

New SID: Further enhancements for XR services FS_FEX

Qualcomm Incorporated

3GPP TSG-SA WG2 Meeting #145E
17 - 28 May 2021, Electronic meeting

Motivation

Why further enhancements for XR services?

Application awareness at 5GS/RAN

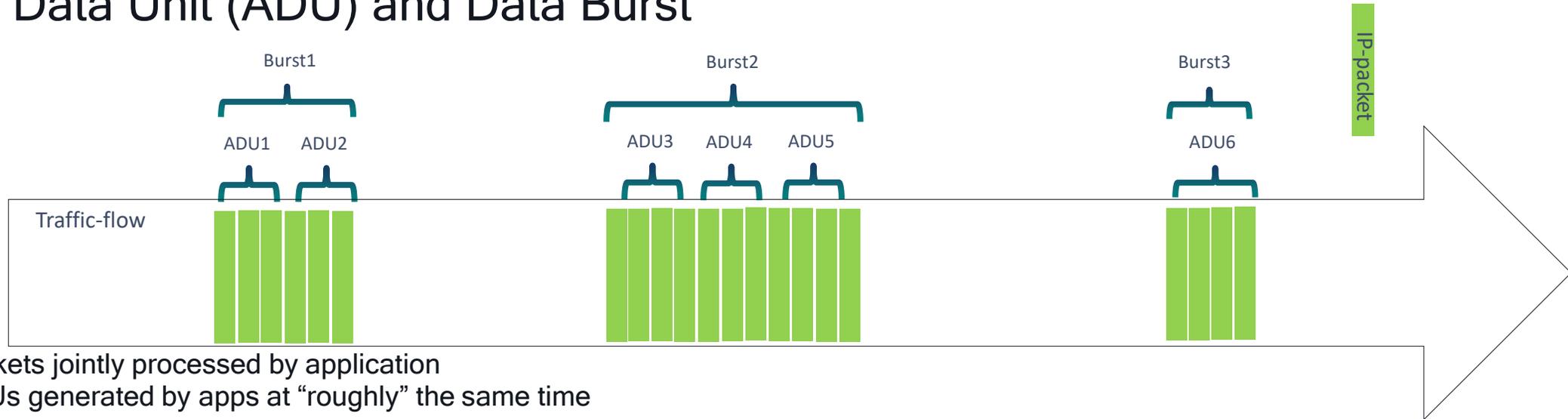
- XR and Cloud Gaming applications impose requirements on a per-unit of application data fashion (e.g., video frames, slices of frames, etc.), while currently 5GS QoS model packet based.
- Data burst awareness can enable RAN to increase power savings and realize form-factor XR and Cloud gaming devices.
- If RAN introduces them, application awareness may help RAN in selecting appropriate inter-frame aligned CDRX cycle value

RAN awareness at application

- Currently, application has limited knowledge of RAN achievable metrics.
 - This may lead to sub-optimal performance when large chunks of data are exchanged at very high bit rate.
- XR and Cloud Gaming applications can adapt for better user experience with awareness of RAN achievable metrics.

Application awareness at RAN

Application Data Unit (ADU) and Data Burst



ADU: Set of packets jointly processed by application

Burst: Set of ADUs generated by apps at “roughly” the same time

- Applications consume data in ADUs which are bigger than IP packets
 - E.g.: One video frame per burst, “slices” of a video frame per burst, etc.
- ADU aware communication systems can improve performance
 - Reliability → ADU error rate vs. packet error rate improves reliability
 - Power → ADU delivery in time continuous ON slots to maximize modem OFF time
 - Latency → Meet ADU delay budget instead of packet delay budget that is less meaningful to application
 - Capacity → Loss of information when ADU requirements translated into PER, PDB can result in lowered capacity
- Data burst awareness at 5G can lead to better device power management
 - End of burst information feeds into algorithms for sending device to sleep (CDRX off or Low-power Bandwidth Part)

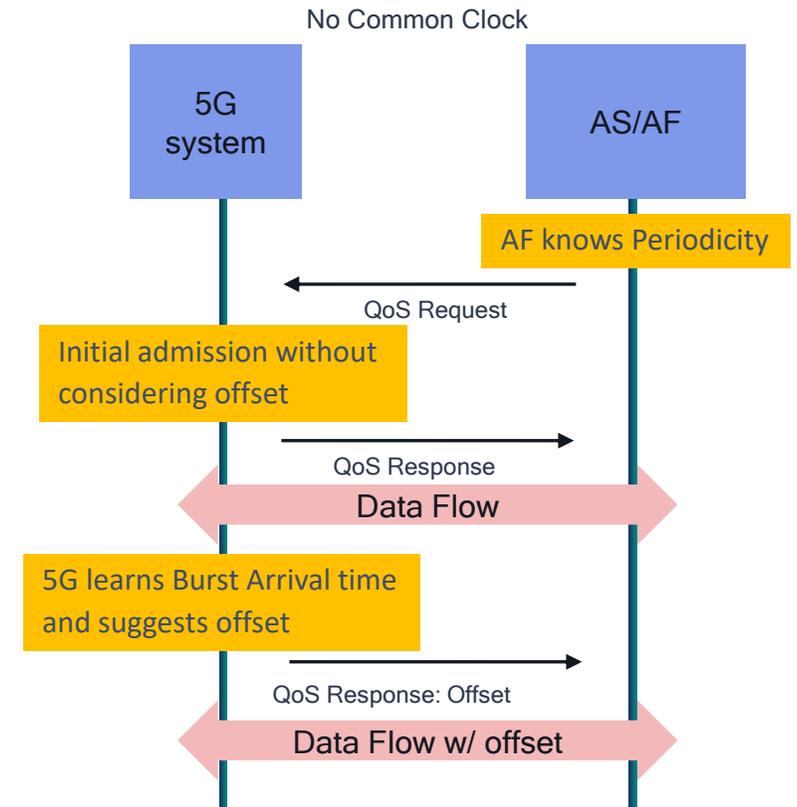
Application awareness at RAN

Application Data Unit (ADU) and Data Burst

- Potential enhancements
 - **Application Data Unit (ADU) based QoS**
 - Enabling signaling between AF and 5GS to identify ADU boundaries
 - ADU error rate (AER) and ADU delay budget (ADB)
 - Packet filtering enhancement at UPF for ADU awareness
 - Introduce **ADU content Policy** to QoS information.
 - Introduce **Application assisted RAN awareness** of Burst start/end

RAN awareness at Application

- **Expose RAN information to the Application** to enable codec adaptation
- **RAN reports** - RAN performance metrics including supported burst-rate and notification of temporary degradation
- **Burst timing offset** - Application awareness of RAN scheduling timing for traffic synchronization to better allocate resources





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