5G System interactions wrt QoS / Network Slicing

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3GPP QoS and Network Slicing

5G Architecture (Non-Roaming, Stand Alone)

- Relevant Stage 2 3GPP Specifications
  - TS 23.501 (Architecture)
  - TS 23.502 (Procedures)
  - TS 23.503 (Policy Control and Charging)

- User Plane
  - DN: Data Network, e.g. a server in an (Edge) Cloud
  - UPF: User Plane Function, the 5G System entry
  - UE: User Equipment, the other 5G System entry

- AF: Application Function – The API invoker
- PCF/ NEF: The API Provider
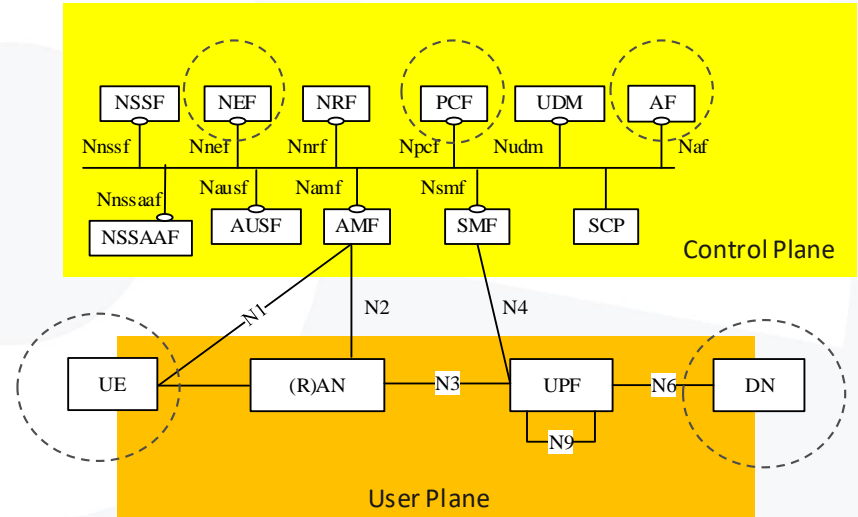
TS 23.501

3GPP QoS Model

- QOS rules: mapping "Service Data Flows" (packets) to QoS Flows
- PDR (Packet detection rule): mark and tread packets according to a matching rule
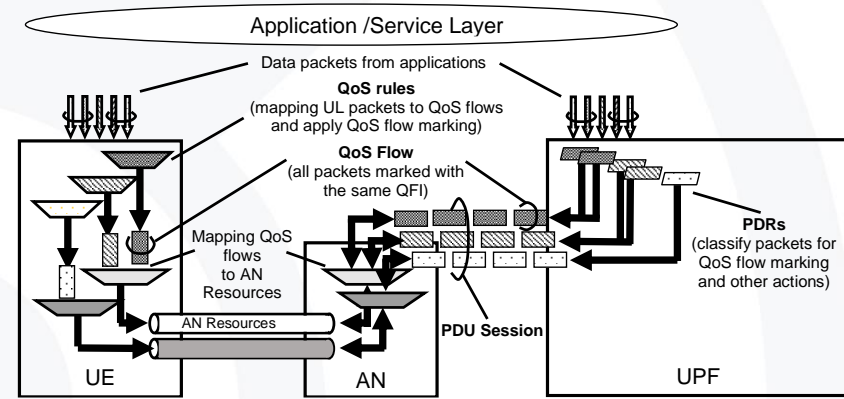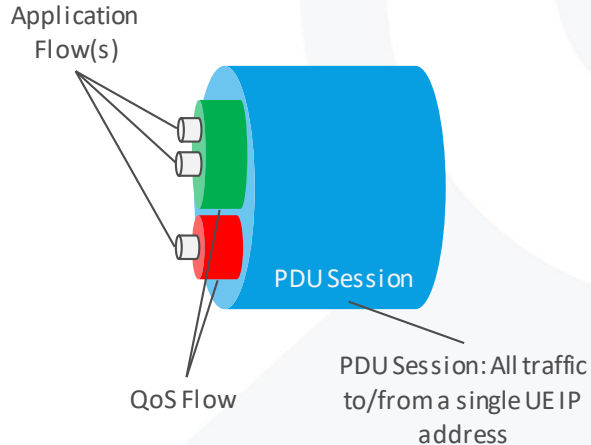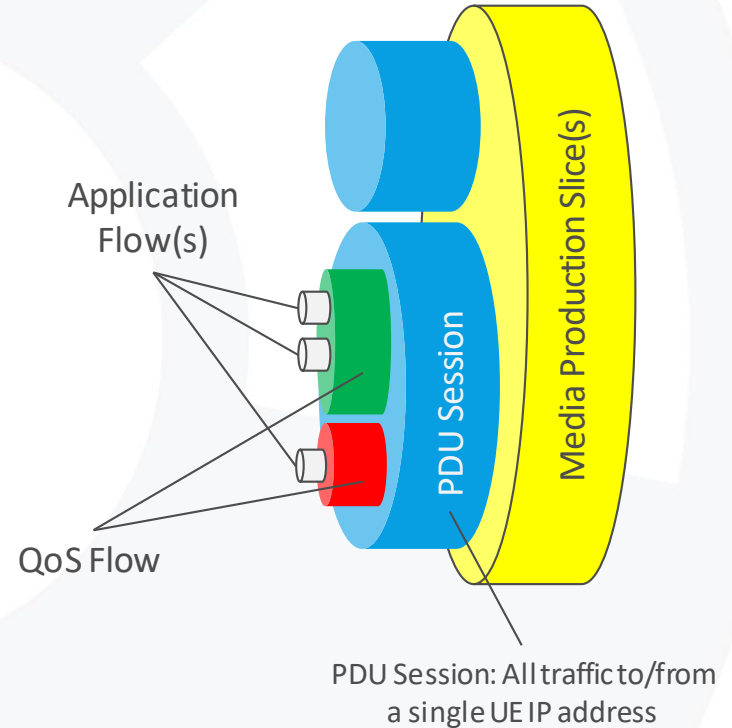- Two types of QoS Flow: GBR and Non-GBR

Application Flow(s)

QoS Flow

PDU Session

PDU Session: All traffic to/from a single UE IP address

Table 5.7.4-1: Standardized 5QI to QoS characteristics mapping

5QI Value	Resource Type	Default Priority Level	Packet Delay Budget (NOTE 3)	Packet Error Rate	Default Maximum Data Burst Volume (NOTE 2)	Default Averaging Window	Example Services
1	GBR (NOTE 1)	20	100 ms (NOTE 11, NOTE 13)	10^{-2}	N/A	2000 ms	Conversational Voice
2		40	150 ms (NOTE 11, NOTE 13)	10^{-3}	N/A	2000 ms	Conversational Video (Live Streaming)
3		30	50 ms (NOTE 11, NOTE 13)	10^{-3}	N/A	2000 ms	Real Time Gaming, V2X messages (see TS 23.287 [121]). Electricity distribution – medium voltage, Process automation monitoring
4		50	300 ms (NOTE 11, NOTE 13)	10^{-6}	N/A	2000 ms	Non-Conversational Video (Buffered Streaming)
65 (NOTE 9, NOTE 12)		7	75 ms (NOTE 7, NOTE 8)	10^{-2}	N/A	2000 ms	Mission Critical user plane Push To Talk voice (e.g., MCPTT)
66 (NOTE 12)		20	100 ms (NOTE 10, NOTE 13)	10^{-2}	N/A	2000 ms	Non-Mission-Critical user plane Push To Talk voice
67 (NOTE 12)		15	100 ms (NOTE 10, NOTE 13)	10^{-3}	N/A	2000 ms	Mission Critical Video user plane
75 (NOTE 14)							
71		56	150 ms (NOTE 11,	10^{-6}	N/A	2000 ms	"Live" Uplink Streaming (e.g.

3GPP QoS and Network Slicing

- QoS Model: Application Flow base separation and prioritization
  - Allows differentiation of traffic characteristics like priority, packet error rates (PER) or packet delay budgets (PDB)
  - Supports guaranteed bitrate (GBR) and non-GBR for application flows

- Network Slicing: Industry Vertical separation
  - Facilitates use-case differentiation and secures the necessary capacity and performance during high load to fulfill service-level agreements (SLA)
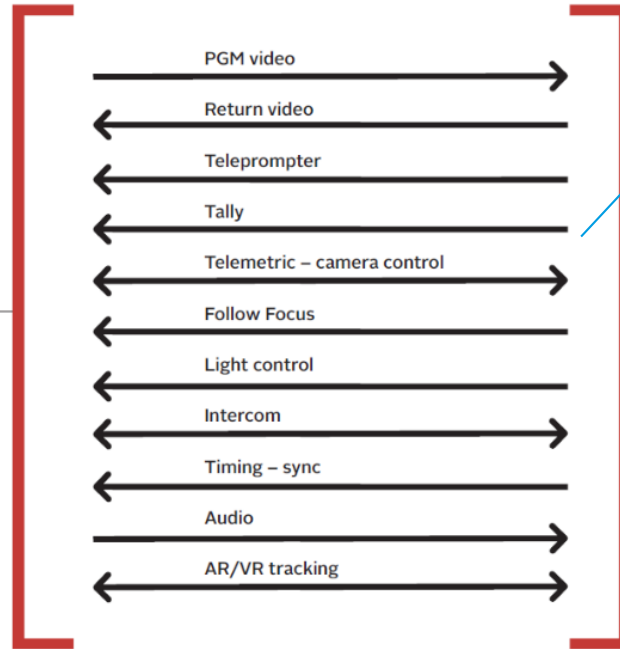

Application Flow(s)

Media Production Slice(s)

PDU Session

QoS Flow

PDU Session: All traffic to/from a single UE IP address

Applying to Media Production

One camera unit

Network Slicing: Provide capacity to one or more 5G Cameras

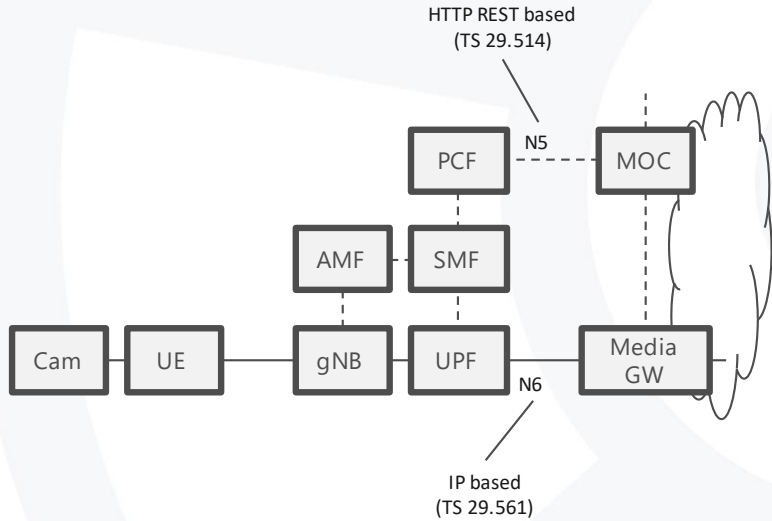QoS: Separate flows using the QoS framework within one / some Network Slices

PGM video

Return video

Teleprompter

Tally

Telemetric – camera control

Follow Focus

Light control

Intercom

Timing – sync

Audio

AR/VR tracking

5G

Applying to 5G RECORDS

OCG (now MOC) acts as AF towards 5G System
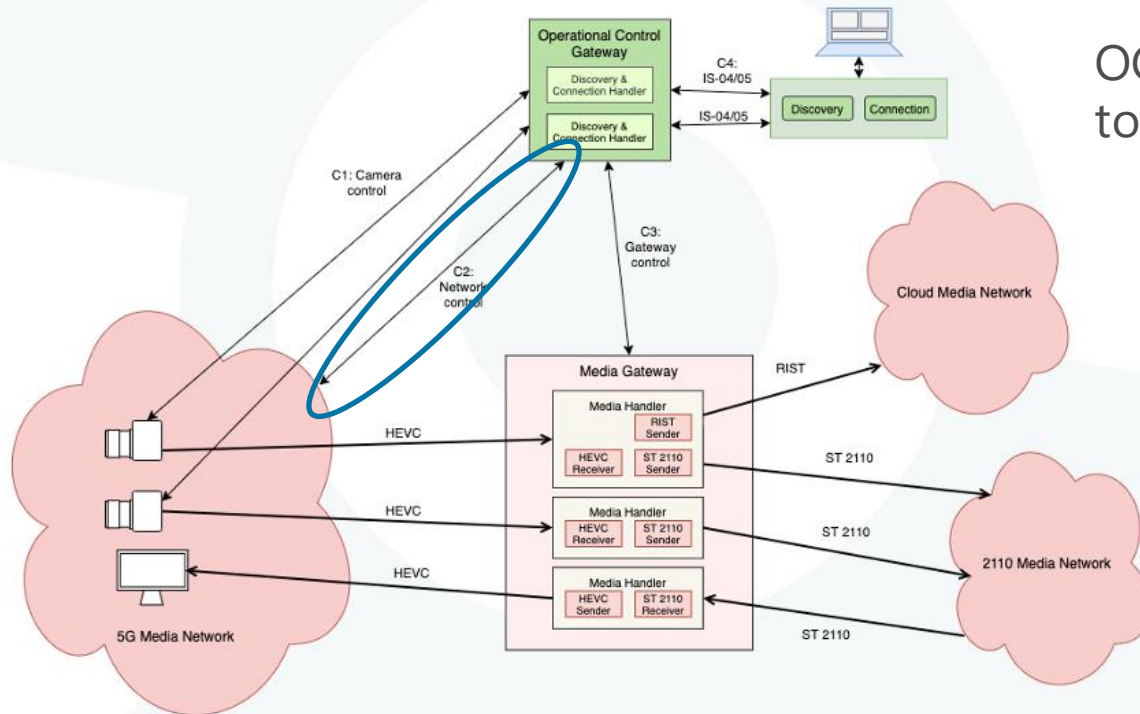
Applying to 5G RECORDS
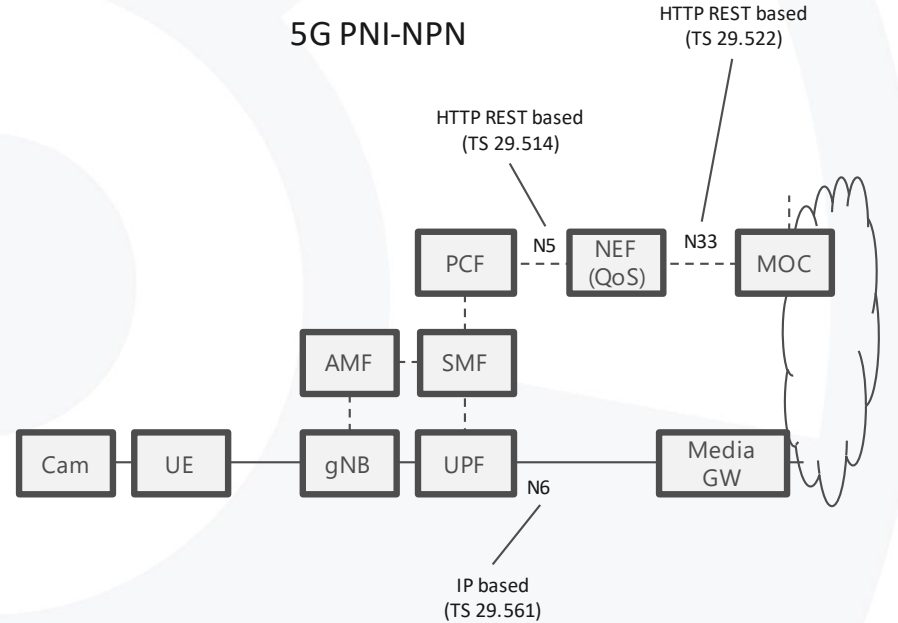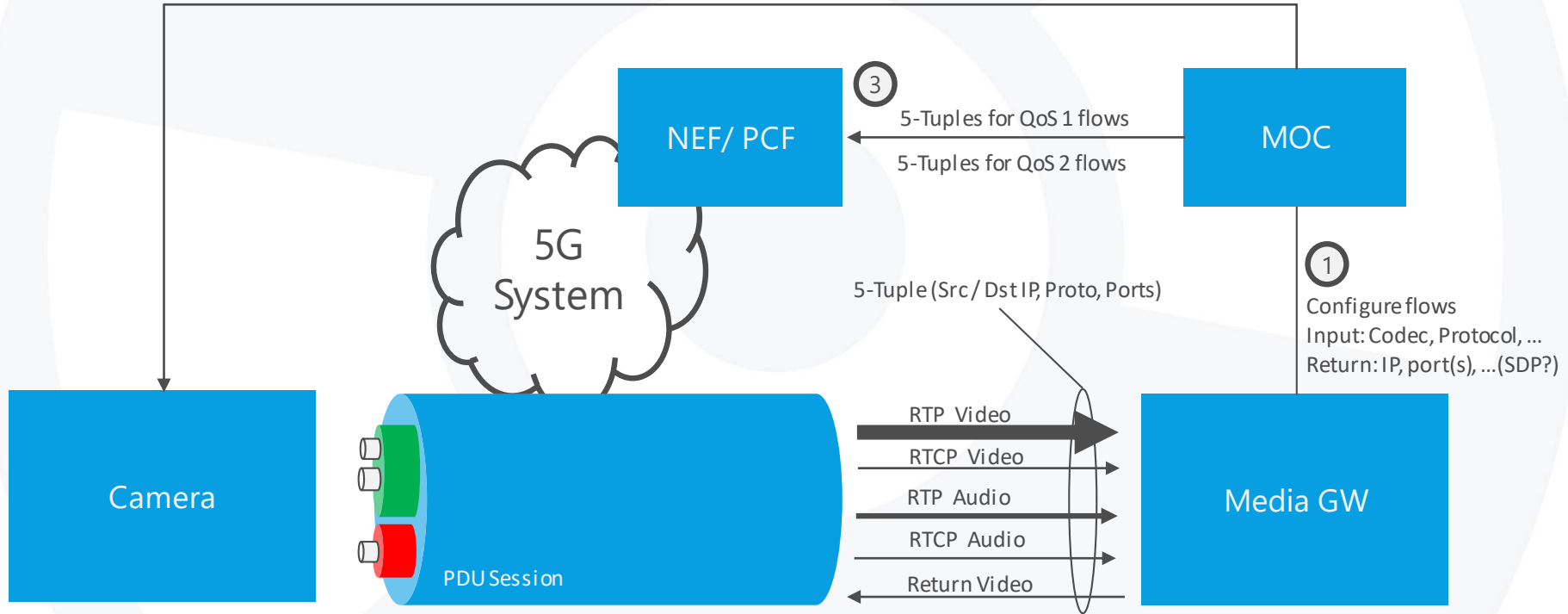
Simplified view

Configure flows (IS-05 like):
Input: Media GW IP Addr & port, protocol, codec, etc, e.g. in form of an SDP
Return: Camera Source IP & Ports per flow,

NEF/ PCF

③

5-Tuples for QoS 1 flows

5-Tuples for QoS 2 flows

MOC

5G System

5-Tuple (Src / Dst IP, Proto, Ports)

①

Configure flows
Input: Codec, Protocol, …
Return: IP, port(s), …(SDP?)

Camera

PDU Session

RTP Video

RTCP Video

RTP Audio

RTCP Audio

Return Video

Media GW

Example.

Thank you

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