

# Export of GTP-U Information in IPFIX

draft-voyersriram-opsawg-ipfix-gtpu-04

Enabling insights in GTP forwarding plane by adding GTP-U dimensions

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# GTP-U @ IPFIX

## Data-Plane visibility is missing in GTP

- GTP is already deployed by network operators
- Data-Plane visibility is missing in GTP-U and so unable to identify the transport performance of PDU Sessions with specific QoS within a slice or within a group of slices hosted on the same User Plane Function.

3GPP TS 29.281 version 17.4.0 Release 17

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ETSI TS 129 281 V17.4.0 (2022-10)

Octets	Bits						
	8	7	6	5	4	3	2 1
1	Version		PT	(*)	E	S	PN
2	Message Type						
3	Length (1 <sup>st</sup> Octet)						
4	Length (2 <sup>nd</sup> Octet)						
5	Tunnel Endpoint Identifier (1 <sup>st</sup> Octet)						
6	Tunnel Endpoint Identifier (2 <sup>nd</sup> Octet)						
7	Tunnel Endpoint Identifier (3 <sup>rd</sup> Octet)						
8	Tunnel Endpoint Identifier (4 <sup>th</sup> Octet)						
9	Sequence Number (1 <sup>st</sup> Octet) <sup>1) 4)</sup>						
10	Sequence Number (2 <sup>nd</sup> Octet) <sup>1) 4)</sup>						
11	N-PDU Number <sup>2) 4)</sup>						
12	Next Extension Header Type <sup>3) 4)</sup>						

NOTE 0: (\*) This bit is a spare bit. It shall be sent as '0'. The receiver shall not evaluate this bit.

NOTE 1: 1) This field shall only be evaluated when indicated by the S flag set to 1.

NOTE 2: 2) This field shall only be evaluated when indicated by the PN flag set to 1.

NOTE 3: 3) This field shall only be evaluated when indicated by the E flag set to 1.

NOTE 4: 4) This field shall be present if and only if any one or more of the S, PN and E flags are set.

**Figure 5.1-1: Outline of the GTP-U Header**

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## IPFIX entities in context of the GTP-U (1)

3GPP TS 29.281 version 17.4.0 Release 17

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ETSI TS 129 281 V17.4.0 (2022-10)

- **gtpuFlags**

8-bit flags field defined in the GTP-U which indicates the version of GTP-U protocol, protocol type and presence of extension header, sequence number and N-PDU number in the GTP-U header.

- **gtpuMsgType**

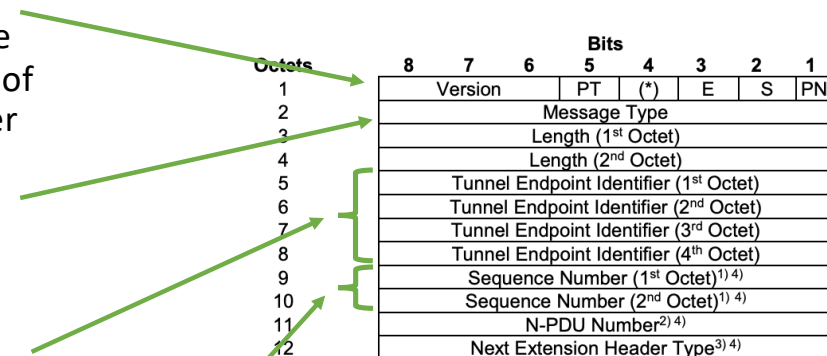
8-bit message type field defined in the GTP-U which indicates the type of GTP-U message.

- **gtpuTEid**

32-bit tunnel endpoint identifier field defined in GTP-U which unambiguously identifies a tunnel endpoint in the receiving GTP-U protocol entity for a given UDP/IP endpoint..

- **gtpuSequenceNum**

16-bit sequence number field defined in the GTP-U. This field is interpreted based on the corresponding flag value from gtpuFlags



NOTE 0: (\*) This bit is a spare bit. It shall be sent as '0'. The receiver shall not evaluate this bit.  
NOTE 1: 1) This field shall only be evaluated when indicated by the S flag set to 1.  
NOTE 2: 2) This field shall only be evaluated when indicated by the PN flag set to 1.  
NOTE 3: 3) This field shall only be evaluated when indicated by the E flag set to 1.  
NOTE 4: 4) This field shall be present if and only if any one or more of the S, PN and E flags are set.

Figure 5.1-1: Outline of the GTP-U Header

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## IPFIX entities in context of the GTP-U (2)

- **gtpuQFI**

8-bit QoS flow identifier field defined in PDU Session Container extension header of GTP-U. This is defined in section 5.5.3 of PDU session spec [TS.38415]. This is used to determine the QoS flow and QoS profile which are associated with the received packet..

- **gtpuPduType**

8-bit PDU type field defined in PDU Session Container extension header of GTP-U. This is defined in section 5.5.3 of PDU session spec [TS.38415]. This field indicates the structure of the PDU session UP frame..

Bits								Number of Octets
7	6	5	4	3	2	1	0	
PDU Type (=0)				QMP	SNP	MSNP	Spare	1
PPP	RQI	QoS Flow Identifier						1
PPI			Spare					0 or 1
DL Sending Time Stamp								0 or 8
DL QFI Sequence Number								0 or 3
DL MBS QFI Sequence Number								0 or 4
Padding								0-3

# GTP-U @ IPFIX – Cisco IOX-XR Implementation status

## IPFIX Records exposed

### 1. gtpuFlags

8-bit flags field defined in the GTP-U which indicates the version of GTP-U protocol, protocol type and presence of extension header, sequence number and N-PDU number in the GTP-U header.

### 2. gtpuMsgType

8-bit message type field defined in the GTP-U which indicates the type of GTP-U message.

### 3. gtpuTEid

32-bit tunnel endpoint identifier field defined in GTP-U which unambiguously identifies a tunnel endpoint in the receiving GTP-U protocol entity for a given UDP/IP endpoint..

### 4. gtpuSequenceNum

16-bit sequence number field defined in the GTP-U. This field is interpreted based on the corresponding flag value from gtpuFlags

### 5. gtpuQFI

8-bit QoS flow identifier field defined in PDU Session Container extension header of GTP-U. This is defined in section 5.5.3 of PDU session spec [TS.38415]. This is used to determine the QoS flow and QoS profile which are associated with the received packet

### 6. gtpuPduType

8-bit PDU type field defined in PDU Session Container extension header of GTP-U. This is defined in section 5.5.3 of PDU session spec [TS.38415]. This field indicates the structure of the PDU session UP frame

```
> Frame 24: 514 bytes on wire (4112 bits), 514 bytes captured (4112 bits)
> Ethernet II, Src: 02:52:b0:a0:a0:aea (02:52:b0:a0:a0:aea), Dst: MS-NLB-PhysServer-32_12:50:04:cf:1a (02:32:50:04:cf:1a)
> Internet Protocol Version 4, Src: 1.1.1.1, Dst: 1.1.1.10
> User Datagram Protocol, Src Port: 51737, Dst Port: 2055
> Cisco NetFlow/IPFIX
  Version: 10
  Length: 472
  Timestamp: Mar 5, 2024 17:19:55.000000000 IST
  FlowSequence: 3
  Observation Domain Id: 16
  Set 1 [Id=2] (Data Template): 351
    FlowSet Id: Data Template (V10 [IPFIX]) (2)
    FlowSet Length: 224
    Template (Id = 351, Count = 54)
      Template Id: 351
      Field Count: 54
      > Field (1/54): PKTS
      > Field (2/54): BYTES
      > Field (3/54): INPUT_SNMP
      > Field (4/54): OUTPUT_SNMP
      > Field (5/54): FIRST_SWITCHED
      > Field (6/54): LAST_SWITCHED
      > Field (7/54): FORWARDING_STATUS
      > Field (8/54): DIRECTION
      > Field (9/54): selectorId
      > Field (10/54): ingressVRFID
      > Field (11/54): egressVRFID
      > Field (12/54): DST_TOS
      > Field (13/54): SRC_MAC
      > Field (14/54): DESTINATION_MAC
      > Field (15/54): ethernetType
      > Field (16/54): dot1qVlanId
      > Field (17/54): dot1qCustomerVlanId
      > Field (18/54): dot1qPriority
      > Field (19/54): IPV6_SRC_ADDR
      > Field (20/54): IPV6_DST_ADDR
      > Field (21/54): IPV6_DST_MASK
      > Field (22/54): IPV6_SRC_MASK
      > Field (23/54): FLOW_LABEL
      > Field (24/54): IP_TOS
      > Field (25/54): SRC_AS
      > Field (26/54): DST_AS
      > Field (27/54): BGP_NEXT_HOP
      > Field (28/54): BGP_IPV6_NEXT_HOP
      > Field (29/54): IP_NEXT_HOP
      > Field (30/54): IPV6_NEXT_HOP
      > Field (31/54): Unknown(602)
        0... .. = Pen provided: No
        .000 0010 0101 1010 = Type: Unknown (602)
        Length: 1
      > Field (32/54): Unknown(603)
        0... .. = Pen provided: No
        .000 0010 0101 1011 = Type: Unknown (603)
        Length: 1
      > Field (33/54): Unknown(604)
        0... .. = Pen provided: No
        .000 0010 0101 1100 = Type: Unknown (604)
        Length: 4
      > Field (34/54): Unknown(605)
        0... .. = Pen provided: No
        .000 0010 0101 1101 = Type: Unknown (605)
        Length: 2
      > Field (35/54): Unknown(606)
        0... .. = Pen provided: No
        .000 0010 0101 1110 = Type: Unknown (606)
        Length: 1
      > Field (36/54): Unknown(607)
        0... .. = Pen provided: No
        .000 0010 0101 1111 = Type: Unknown (607)
        Length: 1
      > Field (37/54): IP_SRC_ADDR
      > Field (38/54): IP_DST_ADDR
```

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## Next Steps

- Data-Plane visibility is missing in GTP.
- Authors want to avoid private enterprise code points being used in GTP 5G deployments.
- During the IETF week, we will be requesting for IPFIX IANA allocation.
- This draft could progress to document the use cases and will be helpful for 3GPP references also.
- Call for adoption at OPSAWG at IETF 119.