SWS-230062

XR related enhancements for Rel-19 (SA)

Meta USA

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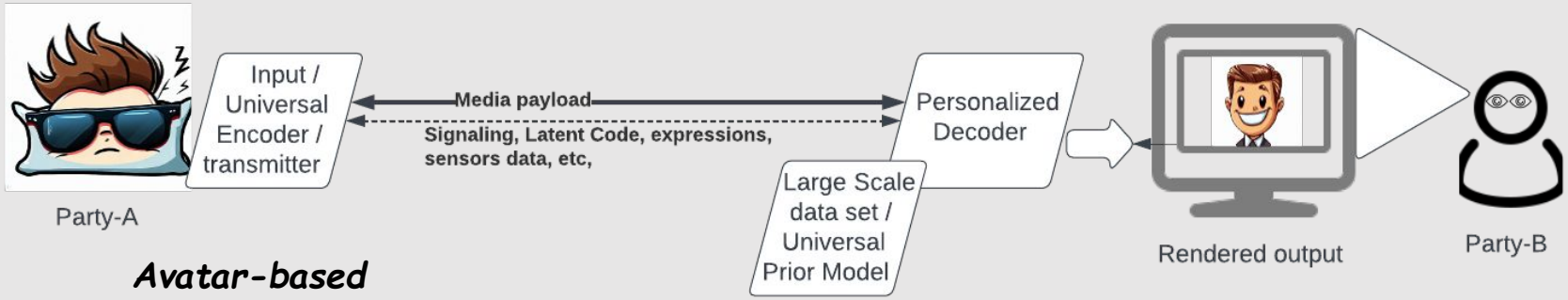
Goal and Outline

Goal: It is all about **creating** a **new** communication **sensation** with 5G-Advanced+ Systems.

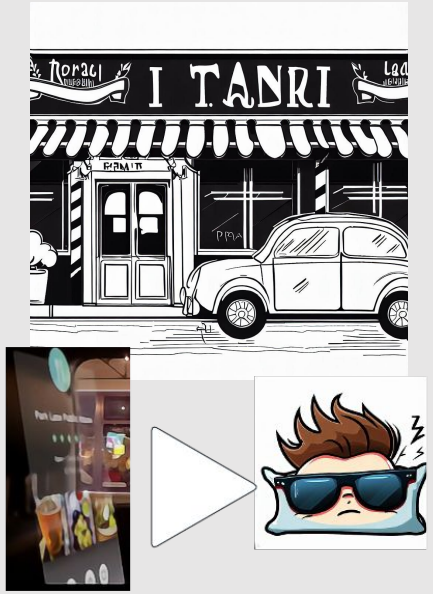


Avatar-based Communication

Outline:

- System enablers for xR
- Overall Requirements for Rel-19 Content

MR



Contextual based (AI) Information (e.g, Menu, best dishes, etc)

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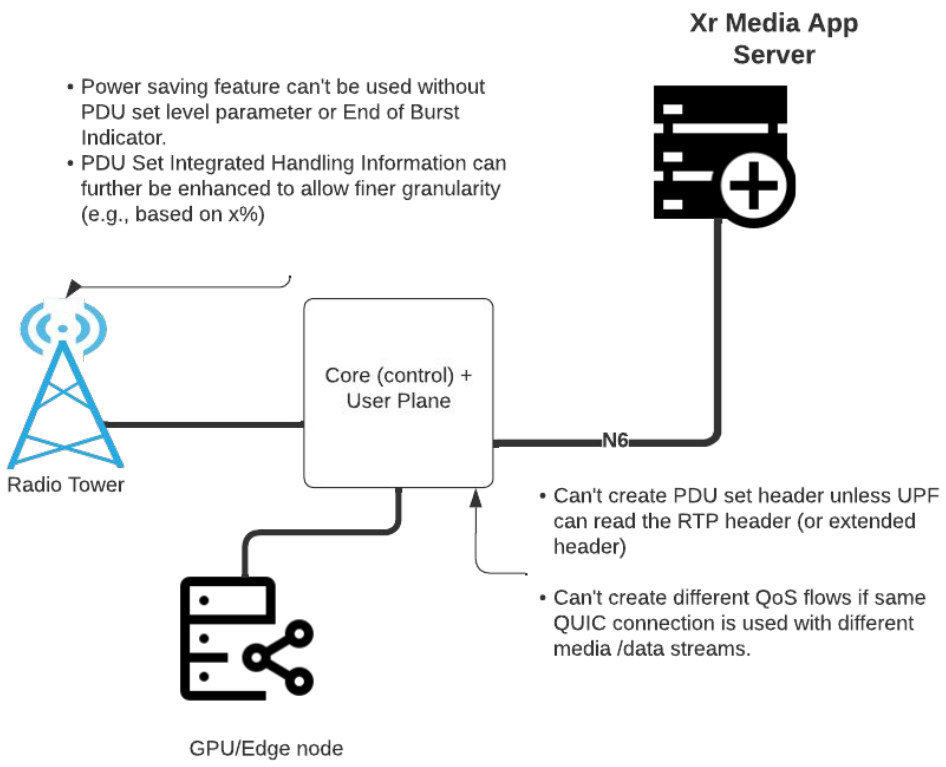
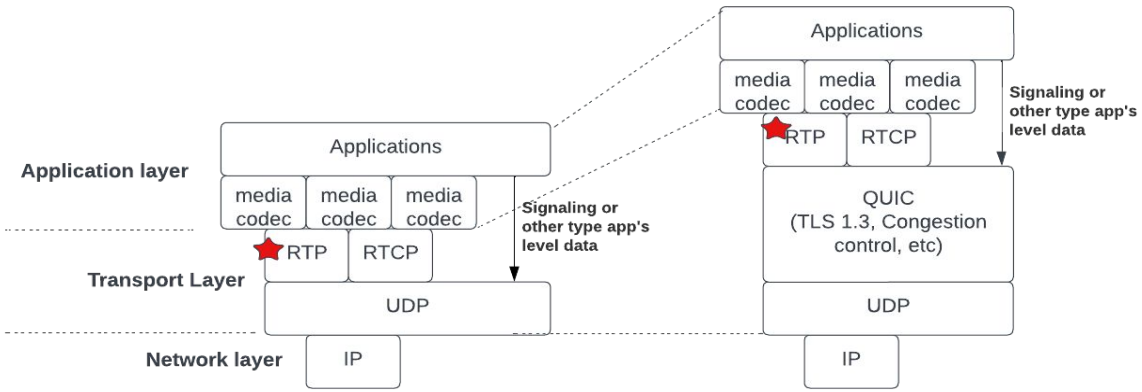
System enablers for xR: General Improvements needed from R18

- PDU set feature from R18 and 5G QoS need to be improved to allow Layer-4 transport with native encryption (e.g, QUIC).
- PDU Set Integrated Handling Information can be further enhanced with finer granularity (e.g., x%)





Information related to PDU set parameterization at the UPF level

PDU set information - including PDU set sequence number, PDU set boundary indication, PDU sequence number within a PDU set, PDU set size, and PDU set importance

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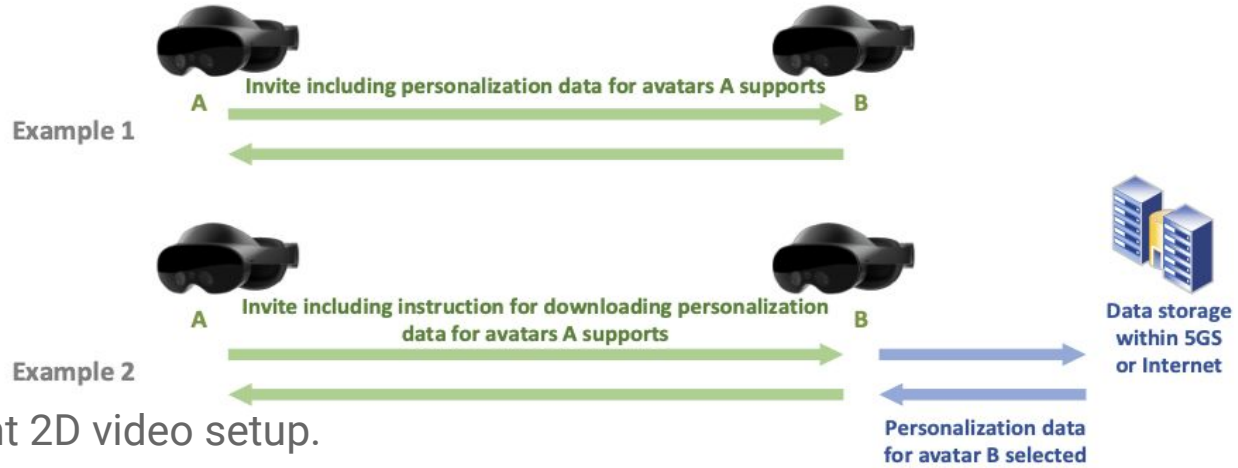
System enablers for xR: Additional enhancements needed for 5GA

1. A notable difference of avatar-based communication is the need for configuring avatar decoder at far-end (receiver) by sending personalization data of sender. This may require new procedures for handling avatar's related payloads.



2. Session Setup time should be comparable to current 2D video setup.
   - Initial set of personalized identity and expression data is expected to be bursty for configuring avatar decoder at the far-end. Avoiding additional setup delay is important for good QoE.
3. QoS improvements for bursty UL and DL data rates (e.g, contextual AI use case, MR/Avatar with split compute for offload rendering).

- **Using GBR/Delay-critical GBR resource type is an overkill** for "occasional" data burst traffic. We believe commercial success using non-GBR resource type is needed but this non-GBR for AR/AI usage needs to have higher priority from RAN's scheduling perspective to achieve better QoE. How this is to be done at a system level is TBD - SA2.

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System enablers for xR: Additional enhancements needed for 5GA

4. Privacy and Security of personalized identity and expression data can't be reused by others (SA3+SA2).

- **Seeing is no-longer believing** unless the end-2-end networking system is trusted. 3GPP's user identity and subscription model should be reused/enhanced (somehow) such that the communication establishment between party-A and party-B is considered as "trusted" communication with the assertion that personalization data can't be reused by other party.

5. Avatar generation capturing requirements through smart phone e.g., RGB, depth sensor, etc. (SA4+SA2).

- **UE's requirements** for avatar capturing/generation, encoding of sensor data capturing the facial expression, movement, and gestures of a person, transcoders from and to, etc for avatar representations. This **is important for driving the success of avatar communications service within 3GPP eco-systems** for both IMS and non-IMS applications, and to allow the interoperability between the two domains.

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Overall view on Rel-19 Content for xR enhancements

S.NO.	Title	Brief Description and Key Objectives	Related Stage-1 Study/Work Item	Lead Stage-2 WG	RAN dependencies	Other WG dependencies
1	Transport level improvements for xR	General transport level improvements for xR - Supporting Layer-4 encrypted protocols like RTP over QUIC with PDU set and QoS classifications. - non GBR based QoS enhancement for burst traffic (e.g., for contextual AI, etc). - Inter PDU/PDU sets dependency handling - More UE power saving features (supporting RAN requirements- FEC rate, xR awareness, C-DRX improvements, etc). - QoS/PDU set support for tethered UE use cases. - Network exposure to understand XR user experience. - AF to 5GS API (what other info can be provided to enhance xR media delivery to UE). - How to do split rendering as an option to minimize downlink heavy processing at the receiver.		SA2	YES	
2	Privacy and security consideration for avatar communications	Privacy and security considerations for IMS based and non-IMS based avatar communications. - How personalized data is secured and prevented from re-used for both IMS and non-IMS applications. - Digital identity authentication and Avatar identity vs. UE's identity (SUPI).	Metaverse Services	SA3	No	SA2 (for any architecture considerations due to SA3)
3	Avatar capturing, animation, and representation, and media codec requirements	UE enhancements needed for IMS and non-IMS based avatar communications. - UE's requirements for avatar capturing/generation, encoding of sensor data capturing the facial expression, movement, and gestures of a person, transcoders from and to avatar representations. - How media codec, session setup protocol with SIP, and personalization data, media transport requirements are done within 3GPP eco-systems, and to allow possibility to interwork between IMS and non-IMS based avatar communications (coordinate with SA2).	Metaverse Services	SA4	No	SA2. (for any architecture considerations due to SA4)
4	TBD	TBD				

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Backup

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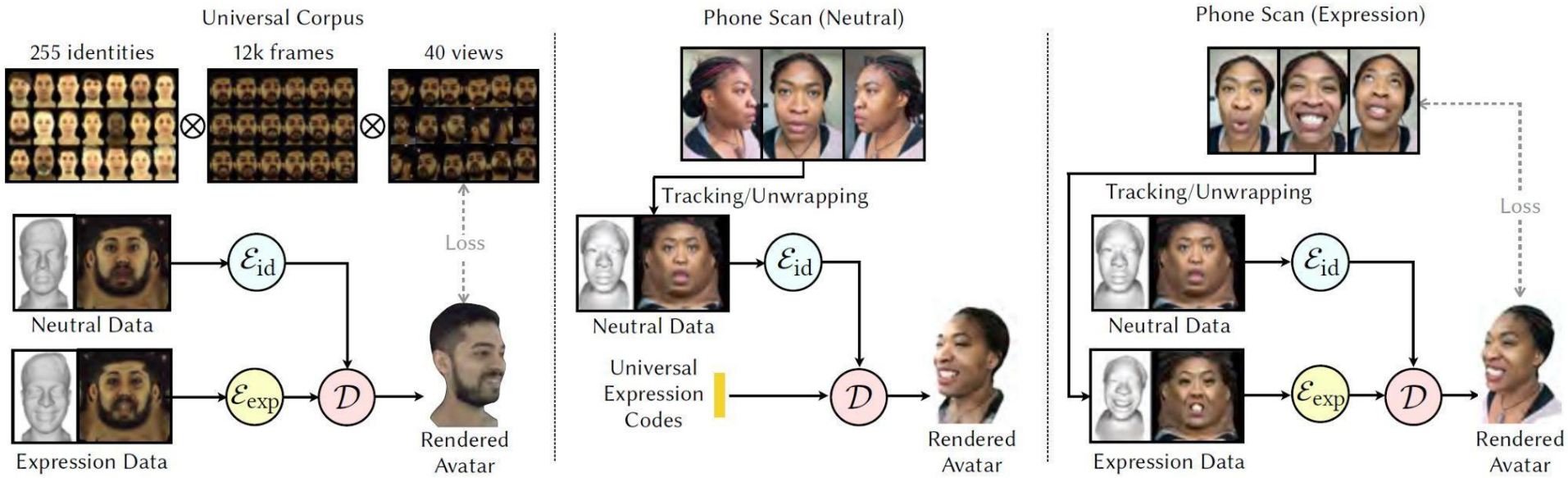
Nature of Personalization Data



(a) Universal Prior Model Training (Section 3.1-3.3) (b) Personalization to unseen identities (Section 3.4) (c) Further expression personalization (Section 3.5)

[ref: 1]

The amount of personalization data, which can be captured with smartphones, will increase as avatars become more realistic. If the data is not separable, the whole avatar decoder needs to be implemented as software and sent to far-end, which will increase power consumption, reduce quality, and also delay session negotiation. This **need for pre-loading user-trained data at the far-end before services may be required in other applications based on AI/ML**.

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