



Definition of Quality, Priority and Pre-emption (QPP)

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Critical communications for all professional users



Importance of QPP across network deployments

QPP mechanisms enable networks to offer mission-critical services, inc. comprehensive control of network resources, ensuring performance of critical applications. QPP is used to ensure the end-to-end KPIs defined for MCX Services are met.

Enhanced User Needs

- Guaranteed bit rate
- High speed throughput
- Priority service

mission-critical service

Resources challenges

- Finite network resources, inc. air interface resources
- Limited backhaul
- Managing congestion

Quality of service

Represents the overall service performance. Measurements include latency, jitter, packet loss, throughput and availability.

Priority

Network capability which enables a user's service to take precedence over another user's service.

Pre-emption

Network capability that permits taking over resources from other services.

- Efficient use of network/radio resources
- Ensure MC users service availability and performance
- Compliance with regulation



Functions required for Static/Dynamic QPP capability

Quality of Service

Default/ Dedicated Bearers

- Default bearers (one per 4G UE PDN Connection) or flows (one per 5G UE PDU Session) setup on Attach provides basic connectivity.
- Dedicated bearers or flows for specific QoS requirements.

GBR/ Non-GBR MBR UE AMBR

- Resource allocation/modification strategy for providing GBR / dynamically allocated non-GBR resources; GBR has an associated bit rate value.
- Maximum Bit Rate provided to the bearer/flow.
- UE AMBR: the system limits flows to ensure that the total bit rate of a group of SDFs does not exceed AMBR.

QCI/5QI

- Labels for QoS parameters in relation to a set of 4G bearers or 5G flows. 3GPP has standardized several QCI/5QIs for frequently used services.

QCI/5QI Priority

- Scheduling priority used for differentiating packet forwarding treatment between services with different QCI/5QIs (or explicit QoS priority levels).

Packet Delay Budget

- The PDB defines an upper bound for the time that a packet may be delayed between the UE and the Core network.

Packet Error Rate

- The PER defines an upper bound for a rate of non-congestion related packet losses.

Priority (Admission control)

Allocation/ Retention Priority

- The range of the ARP priority level is 1 to 15; 1 being the highest priority.

Pre-emption

Pre-emption Capability/ Vulnerability

- The ARP priority together with the PCI and PVI flags determines whether a bearer/flow may be pre-empted by another.

Complementary priority mechanisms

Application Priority

MCX Priority

- The MCX service may prioritize between services, calls and users at the application layer.

Access Priority

Access Barring

- Under high network load conditions, the network may protect itself against overload by using Access Control functionality like ACB(4G) or UAC(5G).

Acronym Definitions

5GS 5G System

5QI 5G QoS Identifier

ACB Access Class Barring

(A)MBR (Aggregated) Maximum Bit Rate

ARP Allocation/Retention Priority

EPS Evolved Packet System (4G)

GBR Guaranteed Bit Rate

MCX Mission Critical service – PTT, Video or Data

PCI Pre-emption Capability

PDB Packet Delay Budget

PDN Packet Data Network

PDU Packet Data Unit

PER Packet Error Rate

PVI Pre-emption Vulnerability

QCI QoS Class Identifier

SDF Service Data Flow

UAC Unified Access Control

UE User Equipment