**Agenda item:** **10.8**

**Source:** Qualcomm Inc., Interdigital

**Title: [5G\_RTP] Signaling the Usage of PDU Set and End of Burst marking**

**Document for** Discussion andAgreement

# Introduction

The marking of XR traffic is a mechanism that helps the network to identify XR traffic and optimize its delivery. The concept of PDU Sets has been introduced specifically for this purpose but can also be used for other types of traffic. PDU Sets are PDUs that are consumed together by the receiver, and as such should be handled together by the network. End of Burst (EoB) provides another tool to optimize delivery of the XR traffic by allowing for appropriate usage of Connected mode Discontinuous Reception (CDRX), in order to save power on the receiver side.

The PDU Set marking is performed for RTP/SRTP traffic through the usage of an RTP header extension that is appended to the RTP packet header of each PDU of an RTP stream that has PDU Set marking activated. The UPF will be able to inspect downlink traffic and extract the information about PDU Set marking and pass it to the gNB.

In this contribution, we propose two signaling mechanisms to configure PDU Set marking with the PCF, which in turn will configure the UPF.

# Signaling the use of PDU Set marking and EoB

## Background

The UE and the Application Server (or remote UE) negotiate the usage of PDU Set and EoB marking during the offer/answer exchange at session setup or during an update (e.g. through a SIP re-Invite).

According to RFC8285, the negotiation of the used RTP header extensions is performed through the inclusion of the “extmap” attribute. The URN for the PDU Set marking shall be set to “**urn:3gpp:pdus-marking:rel-18**”.

The following options are currently supported for an RTP stream and apply to all RTP packets of that RTP stream, throughout the lifetime of the RTP session:

* One-byte or two-byte header extension format identified through the extension attribute “**short**” or “**long**” correspondingly. If not present, the header extension format shall be deduced from the preamble bytes 0xBEDE or 0x100 (+appbits). In any case, the Application Server shall not change the format during the RTP session.
* PDU Set size in bytes identified through the presence of the string flag “**pdu-set-size**”. If not present, the receiver shall assume that the PDU Set Size field is not present. This leads to a shorter header extension for that RTP session.
* End of Burst marking identified through the presence of the string flag “**end-of-burst**”. When not present, the receiver shall ignore the EoB bits.

The ABNF syntax for the extmap attribute is then as follows:

*extmap-attr="a=extmap:" 1\*5DIGIT ["/" direction] SP "urn:3gpp:pdus-marking:rel-18" SP extensionattributes*

*extensionattributes = \*3(format / "pdu-set-size" / "end-of-burst")*

*format = "short" / "long"*

## Configuration by the AF

The AF uses the N5 Npcf\_PolicyAuthorization (TS29.514) procedure or the N33 Nnef\_AFSessionWithQoS (TS29.122) procedure to request QoS allocation for the session.

These methods are extended to add support for signaling the PDU Set and EoB marking to the PCF.

The MediaSubComponent data type is extended as follows:

| Attribute name | Data type | P | Cardinality | Description | Applicability |
| --- | --- | --- | --- | --- | --- |
| afSigProtocol | AfSigProtocol | O | 0..1 | Indicates the protocol used for signalling between the UE and the NF service consumer. It may be included only if the "flowUsage" attribute is set to the value "AF\_SIGNALLING". | ProvAFsignalFlow |
| ethfDescs | array(EthFlowDescription) | O | 1..2 | Contains the flow description for the Uplink and/or Downlink Ethernet flows. |  |
| fNum | integer | M | 1 | Identifies the ordinal number of the service data flow. |  |
| fDescs | array(FlowDescription) | O | 1..2 | Contains the flow description for the Uplink and/or Downlink IP flows. |  |
| fStatus | FlowStatus | O | 0..1 | Indicates whether the status of the service data flows is enabled or disabled. |  |
| flowUsage | FlowUsage | O | 0..1 | Flow usage of the flows (e.g. RTCP, AF signalling). |  |
| marBwUl | BitRate | O | 0..1 | Maximum requested bandwidth for the Uplink. |  |
| marBwDl | BitRate | O | 0..1 | Maximum requested bandwidth for the Downlink. |  |
| tosTrCl | TosTrafficClass | O | 0..1 | Type of Service or Traffic Class. |  |
| pduSetMarking | PDUSetMarking | O | 0..1 | Configuration information for the PDU Set and end of burst marking. |  |

The PDUSetMarking data type is defined as follows:

| Attribute name | Data type | P | Cardinality | Description | Applicability |
| --- | --- | --- | --- | --- | --- |
| version | Integer | O | 0..1 |  |  |
| localIdentifier | Integer | M | 0..1 |  |  |
| format | Boolean | O | 0..1 |  |  |
| pduSetSizeActive | Boolean | O | 0..1 |  |  |
| eobMarkingActive | Boolean | O | 0..1 |  |  |

## Signaling by Intermediate Server

An intermediate server, namely a trusted WebRTC signaling server or a P-CSCF, is able to inspect the SDP offer/answer and extract the information related to the PDU Set and End of Burst marking. The procedure is as follows:



The steps are as follows:

1. UE1 sends an SDP offer for the establishment of an XR session to the WebRTC Signaling Server or P-CSCF. The Signaling Server forwards the request to the Application Server.
2. The Application Server responds with an SDP answer. The Application Server includes an indication of the PDU Set and End of Burt marking in the SDP as described in the previous section.
3. The Signaling Server inspects the SDP and extracts the information related to the PDU Set and End of Burst marking.
4. The Signaling Server informs the AF about the new IMS/WebRTC session. It includes the information about the configuration for the PDU Set and EoB marking.
5. The AF uses the Npcf\_PolicyAuthorization procedure to request allocation of the QoS for the media streams of the IMS/WebRTC session.
6. Alternatively, the AF may use the Nnef\_AFSessionWithQoS procedure to request allocation of the QoS for the media streams of the IMS/WebRTC session.
7. The AF confirms the allocation of the QoS for the media streams to the Signaling Server.
8. The Signaling Server forwards the SDP answer to UE1.

## Signaling by the MSH

An alternative approach is for the application on UE1 to use the M6 interface to the Media Session Handler to pass the information about the session. This information includes the media components of the session and also the PDU Set and End of Burst marking configuration.

The dynamic policy information that is configured by the MSH for the session contains the following information:

| Attribute name | Data type | P | Cardinality | Description |
| --- | --- | --- | --- | --- |
| policyTemplateId | ResourceId | O | 0..1 | Identifier of the provisioned policy template |
| mediaComponentQoS | Array(MediaComponentQoS) | M | 0..n | A list of QoS allocation specifications for the media sessions of the WebRTC session. |

The MediaComponentQoS object contains the following information:

| Attribute name | Data type | P | Cardinality | Description |
| --- | --- | --- | --- | --- |
| Name | string | M | 1 | Unique identifier of this media component in the session |
| flowDescription | FlowDescription | M | 1 | The flow description, provided as a 5-Tuple, for the media component. |
| qosAllocation | M5QoSSpecification | M | 1 | The QoS description as described in 3GPP TS26.512, which applies to the stream with the given flow description. |

## Mapping of the Media Sub-components

The QoS policy template is extended to include a name for each sub-component of the session. The name is used to associate the actual media stream with the QoS sub-component policy. The RTC AF uses this mapping to associate the network assistance request for each media stream to the corresponding sub-component of the QoS policy.

The RTC AF uses this information to verify that the requested/desired QoS for each component is aligned with the provisioned QoS policy by the Application Service Provider (ASP).

# Proposal

We propose to agree the content of section 2 to TS26.113 and liaise with SA2 and CT3 to implement the necessary changes to N5 and N33.