

ADC Over Gx

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Feature Description

In compliance with 3GPP TS 29.244 V15.0.0, ADC over Gx feature supports the following functionalities in CUPS environment:

- Application START/STOP event reporting at the instance level, over the Sx Interface, as part of the session usage report request.
- Application START/STOP is sent for Group of Ruledef when a flow matches the Group of Ruledef.
- Supports AND logic for rulelines while matching ADC ruledefs.
- Supports new Information Elements (IEs) for Packet Forwarding Control Protocol (PFCP) messages that are used for ADC application detection notifications.

Important In this release, the ADC Over Gx feature is applicable for ADC L3/L4 rules.

How It Works

For ADC over Gx feature in the CUPS environment, support is added for the following:

- The Application ID/TDF Application Identifier is part of the PDI of PDR, either in Sx Establishment Request or Sx Session Modify Request.
- Handling of the ADC rule match on U-Plane.
- When qci8 is removed and no policy-control update-default-Bearer is configured alongside a dynamic ADC rule-def, sessmgr rejects traffic if the Application ID remains unresolved during Create-PDR
- To generate a session usage report request when the Application START/STOP event occurs on U-Plane.

- New IEs as part of the Usage report request:
  - Application ID
  - Application Instance ID
  - Flow Information
- Monitor Protocol to decode the new IEs.
- To handle the usage report request that is received, and trigger the CCR-U to PCRF on C-Plane.

The functionality of ADC Over Gx feature consists of the following components, and each are described in this section.

ADC Rule Match

The ADC rule match is invoked after the traditional rule match. After the L3/L4 filters are being matched, the rule match engine checks for any ADC rules being configured on the bearer. If ADC rules are present, then the ADC rule match occurs.

If the bearer has ADC rule which does not have the L3/L4 filters, and it's a non-GBR bearer, then the ADC rule match is done across all the non-GBR bearers. The charging is done against the charging and action policy of the rule match.

For ADC dynamic rules, if the L3/L4 filter matches but the ADC rule match fails, then the rule is considered as not matched.

Session Usage Report Request Generation

Once the ADC rule matches on the U-Plane and an application has been detected, the U-Plane triggers the Application START notification over the Sx interface as a session usage report:

- With the measurement method set to Event
- Usage Report Trigger set to "Start of Traffic"
- The Application Detection Info, such as Application ID, Application Instance ID, and Application Flow Information along with the direction.

When the application teardown gracefully, the application gets timed out, or the rule match changes, the application STOP is triggered from U-Plane to C-Plane as a session usage report:

- With the measurement method set to "Event"
- Usage Report Trigger set to "Stop of Traffic"
- Application ID
- Application Instance ID

The application STOP is not triggered when:

- "mute" is enabled.
- The call is going down.
- The rule/PDR is deleted.

- The bearer/tunnel deletion occurs.

Handling Session Usage Report on C-Plane

After receiving the session usage report on C-Plane, it detects the event and CCR-U is triggered toward PCRF, along with the required attributes to be sent.

Dynamic HTPP Redirect

Redirection rules and actions that are received over Gx are part of RAR and CCA-U messages in a dynamic rule. CUPS supports redirection rules and actions to be conveyed from C-Plane to U-Plane and applied to U-Plane. The following fields are translated and sent to U-Plane and U-Plane redirects accordingly:

```
[V] Redirect-Information:
   [V] Redirect-Support:
   [M] Redirect-Address-Type:
   [M] Redirect-Server-Address:
```

In C-Plane:

- FAR, associated with PDR, is populated to support "Redirect-Information" AVP in ADC dynamic rule over Gx.
- PDR and FAR are sent with the "Redirect Information" IE to U-Plane in:
  - Sx Session Establishment Request in case "Redirect-Information" AVP is received in an ADC dynamic rule over Gx in CCA-I from PCRF.
  - Sx Session Modification Request in case "Redirect-Information" AVP is received in an ADC dynamic rule over Gx in CCA-U from PCRF.
  - Sx Session Modification Request in case "Redirect-Information" AVP is received in an ADC dynamic rule over Gx in RAR from PCRF.
- Support is added for removal of ADC dynamic rule.

In U-Plane:

- ADC dynamic rule for the subscriber is installed.
- The packet is redirected if ADC dynamic rule is matched.

Limitations

Following are the known limitations of the ADC Over Gx feature:

- When the TDF Application Identifier on the U-Plane and the "**policy-control bypass TDF-ID-validation** CLI command are not present, the calls are dropped. And, the proper disconnect reason is not being shown.
- The configuration change for predefined ADC rules, such as "mute" to "unmute" and "unmute" to "mute" scenarios are not supported in this release.
- Mid-session update and/or modification of ADC rules—whether change in configuration or PDN update over RAR, is not supported.
- ADC is supported for L3/L4 rules on default bearer.

- ADC over Gx for HTTP Redirect is not qualified for Dedicated bearers.

Licensing

ADC over Gx feature requires Application Detection Control License. Contact your Cisco account representative for detailed information on specific licensing requirements.

Configuring ADC over Gx

The CLI commands available for ADC Over Gx in non-CUPS environment can be used in CUPS environment.

Following are the sample configurations to:

- Enable the feature under Policy Control Configuration mode:

```
diameter encode-supported-features adc-rules
```

- Configure ADC predefined rule under ACS Rulebase Configuration mode:

```
action priority 55 dynamic-only adc ruledef qci5 charging-action charge-action-qci5
action priority 56 dynamic-only adc mute group-of-ruledefs qci5_gor charging-action
charge-action-qci5
```

Important Application START/STOP will not be sent to PCRF if the Application START/STOP event trigger is not registered while enabling the ADC Over Gx feature.

Important For additional information about the CLI commands, refer the *Command Line Interface Reference*.

Monitoring and Troubleshooting

This section describes the CLI commands available to monitor and/or troubleshoot the feature.

Monitor Protocol

When using the monitor protocol command, enable option 49 to see ADC related parameters in Sx messages.

Show Command(s) and/or Outputs

On C-Plane

show active-charging subscribers callid <callid> urr-info

The output of this show command has been modified to display the ADC URRs along with Volume and Duration related URRs.

On U-Plane

show subscribers user-plane-only full all

The output of this show command has been modified to display the “Number of associated ADC PDRs”.

show subscribers user-plane-only callid <callid> pdr full all

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

- TDF App Id
- TDF Notifications
- Total ADC PDRs found

show subscribers user-plane-only callid <callid> urr full all

The output of this show command has been modified to display the ADC URRs along with Volume and Duration related URRs.

show user-plane-service rulebase name <rulebase_name>

The output of this show command has been enhanced in support of this feature. Two new Type characters are introduced to identify ADC rules and ADC rules with “mute”:

- RDA – Where A is for ADC rule
- GDAM – Where AM is for ADC rule with “mute”

show sub user-plane-only full all

The output of this show command has been enhanced to display information about ADC PDRs and redirected flows:

- Flow Action Redirected Flows
- Number of associated ADC PDRs

show user-plane-service statistics all

The output of this show command has been enhanced to display the following new field under ADC Redirect Stats:

- ADC Redirected Flows