

Encoding 3GPP Slices for Interactive Media Services

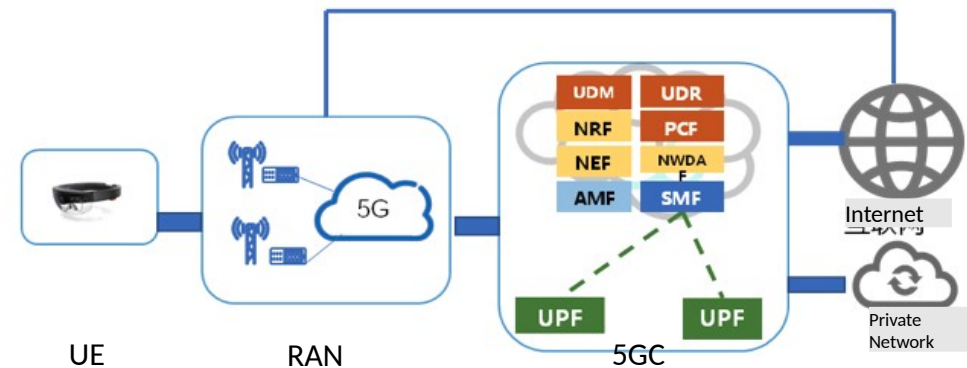
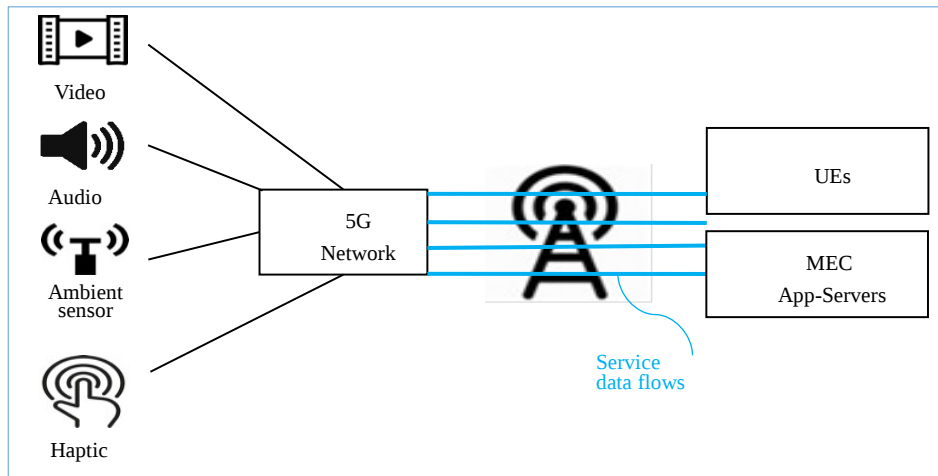
(draft-jiang-tsvwg-slice-media-service-00)

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Motivation of the Draft (1): - 3GPP SA2 XRM (Extended Reality & Multi-modality Services) (Rel-18 & Rel-19)

- **XRM:** A type of 5G advanced service that enables multi-modality interactions; normally 4 modalities: *video*, *audio*, *ambient-sensor* and *haptic data*; typical use cases with immersive real-time experience (AR, VR, XR); a subset of the more-general 'Metaverse' application
 - Services characterized by the requirements of **high data rate and low latency**, including MM transmission, congestion control of media streams, PDU/PDU-set -based QoS handling, uplink-downlink transmission coordination, Packet Delay jitter handling, and etc.
- Various networking related issues to address + **IETF technologies applied:**
 - Network information exposure & congestion control of media streams: L4S with ECN/AQM (3 RFCs in 5G Spec. already), etc.; QoS handling: (PDU/PDU-set, RTP w/ extension, delay, error-rate, GBR/Non-GBR, etc.); Jitter (UL/DL): provisioning, measurement, guarantee, etc.



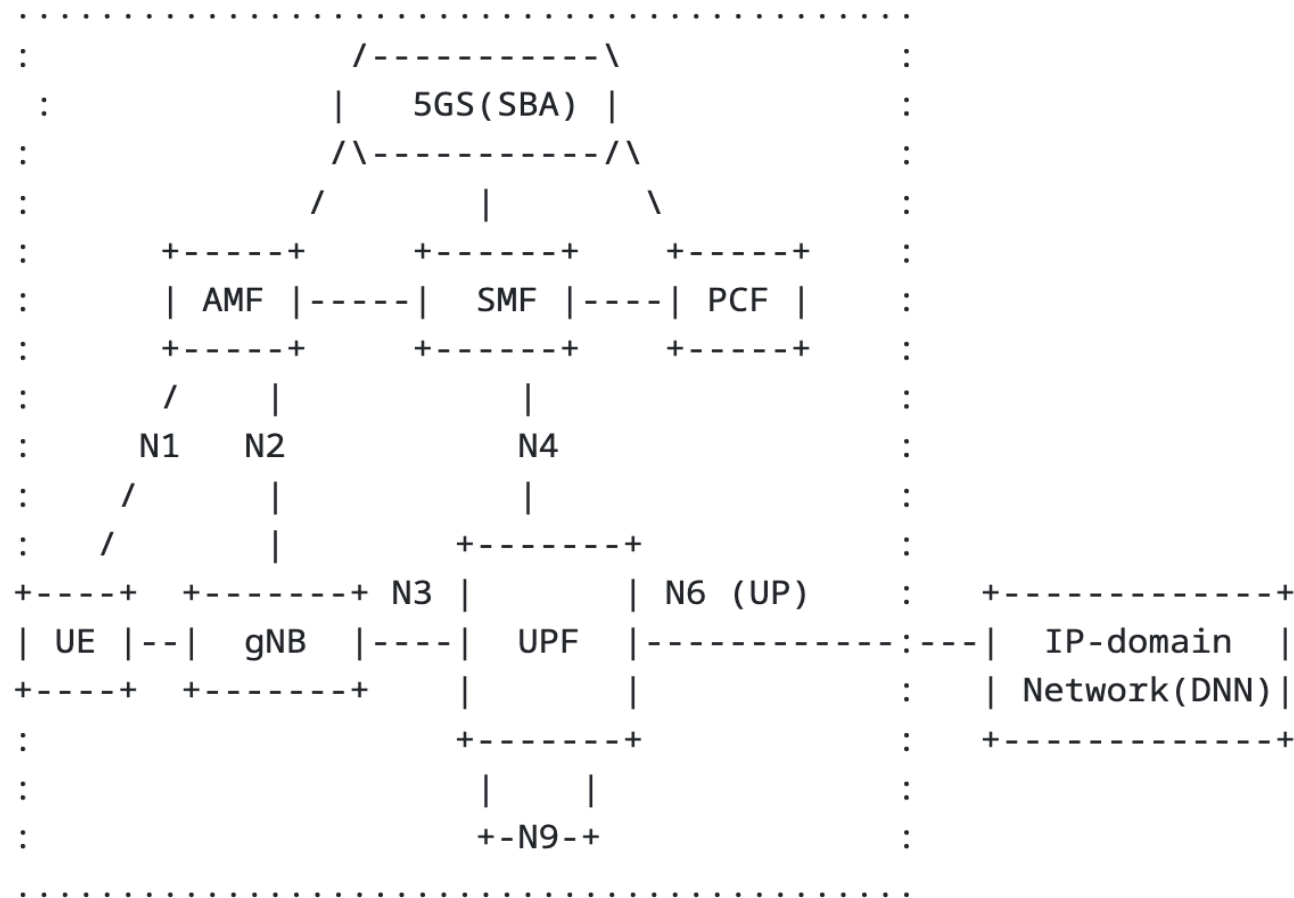
Motivation of the Draft (2): 3GPP-defined Standardized SSTs

Types	Value	Characteristics
eMBB	1	Slice for 5G enhanced mobile broadband
URLLC	2	Slice for ultra-reliable low-latency comm.
MIoT	3	Slice for Massive IoT
V2X	4	Slice for V2X Services
HMTC	5	Slice for High-performance Machine-type comm.
HDLLC	6	Slice for High data-rate & low-latency comm.

- The 6th SST, i.e., HDLLC or the slice for **High Data-rate & Low-Latency** communication service, was just introduced as a new SST for the handling of the XRM service in May, 2023.
- XRM service is characterized by high data rate and low latency communication.

Motivation of the Draft (3): Challenge from Encrypted XRM Streams

- RTP is used to transport video data. If the data contents in a packet are encrypted at the video source (i.e., the UDP source), then the later-added UDP header would not be able to expose the 'metadata' (of XRM streams) to the routing entities in underlay transport networks until the same packet reaches the UDP destinations (UEs).
- This posts somewhat great challenges to the 5GS-based XRM service.
 - E.g., GTP-U @ N3, and gNB @ air-interface DRB resource (prioritized) allocations



Possible IETF Schemes to **Map 3GPP SSTs (1)** : DS-field

- **6-bit DS field** in an IP header:
 - Pros: IP-DSCP bits are not normally subject to the encryption hurdle.
 - Cons:
 - 64 DSCP combinations could not provide better granularity which is an equal important factor for the further evolution of 5G advanced services.
 - DSCP does not have good hierarchy among its 6 bits. E.g., HDLLC (SST=6) targeting at XRM, but could be applied to other services w/ similar HD/LL requirements.

Possible IETF Schemes to **Map 3GPP SSTs** (2): UDP-option

- Pros:
 - A better alternative (than using the IP-DSCP) for encryption-handling, more-granular capability, as well as the extensibility
 - E.g., a single code [*UDP-option-draft*] to identify the main type being the '3GPP network slice'; then further define the sub-structure for more concrete SSTs.
 - A layer-4 protocol and UDP header will normally not be processed by IP routers; relieve the processing burden off IP transport devices; provide a clear demarcation of the TCP/IP layer structure.
- Cons: UDP datagrams should best be processed in the end-to-end way, i.e., encapsulated at UDP sources and decapsulated at UDP destinations.
 - **[Our I.D. argument]** The 5GS XRM service is unique in that the 5GS is a composite system which might grant a 5GS UPF to 'intelligently' break the IP-UDP demarcation rule by peeking at the XRM 'metadata' in the UDP option field.
 - So, a 5GS is just like a 'composite' UDP destination receiver to the external world (of a 5GS). Thus, conforming to the UDP-option end-to-end rule.

Further, one basic Tenet (out of 5) quoted from *draft-ietf-tsvwg-udp-options-22*

E.) UDP options are a framework

- Options may be defined even when the details are not sufficient to implement
- Uses of such options may then be described in other documents

Next Steps

- Further refine our I.D. based on the tenet ' UDP-option being a framework'
- Lots of people have shown interests in working in this issue