**3GPP TSG-WG2 Meeting #165 *S2-24nxxxx***

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**Source: Ericsson**

**Title:** **XRM Phase 2. Additional Packet Filters**

**Document for:** **Discussion**

**Agenda Item:** **19.xx**

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*Abstract: Provides arguments for which elements are relevant for Media streams multiplexed in same (S)RTP session*

# 1. Introduction

As in TR conclusions for KI#4,

*“In order to uniquely identify each media flow, the additional packet filter is used together with the legacy packet filter. The additional Packet Filter is used* **to differentiate the media flow among multiple media flows** *that share the same legacy packet filter in uplink (in UE) and/or downlink (in UPF) in the following case:*

*a)        For the media flows that are transported in (S)RTP, (S)RTCP and other associated protocols that are multiplexed into a single UDP/IP traffic flow* *as specified in IETF RFCs 5761, 5764, 7983, 8872, 8843 and 9443, the additional Packet Filter SHALL be the Synchronization Source (SSRC), Payload Type (PT) and RTP-M header fields.”*

The agreement is to identify the media flows that require certain mapping to QoS Flow when media streams are transported in (S)RTP on UDP/IP. Multiple RTP streams may be generated in one RTP session. Legacy packet filter does not suffice, and an Additional Packet Filter is needed.

Discussion follows regarding the parameters that Additional Packet Filter shall include according to the conclusions.

# 2. Discussion

RFC 5764 describes the Datagram Transport Layer Security (DTLS) Extension to Establish Keys for the Secure Real-time Transport Protocol (SRTP), including how to differentiate RTC/RTCP from associated protocols like DTLS and STUN that may be multiplexed in the same 5-tuple. RFC 7983 has updated RFC 5764 multiplexing Scheme to consider additional protocols, but it has been further updated by RFC 9443. According to RFC 9443, the first UDP Payload byte of the packet can be used to differentiate RTP/RTCP from the rest. A packet with first UDP byte with a binary value in the range 10xxxxxx corresponds to an RTP/RTCP packet. This first byte is not modified when secure versions of these protocols are used.

**Observation 1:** by looking at first byte of the UDP Payload, it is possible to differentiate (S)RTP/(S)RTCP packets from packets of associated protocols multiplexed on same 5-tuple on UDP/IP.

RFC 5761 describes how to multiplex RTP and RTCP in the same 5-tuple and how to differentiate them. According to RFC 5761, the 2nd byte in UDP Payload can be used to distinguish RTP and RTCP when certain restrictions are observed:

* As described by RFC 3550 section 5.1, the RTP datagram second byte consists of the ‘M’ bit (most significant bit) and Payload Type (least significant 7 bits). In RTCP datagram, the second byte carries the Packet Type, as described by RFC 3550 section 6.4. This byte is not modified when secure versions of these protocols are used
* As in RFC 5761, RTP/RTCP can be differentiated if 1) the RTP payload type values used are distinct from the RTCP packet types used; and 2) for each RTP payload type (PT), PT+128 is distinct from the RTCP packet types used. In an RTP media stream, the ‘M’ bit changes during the lifetime of the stream. Some conflicts between RTP payload types and RTCP packet types are known. They are listed in the RFC

**Observation 2**: Payload Type (least significant 7 bits in second byte of the UDP payload) can be used to differentiate (S)RTP media stream packets from (S)RTCP packets, assuming conflicts listed in RFC 5761 are avoided. The ‘M’ bit is not needed for differentiation.

SSRC stands for Synchronization Source and it is a unique identifier of the RTP media stream source. As described in RFC 3550 and RFC 8872, the SSRC in RTP datagram in bytes 9-12 can be used to differentiate RTP media streams in an RTP session (same 5-tuple). It is not modified when the secure version of the protocol (i.e. SRTP) is used.

**Observation 3:** (S)RTP Payload Type and SSRC provide enough information to differentiate (S)RTP Media stream packets.

However, to reach the benefits of differentiated mapping of (S)RTP media streams to QoS Flows, certain (S)RTCP packet types need to be mapped to the same QoS Flow as the (S)RTP media streams they control. (S)RTCP Packet Type = 200 (RTCP Sender Report) and Packet Type = 201 (RTCP Receiver Report) are two examples; the measured RTT based on the LSR and DLSR fields will not correspond to the RTP media stream unless taken in same QoS flow, which could lead to wrong decisions. Some (S)RTCP packet types need to be delivered in a timely manner. This is however not needed for other Packet Types, e.g., for Packet Type = 202 (RTCP Source Description).

(S)RTCP datagrams have Packet Type instead of Payload type and bit ‘M’ in their second byte. In addition, (S)RTCP packets and corresponding (S)RTCP-controlled (S)RTP packets share sender’s SSRC value for a specific RTP stream. The position of SSRC in the (S)RTCP header varies with the Packet Type, which is in the second byte in the (S)RTCP packet, as described by RFC 3550 section 6.4.

**Observation 4:** Some (S)RTCP packets need also be differentiated and mapped to QoS Flows. (S)RTCP Packet Type (second byte un UDP payload) and SSRC, whose position varies with Packet Type, can be used to differentiate them. RTCP datagram parsing differs with Packet Type.

**Conclusion:** based on above observations, the conclusions in the TR are not fully correct. Whereas second byte in UDP Payload is relevant for identification of both (S)RTP media streams and RTCP control packets, most significant ‘M’ bit is present only in (S)RTP and is of no relevance for identification. (S)RTCP carries in the second byte the Packet Type instead of ‘M’ bit + PayloadType”.

# 3. Proposal

Replace the text in the TR by following text in normative specifications:

The Additional Packet Filter is defined for identification of specific media flows that are transported in (S)RTP and control packets that may be multiplexed into a single UDP/IP traffic flow with (S)RTCP and other associated protocols as specified in IETF RFCs 5761, 5764, 7983, 8872, 8843 and 9443.

Additional Packet Filters are based on the following (stage 3 specifications detail specific structures used):

As in RFC 9143, (S)RTP/(S)RTCP can be differentiated from other protocols based on the 1st byte of the UDP Payload. RFC 9143 updates RFC 7893 and RFC 5764 in aspects of multiplexing. As in RFC 5761, (S)RTP and (S)RTCP packets can be differentiated if certain (listed in RFC) restrictions are observed.

Then, Packets belonging to an (S)RTP media stream can be identified by means of

- Payload Type (7 least significant bits of the second octet of the UDP Payload) and Synchronization Source (SSRC)

And, the (S)RTCP packets that need to be mapped to QoS Flows with the (S)RTP media stream they control can be identified by means of:

- Packet Type (second octet of the UDP Payload) and SSRC, whose position in the packet varies with the Packet Type.

NOTE: It is for SA4 to recommend the (S)RTCP Packet Types that should be mapped to same QoS Flow as the (S)RTP streams they control.