

QCI 80 Support on UPF

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Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	5G-UPF
Applicable Platform(s)	VPC-SI SMI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	*UCC 5G UPF Configuration and Administration Guide*

Revision History

Table 2: Revision History

Revision Details	Release
First introduced.	2022.01.1

Feature Description

The 5G-UPF supports new standard QoS Class Index (QCI) 80 based on 3GPP TS 23.203, for establishing a non-GBR QoS flow when an application sends traffic to the specific destination.

How it Works

Dynamic QoS Flow Establishment based on Detected Traffic

To establish a dynamic QoS flow when traffic is detected, UPF uses the Application Detection and Control (ADC) over Gx feature.

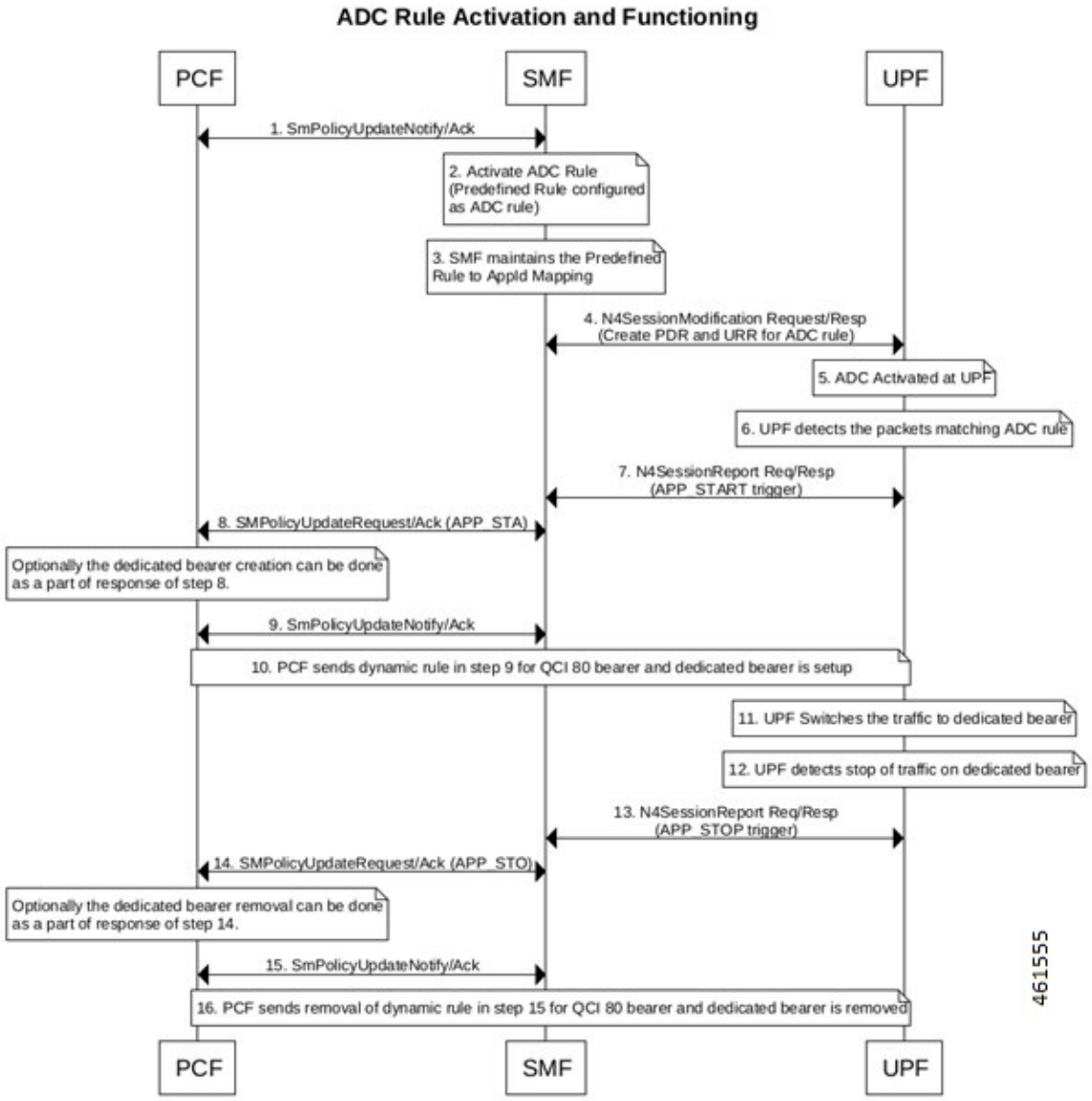
On receiving a PCC predefined rule over default 5G QoS Identifier (5QI) for application detection and control, the SMF instructs the UPF to detect application traffic. The UPF installs the Gx ADC PDR with default QFI, and the rule name is considered as Application ID for reporting to the SMF.

On detecting a new flow hitting the Gx ADC predefined rule, the UPF triggers an Application Start event. When the application traffic is identified by an application identifier, the SMF reports the start of application to the PCF.

The PCF then makes policy decisions based on the information received and sends the corresponding updated PCC rules (with QCI-80) to the SMF.

Call Flow

The following figure shows the call flow details and the message exchanges in a 5G core system.



Step	Description
1	The PCF sends SmPolicyUpdateNotify to SMF, and receives an acknowledgment.
2	SMF activates the ADC rule (Predefined rule).
3	SMF maintains the predefined rule for Application ID mapping.
4	SMF sends the N4 Session Modification Request to UPF, and receives a response from UPF.
5	ADC is activated at the UPF.
6	UPF detects the packets matching ADC rule.

Step	Description
7	UPF sends the N4SessionUpdate request to the SMF, and receives a response from the SMF. UPF triggers Application Start.
8	SMF sends the SmPolicyUpdate Request to PCF, and receives an acknowledgment from the PCF. Optionally, the dedicated bearer is created as part of response.
9	PCF sends SmPolicyUpdateNotify to SMF, and receives an acknowledgment from SMF.
10	PCF sends dynamic rule for QCI 80 bearer, and a dedicated bearer is setup.
11	UPF switches the traffic to dedicated bearer.
12	UPF detects stop of traffic on dedicated bearer.
13	UPF sends the N4SessionUpdate request to the SMF, and receives a response from the SMF. UPF triggers Application Stop.
14	SMF sends the SmPolicyUpdate Request to PCF, and receives an acknowledgment from the PCF. Optionally, the dedicated bearer is removed as part of response.
15	PCF sends SmPolicyUpdateNotify to SMF, and receives an acknowledgment from SMF.
16	PCF sends removal of dynamic rule for QCI 80 bearer, and the dedicated bearer is removed.

Limitations

The following is the known limitation to this feature in this release:

- Gx ADC predefined rule is installed only with default bearer 5QI.

Configuring ADC Rule

To support activation of predefined ADC rules, you must configure the ADC rule in SMF with appropriate action priority, and **adc** keyword. The following is a sample configuration:

```
active-charging service service_name
    rulebase rulebase_name
          action priority action_priority dynamic-only adc ruledef ruledef_name
 charging-action charging_action_name
    exit
ruledef ruledef_name
   ip server-ip-address ipv4/ipv6_address/mask
   ip server-ip-address ipv4/ipv6_address/mask
   exit
exit
```

To mute the reporting, use the following CLI command under rulebase configuration:

action priority *action_priority* **dynamic-only adc mute ruledef** *ruledef_name* **charging-action** *charging_action_name*

To optimize the application reporting once per application, use the following CLI command under rulebase configuration:

adc app-notification once-per-app

To optimize the application reporting once per application per flow, use the following CLI command under rulebase configuration:

adc app-notification once-per-ipflow

NOTES:

- **rulebase** *rulebase_name*: Enables the Active Charging Service Rulebase configuration
- **action priority** *action_priority*: Assigns priority to a ruledef in the rulebase. Priority must be a unique integer value ranging 1–65535.
- **dynamic-only**: Enables matching of dynamic rules with static rules for this action priority on a flow.
- **adc**: Specifies the ruledef to-be given as ADC rule.
- **ruledef** *ruledef_name* : Adds the specified ruledef to the current rulebase.
- **charging-action** *charging_action_name*: Specifies the charging action.
- **description** *description*: Adds specified text to the rule and action.
- **ip server-ip-address** *ipv4/ipv6_address/mask*: Specifies the server IP address with subnet mask bit. For uplink packets (subscriber to network), this field matches the destination IP address in the IP header. For downlink packets (network to subscriber), this field matches the source IP address in the IP header.
- **once-per-app**: Notifies APP_START or APP_STOP notification once per App ID.

  Whenever traffic for an application is detected, the UPF sends APP-START notification to the SMF with an Application Instance Identifier as the Flow-Id of the first data flow of an application.This application instance Id gets cached in the User Plane.When the last data flow of an application is terminated, the cached application instance Id is sent in APP-STOP notification so that PCF can better correlate APP-START and APP-STOP.
- **once-per-ipflow**: Notifies APP_START or APP_STOP notifications per App ID per IP flow.

Monitoring and Troubleshooting

This section provides information on CLI commands that are available for monitoring and troubleshooting the feature.

Show Commands to Display PDR and URR

Use the following command on UPF to display the PDR for which ADC is enabled:

show subscribers user-plane-only callid *callid_value* **pdr full all**

Use the following command on UPF to display the URR for which ADC is enabled:

show subscribers user-plane-only callid *callid_value* **urr full all**

Show Commands to Display ADC Statistics

Use the following command on UPF to display the ADC statistics:

show subscribers user-plane-only callid *callid_value* **adc statistics**