proto = 0x200, // output statistics by ip type
brg_lgmsk_eth_type = 0x400, // display statistics by type of ethernet packet
brg_lgmsk_slice_stat = 0x800, // print slice statistics for flow and IP
brg_lgmsk_dna_cluster = 0x1000, // debug DNA cluster creation
```



```

brg_lgmsk_lock_stat = 0x2000, // multicluster lock statistics
brg_lgmsk_all_cpu_stat = 0x4000, // load statistics for all cores
brg_lgmsk_load_vchannels= 0x8000, // vcahnnels loading statistics
brg_lgmsk_redirect = 0x10000, // redirect operations
brg_lgmsk_dna_cluster_stat= 0x20000, // record statistics for
pfring_zc_stats
brg_lgmsk_nat = 0x40000, // NAT initialization
brg_lgmsk_bind = 0x80000, // bind operations
brg_lgmsk_stat_nat_whbl = 0x100000, // output NAT statistics on white block
brg_lgmsk_print_ip = 0x200000, // Printing IP data to the statistics file
brg_lgmsk_print_nat = 0x400000, // Print NAT data to statistics file
brg_lgmsk_check_nat = 0x800000, // check NAT
brg_lgmsk_tm_nflw_ipfix = 0x1000000, // output netflow/ipfix send time
brg_lgmsk_stat_nat = 0x2000000, // output NAT statistics to fastdpi_stat.log
brg_lgmsk_tod_brg_sync = 0x4000000, // trace time synchronization
gettimeofday <--> rtdsc

brg_lgmsk_ctrlopt = 0x8000000, // Display data for CTRLLOPT in statistics

brg_lgmsk_auth = 0x10000000, // authorization statistics for local users
brg_lgmsk_apartment = 0x20000000, // apartment statistics
brg_lgmsk_conmon = 0x40000000, // print connection monitor traces to alert
brg_lgmsk_task_scheduler= 0x80000000, // output scheduler traces to alert
brg_lgmsk_tfrwd =0x100000000, // print statistics for trafix forward
};

```

1)

for the IPv6 variant see difference above

2)

for the IPv6 variant, see difference above