

# Time-Based Rule Activation and Deactivation


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## Feature Summary and Revision History

### Summary Data

| | |
|---|---|
| Applicable Product(s) or Functional Area | P-GW |
| Applicable Platform(s) | ASR 5500 |
| Default Setting | Disabled - Configuration Required |
| Related Changes in This Release | Not Applicable |
| Related Documentation | Not Applicable |

### Revision History

| Revision Details | Release |
|---|---|
| With this release, Time-Based Rule Activation and Deactivation feature is supported. | 21.10 |
| First introduced. | Pre 21.2 |

## Feature Description

The 3GPP specification 29.212 allows Policy and Charging Rules Function (PCRF) to send a Policy and Charging Control (PCC) rule, along with Network Time Protocol (NTP) time, at which the rule is activated through Rule-Activation-Time AVP. In earlier releases, StarOS installed the PCC rule when the PCC rule

was received with Rule-Activation-Time. StarOS also created a dedicated bearer, if required, to reserve the network resources. This approach led to the wastage of the network resources and their unavailability in several scenarios, such as:

- When Policy and Charging Rules Function (PCRF) sent a PCC rule.
- When a PCC rule has the Rule-Deactivation-Time AVP, the rule remained installed even after the rule deactivation time completed.

To elimate the wastage of network resources and utilize them as required, the Time-Based Rule Activation and Deactivation feature is developed. With this feature:

- You can install time-based PCC rules after Rule-Activation-Time.
- You can remove time-based PCC rules after Rule-Activation-Time.
- Predefined and dynamic rule maintain their existing behavior.
- Session Recovery and ICSR are supported.

# How It Works

The following section provides an overview of the time-based PCC rule activation and deactivation feature.

## Architecture

To configure time-based PCC rule activation and deactivation, StarOS saves these rules separately till the rule activation time. When the rules are activated, they are processed and installed as PCC rules. A dedicated bearer is created, if required. The deactivated PCC rules are removed to generate a request to update or delete a bearer.



**Note** This feature is CLI-controlled to maintain backward compatibility.

### Rule Modification Scenarios

When a PCC rule is available with Rule-Activation-Time, StarOS verifies if this feature is enabled or disabled. If the feature is enabled, StarOS does not install the PCC rule immediately. When the Rule-Activation-Time times out, the PCC rule is installed.

Following are some of the rule modification scenarios and the StarOS behaviour in these scenarios:

- If PCRF modifies the rule, for which the timer is running, then StarOS stops the existing timer and starts a new timer by using Rule-Activation-Time.
- If the rule modification does not include Rule-Activation-Time AVP, then StarOS installs the rule immediately. In this scenario, Rule-Activation-Time is not carried forward.
- During the rule modification of time-based rules, parameters of the rules are not merged. It implies that only the parameters that are received in the latest definition are applied.

For example, a time-based rule is received with definition rating-group as 500, charging-id as 10 and Rule-Activation-Time as T1. After some time (before T1), the rule is modified with a new definition of rating-group as 400 and Rule-Activation-Time as T2, then after T2, the rule is installed with parameters rating-group as 400. Here the charging-id is not received for T2 and parameters rating-group has no charging-id.

## Default Bearer QoS Change

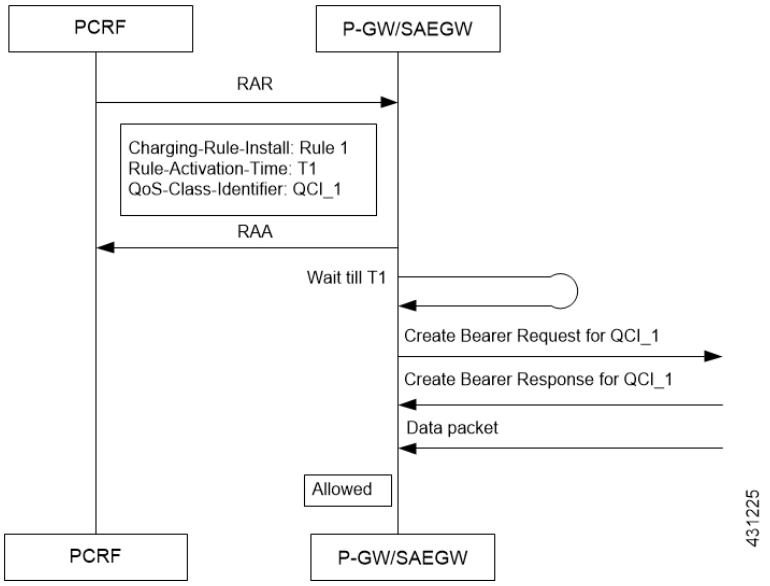
A subscriber has default bearer QoS as QCI_8. PCRF sends the Rule1 rule with QCI_5 and Rule-Activation-Time as T1. Before T1 expires, the default bearer QoS is changed to QCI_5. After T1 expires, the Update Bearer Request is sent on the default bearer to install the Rule1 rule.

# Call Flows

Following call flows show the handling of Rule-Activation-Time and Rule-Deactivation-Time.

## Rule-Activation Time Configuration

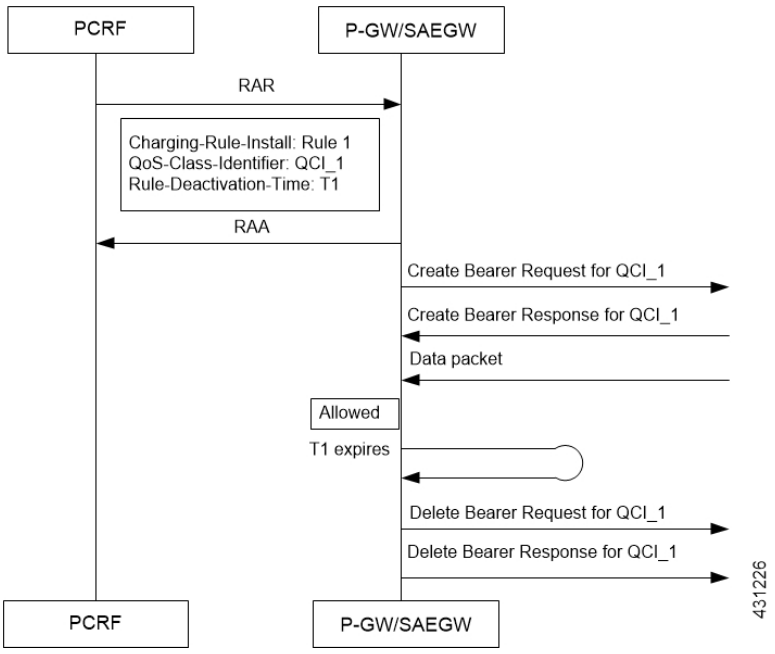
Following call flow shows the handling of Rule-Activation-Time:




In this call flow, no bearer is available with QCI_1 QoS-Class-Identifier. If a bearer with QCI_1 is available, then Update Bearer Request is expected after the T1 timer expires.

## Rule-Deactivation Time Configuration

Following call flow shows the handling of Rule-Deactivation-Time:




In this call flow, the bearer with QCI_1 QoS-Class-Identifier has only one rule, which is Rule 1. In case of multiple rules on the bearer, an Update Bearer Request is expected after the T1 timer expires.

# Configuring Time-Based Rule Activation and Deactivation

This section provides information on the configuration of CLI command to activate and deactive a time-based PCC rule.

## Configuring Time-Based PCC Rule

Use the following configuration commands to configure time-based PCC rule.

```
configure
   require active-charging
   [ default | no ] policy-control time-based-pcc-rule
install-on-activation-time remove-on-deactivation-time
     end
```

Notes:

- **default**: Resets the command to it its default setting—Disabled.
- **no**: Disables the time-based activation or deactivation of a PCC rule.
- **policy-control**: Configures the ACS Policy Control.
- **time-based-pcc-rule**: Configures the PCC rule with activation or deactivation time.
- **install-on-activation-time**: Installs the PCC rule only on activation time.
- **remove-on-deactivation-time**: Removes the PCC rule on the deactivation time.

# Monitoring and Troubleshooting

## Show Command(s) and/or Outputs

This section provides information about show commands and the fields that are introduced in support of time-based PCC rule activation and deactivation.

### show active-charging sessions full callid *callid*

The output of this show command has been modified to display the following fields for Time Based PCC Rule:

- Installs Deferred
- Total Time Based Pending PCC Rules

### show active-charging service statistics

The output of this show command has been modified to display the following fields:

- Time Based PCC Rule Statistics
  - Dynamic Rule
    - Activation-Time Received
    - Deactivation-Time Received
    - Removed received before Activation
    - Removed due to Deactivation
  - Predefined Rule
    - Activation-Time Received
    - Deactivation-Time Received
    - Removed received before Activation
    - Removed due to Deactivation

### show active-charging subscribers callid *callid* pending-pcc-rules

The output of this show command has been modified to display the following fields:

- CALLID
- Dynamic Charging Rule Definition(s) Configured
  - Name
  - Prior

    - Content-Id
    - Chrg-Type
    - Rule Parameters

- Status
- Service Identifier
- QoS Class Identifier
- ARP Priority Level
- Reporting Level
- Metering Method
- Uplink MBR
- Downlink MBR
- Uplink GBR
- Downlink GBR
- Rule Activation Time
- Rule De-activation Time
- Filter 1
- Direction
- Protocol
- Dst Addr
- Filter 2
- Direction
- Protocol
- Src Addr
- Predefined Rules Enabled List